STANDARDS FOR MICROFICHE OF SOURCE DOCUMENTS

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1. GENERAL

1.01 This section covers the requirements for the production of 105 by 148-mm (4 by 6 inches) microfiche of source documents. It also covers the requirements for the equipment and materials needed to produce and use the microfiche. English equivalents of metric dimensions are approximate and are provided for reference purposes only.

1.02 Whenever this section is reissued, the reason for reissue will be listed in this paragraph.

1.03 Computer Output Microfilm (COM) Generated Microfiche (105 by 148 mm) is covered in Specification X-74302.

1.04 Production

(a) The production of microfiche for Bell System use requires that source documents be photographed with a precision microfilm camera on 105 mm silver film or 16 or 35 mm silver film which can be stripped up for use as a master from which a 105 mm intermediate microfiche can be made. The intermediate microfiche can then be used for producing user microfiche. (See Fig. 1.)

(b) Documents are reduced photographically so that the great majority of them can be accommodated on one frame of a microfiche. Large documents, which cannot be photographed completely on one frame of a microfiche, are photographed in sections.

(c) The exposed film is processed and then inspected in accordance with 7. to ensure that requirements have been met.

(d) Each microfiche may contain up to 98 negative microimages at a 24× reduction. An enlarged image of the miniaturized information can be read on a reader or on a print made from the microfiche. Each microfiche shall contain header information readable with the unaided eye. A microfiche may also contain a microimage of a frame index (not in the header area) to permit ready access to needed information.

(e) The dimensions specified for information areas, lettering, linework, and the camera reduction specified require a minimum 20.5× magnification to produce a character of sufficient height to assure legibility of reader images and prints made from the microfiche. Where an application requires prolonged viewing of microimages on a reader, the reader magnification should be such that the user will be viewing character sizes equivalent to those on the original document.

(f) Wherever feasible, to facilitate indexing on microfiche, any document which contains numerous categories should be arranged so that

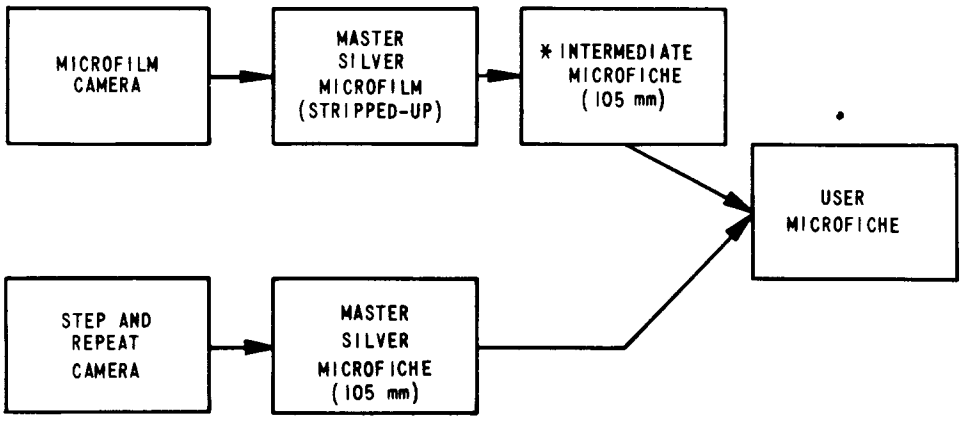


Fig. 1—Microfiche Production Methods

each distinct category starts on a separate document page.

(g) Microfiche produced by a commercial supplier should be inspected to ensure that all applicable requirements are met.

1.05 Use care in handling microfiche to avoid scratching or otherwise damaging the microfiche, particularly the emulsion surface.

1.06 Equipment and materials considered suitable for producing and using microfiche are covered in 3., 4., and 8.

1.07 The general plan for the production, distribution, and use of microfiche of source documents is covered in 6.

2. SOURCE DOCUMENTS

QUALITY

New Documents

2.01 Original documents intended for use in the production of microfiche shall meet the requirements specified below:

(a) ***Background Areas:*** The background area (area between and surrounding text, linework, and illustrations) shall be uniformly clean and free of stains, smudges, and other marks.

(b) ***Text:*** All text information shall be upright and right-reading. Lines and text shall be uniformly dark with sharply defined edges. Breaks in continuity of lines and text and smudged or double impressions will adversely affect the legibility of the microfiche image.

(c) ***Character Heights:*** The minimum character height shall be 1.78 mm (0.07 inch).

(d) ***Character Density:*** The maximum number of characters per 25.4 mm (1 inch) shall be 15.

(e) ***Character Lines:*** The maximum number of lines of characters per 25.4 mm (1 inch) shall be 8.

(f) ***Line Width:*** The minimum line width shall be 0.13 mm (0.005 inch).

(g) ***Line Spacing:*** The minimum spacing between lines shall be 1.27 mm (0.05 inch).

Existing Documents

2.02 Existing documents to be microfilmed for the production of microfiche, which do not meet the requirements for new documents specified in 2.01, are suitable for microfiche application provided the legibility requirement specified in 7.20 can be met.

(a) ***Character Heights:*** Documents which include characters smaller than the minimum specified (see 2.01) are suitable for microfiche applications provided such characters appear for illustrative purposes only and complete intelligence can otherwise be derived from the related text contained on the same page of the document.

INFORMATION AREAS

Single Frame

2.03 The maximum information area of a source document to appear within a single frame on the microfiche shall be 203.2 mm (8 inches) wide by 269.9 mm (10-5/8 inches) high.

Double Frame

2.04 The maximum information area of a source document to appear within a double frame on the microfiche shall be 406.4 mm (16 inches) wide by 269.9 mm (10-5/8 inches) high.

Multiframe

2.05 The information area of a source document which exceeds 406.4 mm (16 inches) in width or 269.9 mm (10-5/8 inches) in height shall be microfilmed in sections as covered in 5.09.

INDEXING DATA

2.06 If an index to the contents of a microfiche is provided, a frame index sheet should be prepared in accordance with the following requirements:

(a) ***Size:*** Information should be confined to an area 203.2 mm (8 inches) wide by 269.9 mm (10-5/8 inches) high, and all information shall read parallel to the short dimension of the sheet. (See Fig. 2.)

(b) ***Contents:*** Each index sheet should contain information such as the project or document title, the page numbers, the first item on each page, the first item of each distinct category on each page, and the microfiche frame within which each item appears on the microfiche. The index pages should be numbered and indicate the number of sheets in the set as follows: for a single sheet, 1 of 1; for a 3-sheet set, 1 of 3, 2 of 3, 3 of 3. (A sample index is shown in Fig. 2.)

(c) ***Location:*** When an index is provided, the index frame or frames should be recorded in their normal sequence as the last frame(s) of the microfiche, (lower right-hand corner). (See Fig. 3.)

CHECKING DIMENSIONS

2.07 All dimensions specified for source documents shall be checked with an accurate scale. Dimensions of less than 19.0 mm (0.75 inch) should be checked with the measuring magnifier listed in 7.02.

3. PRODUCTION MATERIAL

Microfiche

3.01 The film used for original microfiche shall be nonperforated, safety-type, silver film approved for use in the Bell System microfiche program. (See 8. for specifics.) The unexposed film shall have an average base plus fog density of maximum 0.10 measured in accordance with 7.13. All microimages on microfiche shall be negative (clear lines on a dark background).

3.02 Cut microfiche shall be 105 $+0 - 0.75$ by 148 $+0 -1.0$ mm (4 by 6 inches). (See 6.03.)

4. PRODUCTION EQUIPMENT—GENERAL

4.01 The equipment required for the production and reproduction of source document microfiche is as follows: (See 8. for specifics.)

(a) Cameras

(b) Duplicators

(c) Film Processors

(d) Readers, Reader-Printers, and Enlarger-Printers

(e) Strip-Up Devices

(f) Test Equipment

4.02 All production equipment should be approved for use in the Bell System and be capable of handling 105 mm film except where stripped up film of a lesser width is used, eg, 16 mm. The installation, operation, and maintenance instructions

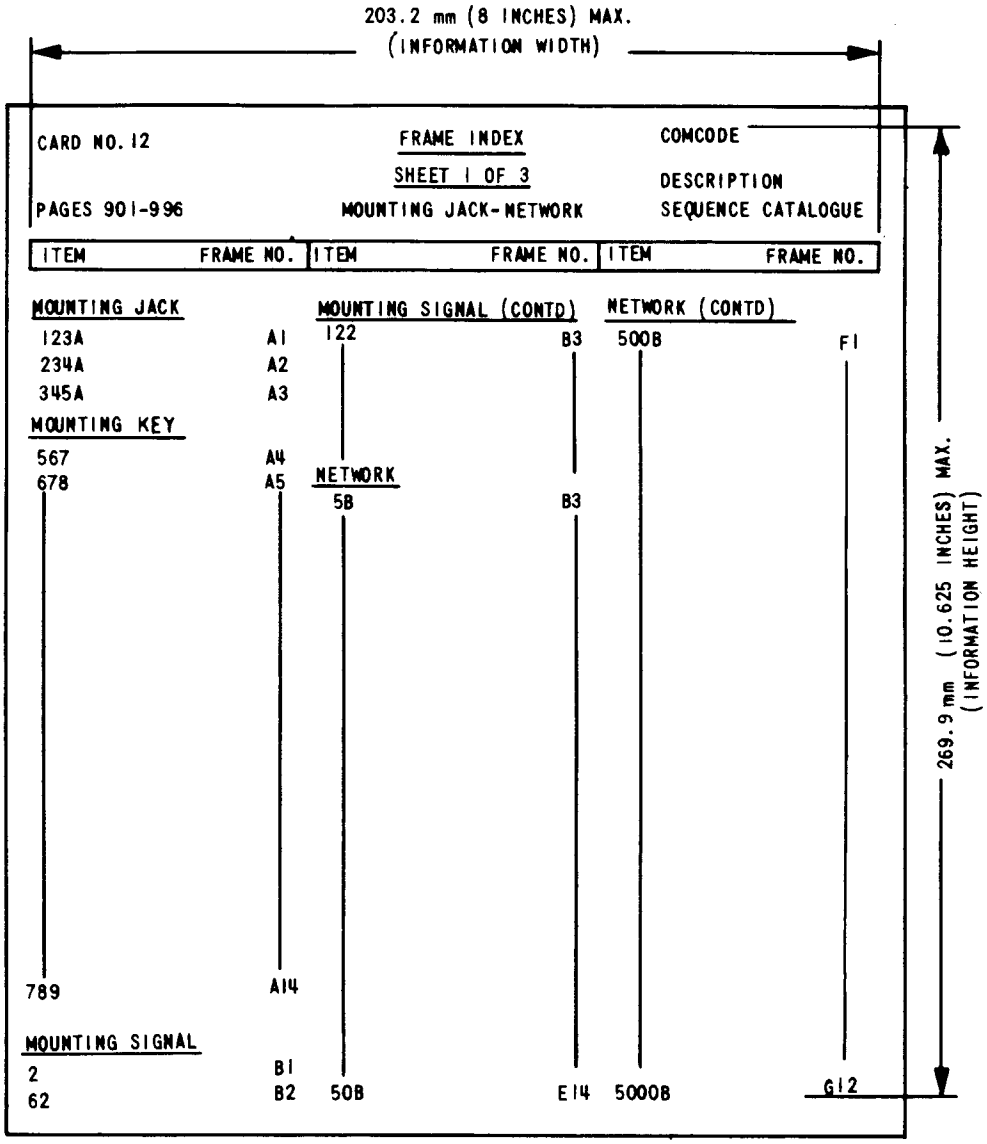


Fig. 2—Typical Index Sheet

provided by the equipment manufacturers should be followed, except as modified in this section.

Cameras

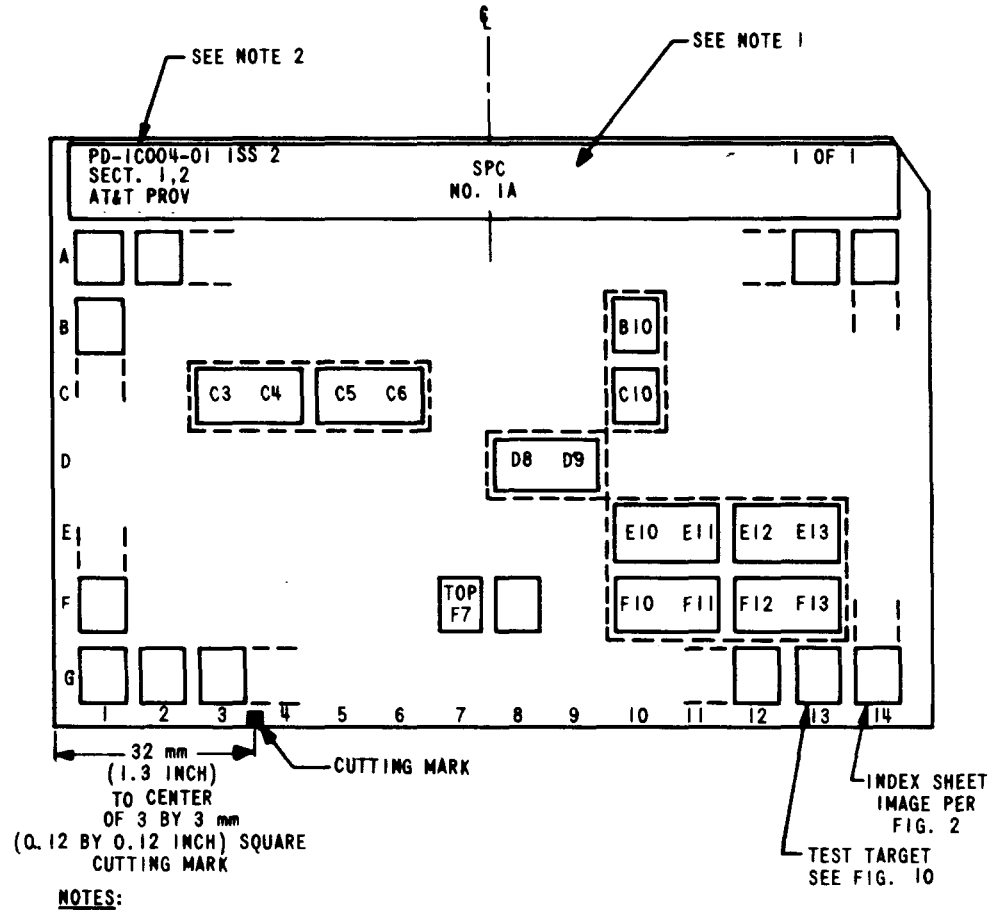
4.03 A typical microfilm camera is a precision instrument used to photograph source documents on roll film. It should have a means of adjusting for correct exposure, a reduction of $24\times + 1.0\times - 0.5\times$, and should be capable of producing microfilm meeting the requirements of this section. A camera requires care in maintenance and should be installed in an area as free of vibrations as possible. Installation and major adjustments should be made by the manufacturer's representative. (See 6.02 and 5.07.)

Duplicators

4.04 Film to film duplicators are available for both cut and roll film. They may be of either manual or automatic design.

Film Processors

4.05 A processor, for purposes of this section, is a machine used to develop, fix, wash, and



NOTES:

1. WHEN A COMPANY SIGNATURE IS USED (BELL SYMBOL AND APPROPRIATE LOGOTYPE), IT SHALL BE PREPARED IN ACCORDANCE WITH THE BELL SYSTEM CORPORATE IDENTIFICATION PROGRAM.

2. TYPICAL HEADER INFORMATION INDICATING PROJECT NAME AND TYPE OF DOCUMENT. CHARACTERS MINIMUM 1.6 mm (1/16 INCH) HIGH, 10 PER 25.4 mm (1 INCH).

Fig. 3—Header Information and Pagination

dry silver film. Office-type processors are available for processing on premises when required.

Readers, Reader-Printers, and Enlarger-Printers

4.06 A reader provides the means for viewing enlarged microimages on a screen or directly through an optical system. Equipment should reflect local requirements and should be selected from those units listed in this practice and/or the Bell System Evaluation and Standards Catalog (BSES). Dual purpose (microfiche-aperture card) units are recommended and dual magnification (24× to 48×) equipment should be used if required.

Strip-Up Devices

4.07 Strip-up devices provide the means for trimming, positioning, and supporting 16 mm and/or 35 mm film so that it may be reproduced in the same format as regular 105 mm microfiche. If needed, film support may be provided by the use of carriers and tape as well as other methods. (See 8. for specifics.)

Test Equipment

4.08 Test equipment required to check the requirements of this BSP are contained in 7.02 and 8.

5. MICROFILMING

General

5.01 Source documents shall be photographed with a precision (planetary) camera under controlled conditions in accordance with the requirements covered herein.

Procedures

5.02 The procedures outlined in the following paragraphs will be helpful in obtaining quality microfilm and in expediting the microfilming of source documents.

(a) Sort documents in groups according to prefix and number.

(b) Mark light, thin, horizontal, and vertical center lines on the camera copy board to assist in the accurate positioning of documents.

(c) Keep the camera copyboard clean to ensure uniform density.

(d) Operate a motorized reduction unit so that the camera head always approaches the desired position from below to ensure consistent reduction.

(e) Keep reflections in the camera area 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. (Instances have been reported of light reflected into the camera lens, or onto the copyboard, by portions of the camera operator's attire, such as white, shiny, or metallic fabrics, buckles, jewlery, buttons, and even eyeglasses.)

(f) 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 whan a camera is installed and is advisable when major changes are introduced in the microfilm operation, eg, changes in processing, brand of film, different emulsion batch, or in exposure control components. A step test consists of microfilming a representative set of sample documents at a range of exposure settings. The sample documents should be representative of the source documents to be microfilmed and should be selected from existing documents in file on the basis of varying degrees of cleanliness, types of document materials, and typical sizes for the reduction. (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, chemicals, 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 measured as covered in 7. The proper exposure setting for the camera is that which produces a document image background density between 0.90 minimum and 1.30 maximum for most sample documents.

Requir ements

5.03 A leader and trailer of appropriate length shall be provided at the beginning and end of each reel of film for light protection and threading purposes when not otherwise provided for by other loading and film handling mechanisms.

5.04 Identification information shall be included at the beginning of each reel of film or film magazine.

5.05 The distance between the centers of adjacent microfiche on processed roll film (frame interval or pull down) shall be determined by the requirements of the particular film cutter employed.

5.06 Test frames of test targets shall be included as described in 7.03.

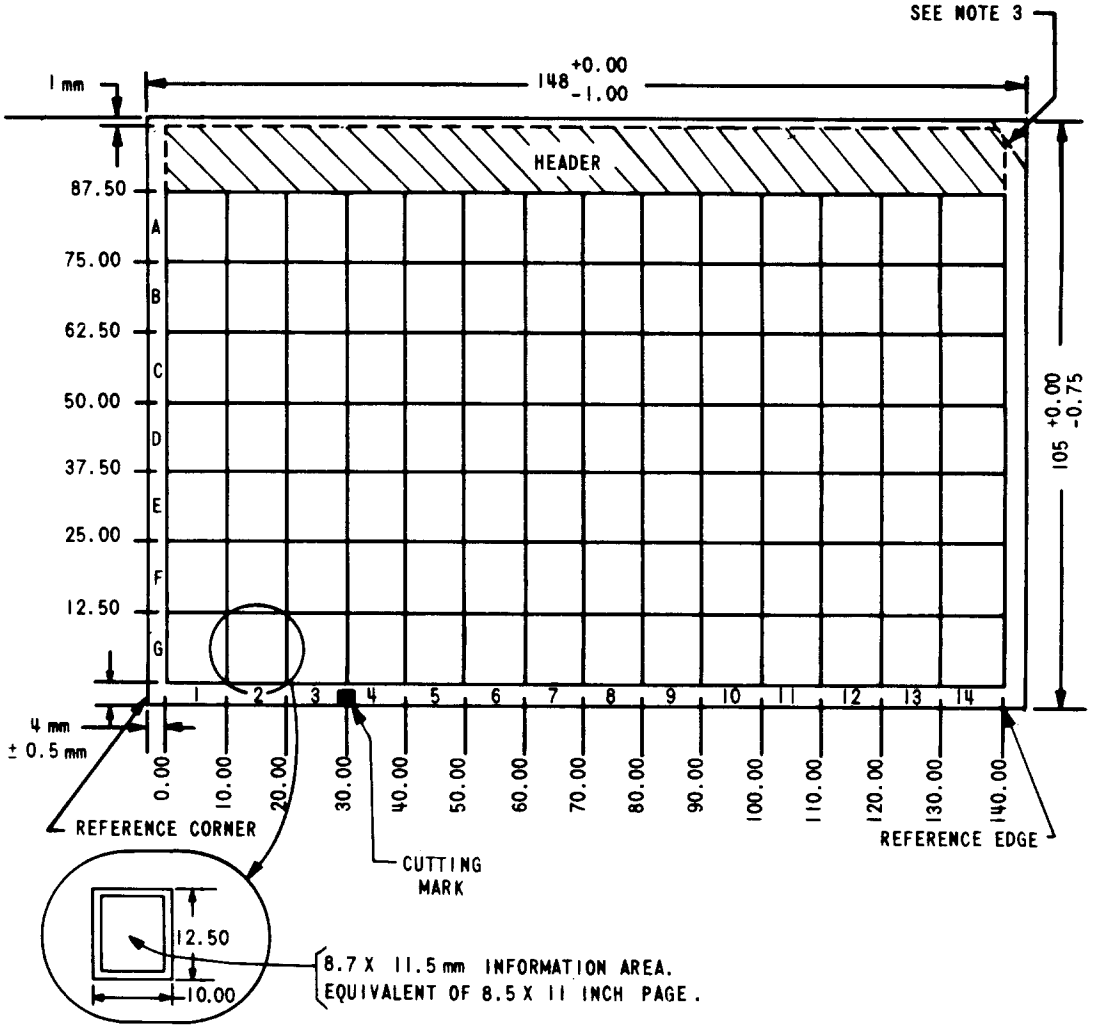
5.07 Reduction shall be 24× + 1.0× − 0.5× for all documents. (See 6.02 and 4.03.)

5.08 The size of exposed microfiche frames shall be in accordance with dimensions shown in Fig. 4 and 5 and arranged in a grid pattern as indicated.

Sectional Filming

5.09 Multiframe documents shall be filmed in sections as indicated below.

(a) ***Multiple, Single Frames:*** Information areas on documents up to 203.2 mm (8 inches) in width and exceeding 269.9 mm (10-5/8 inches) in height shall be filmed in 203.2 by 269.9 mm



NOTES:

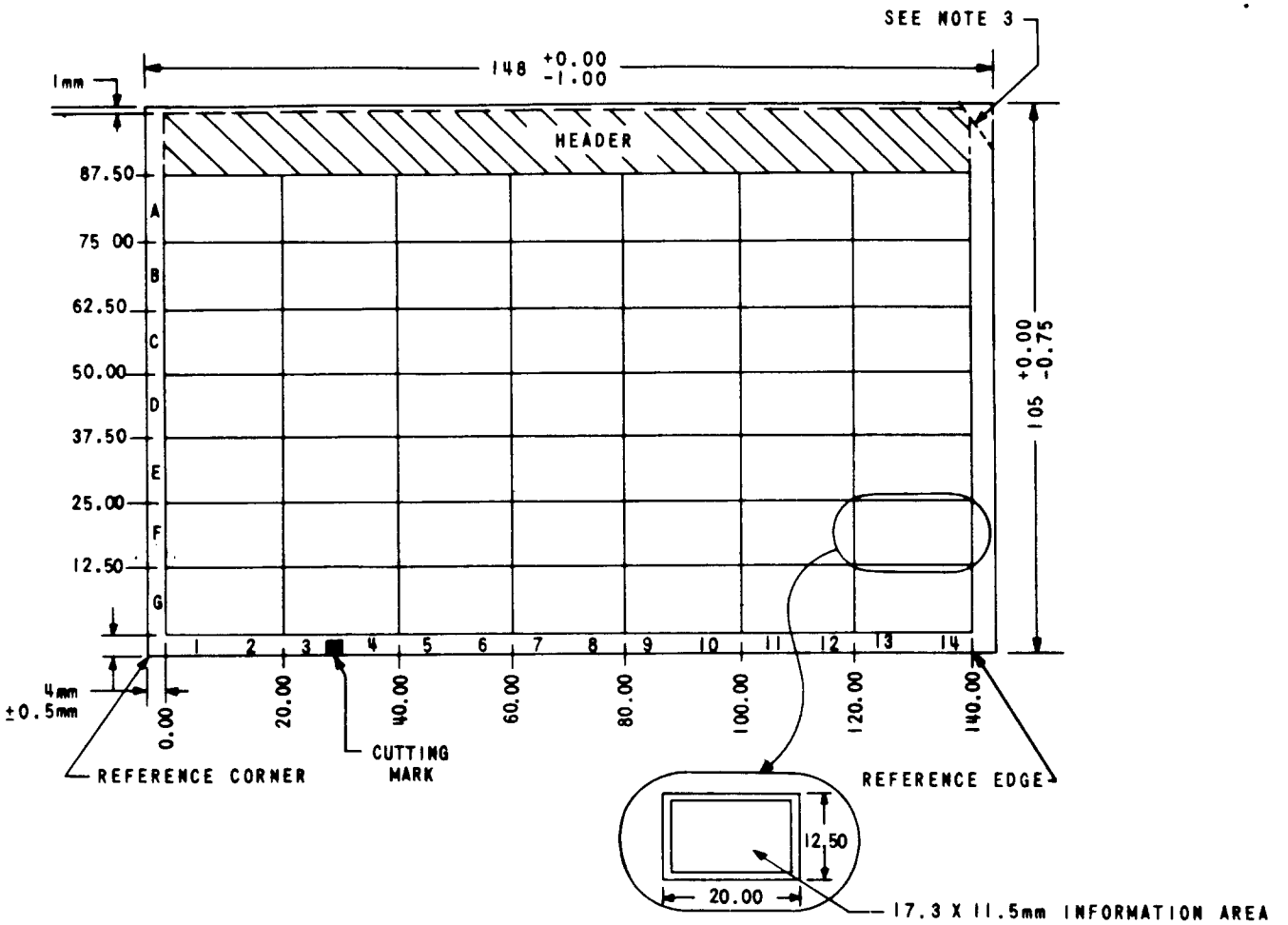
1. DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. GRID LINES SHOWN IN THIS FIGURE DO NOT APPEAR ON MICROFICHE.
3. CORNER CUT SHOWN IS FOR ODD GENERATION FILM. FOR EVEN GENERATION FILM IT SHALL BE AT UPPER LEFT CORNER.
4. 25.4 mm = 1.0 INCH.

Fig. 4—Microfiche Format, 7 by 14

(8 by 10-5/8 inches) sections in accordance with Fig. 6. (See Fig. 3, frames B10 and C10.)

(b) ***Multiple, Double Frames:*** Information areas on documents exceeding 406.4 mm (16 inches) in width but not exceeding 269.9 mm (10-5/8 inches) in height shall be filmed in 406.4 by 269.9 mm (16 by 10-5/8 inches) sections in accordance with Fig. 3, frames C3 through C6, and Fig. 7. Where the information area is such that the rightmost section of the document can be accommodated in a single frame, a single frame may be used.

(c) Information areas on documents exceeding 406.4 mm (16 inches) in width and 269.9



NOTES:

1. DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. GRID LINES SHOWN IN THIS FIGURE DO NOT APPEAR ON MICROFICHE.
3. CORNER CUT SHOWN IS FOR ODD GENERATION FILM. FOR EVEN GENERATION FILM IT SHALL BE AT UPPER LEFT CORNER.
4. 25.4mm = 1.0 INCH.

Fig. 5—Microfiche Format, 7 by 7

mm (10-5/8 inches) in height shall be filmed in 406.4 by 269.9 mm (16 by 10-5/8 inches) sections in accordance with Fig. 5. (See Fig. 3, frames E10 through E13, F10 through F13.)

(d) ***Overlaps:*** All sections being filmed shall include a 50.8 mm (2-inch) portion (overlap) of each adjacent section. The last sections must be full frames and may include an overlap greater than 50.8 mm (2-inches). (See Fig. 8.)

MICROIMAGE PLACEMENT AND ORIENTATION

5.10 Microimages shall be positioned within the grid pattern shown in Fig. 4 or 5. All measurements shall use the bottom edge and bottom left-hand corner of the microfiche as reference. Documents requiring single and double frames may be intermixed. Documents requiring multiple frames (sectionalizing) should be filmed in their normal order where practicable. Where not practicable they should be segregated and their images confined

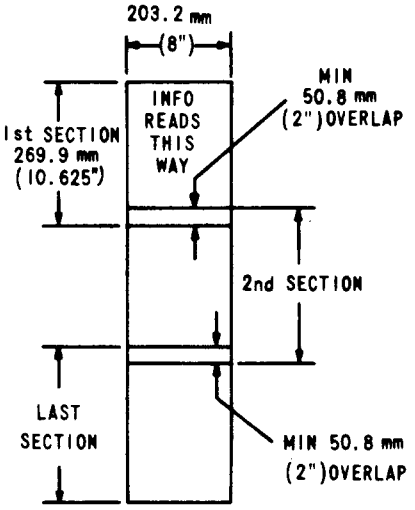


Fig. 6—Sectionalizing of Information Areas for Multiple Single Frame

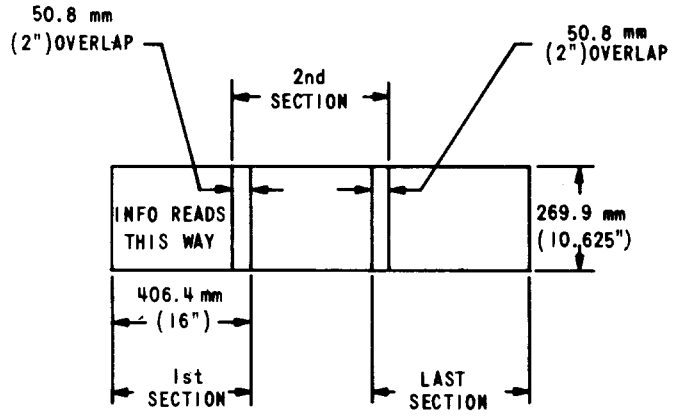


Fig. 7—Sectionalizing of Information Areas for Multiple Double Frames

to the microfiche at the end of the microfiche set. The segregated documents should be referenced on the index sheets of both the microfiche, where they normally would appear if in sequence, and the microfiche in which they do appear.

Frame Margin

5.11 A margin of minimum 0.125 mm (0.005 inch) shall be left between the information area and the boundaries of the frame.

Right-Reading Images

5.12 When first generation microfiche is held with the header at the top and right-reading, all microimages shall be upright and right-reading when viewed from the nonsensitized side of the film.

Frame Centering

5.13 The information area which is to appear in a microimage shall be centered within individual single or double microfiche frames, as specified below:

(a) ***Single Frame Documents:*** When the information area on a document does not exceed 203.2 mm (8 inches) in width and 269.9 mm (10-5/8 inches) in height, the microimage shall appear centered within a single frame with the information upright. (See Fig. 3, frame F7.)

(b) ***Double Frame Documents:*** When the information area on a document, viewed with the information upright, is over 203.2 mm (8 inches) but not over 406.4 mm (16 inches) in width and does not exceed 269.9 mm (10-5/8 inches) in height, the microimage should appear centered within a double frame. (See Fig. 3, frames D8, D9.)

5.14 The source document image should be centered in the microfilm frame with its edges parallel to respective edges of the microfilm frame. To ensure this, drawings shall be centered both horizontally and vertically on the camera copy board within 3.2 mm (1/8 inch).

PAGINATION SEQUENCE

5.15 When the microfiche is held so that the header is at the top and right-reading, the first microimage shall be at the top left corner of the grid area. Succeeding frames shall appear in sequence from left to right and downward from row to row. (See Fig. 3.) When desirable, indexing information readable without magnification may be accommodated within appropriate frames. Frames may be left blank on microfiche to allow for the addition of information in sequence at a later date, or to conform to a predetermined pagination sequence.

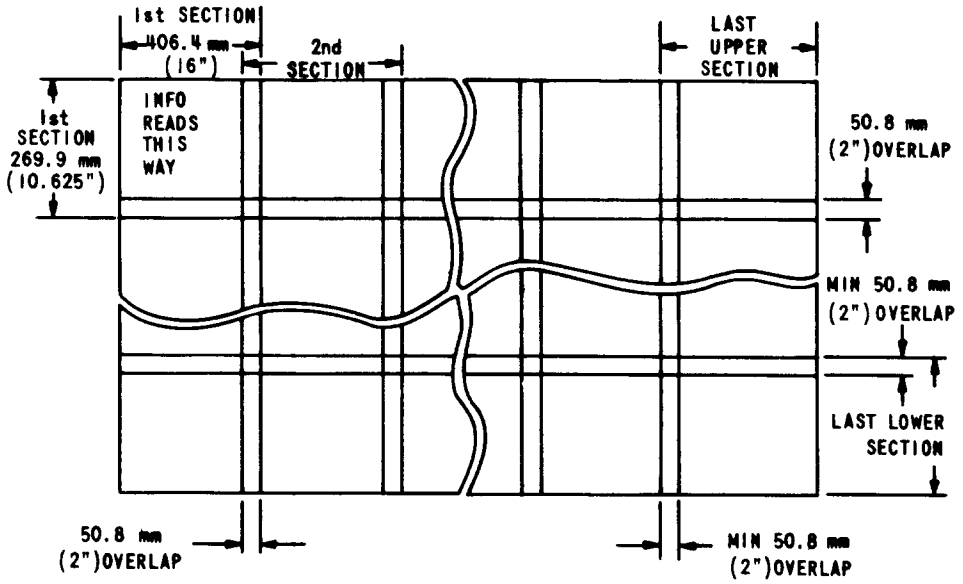


Fig. 8—Sectionalizing of Information Areas for Multiple Double Frames [Over 269.9 mm (10.625 Inches) High]

COORDINATE DESIGNATIONS

5.16 Coordinate designations should appear on the microfiche and shall be readable without magnification. Alphabetic characters, A through G sequentially one character per row centrally located at the beginning of each row, may apppear on the microfiche to identify rows. Numeric characters, 1 through 14, sequentially one number per column centrally located at the bottom of each column may appear on the microfiche to identify columns. (See Fig. 4.) Frame A1 would be the left uppermost frame in the grid.

6. MICROFICHE PRODUCTION

Polarity

6.01 All microimages on microfiche shall be negative (clear lines on a dark background).

Reduction

6.02 The reduction for all documents shall be 24× + 1.0× − 0.5×. (See 4.03 and 5.07.)

Microfiche Size

6.03 The cut microfiche shall be 105 +0 − 0.75 by 148 +0 − 1.0 mm (4 by 6 inches). (See 3.02.)

Microfiche Formats

6.04 The microfiche shall conform to the formats specified below. All dimensions of less than 19.0 mm (0.75 inch) should be checked with the measuring magnifier listed in 7.02.

(a) ***7 by 14 Format:*** The format (7 frames vertically by 14 frames horizontally) shall conform to Fig. 4, and each frame shall be 10.00 mm wide by 12.50 mm high (0.39 by 0.49 inch). The information area within each frame on the microfiche shall not exceed 8.7 by 11.5 mm (0.34 by 0.45 inch). This is equivalent to the image of an 8-1/2 by 11-inch source document.

(b) ***7 by 7 Format:*** The format (7 frames vertically by 7 frames horizontally) shall conform to Fig. 5, and the frame size shall be 20 mm wide by 12.5 mm high (0.78 by 0.47 inch). The information area within each frame on the microfiche shall not exceed 17.3 by 11.5 mm (0.68 by 0.45 inch). This is equivalent to the image of a 17- by 11-inch source document.

Squareness

6.05 Each side edge of the microfiche shall be perpendicular to the bottom (reference edge) within 0.53 mm (0.02 inch) for a 105 by 148 mm microfiche. The total deviation of the side edges from the perpendicular to the bottom reference edge shall not cause the length of the top edge of the microfiche to exceed the tolerances specified in 6.03.

Edge Straightness

6.06 Each of the four edges of the microfiche, taken one at a time, shall be capable of falling between two straight parallel lines 0.254 mm (0.01 inch) apart.

Film Thickness

6.07 The gross thickness of the microfiche, exclusive of header backing, shall be 0.13 to 0.23 mm (0.005 to 0.009 inch) for cellulose acetate film and 0.10 to 0.23 mm (0.004 to 0.009 inch) for polyester film.

Safety Film

6.08 The film used shall conform to American National Standards Institute (ANSI) Standards for Safety Photographic Film PH1.24-1965 or the latest revision thereof.

Corner Cut

6.09 When subsequent microfiche may be produced from user microfiche, the sensitized side of the user microfiche shall be identified by use of a corner cut. When a corner cut is used, the upper left-hand corner shall be clipped when the header area is at the top and the sensitized side is facing the observer. When the header is at the top and the sensitized side is away from the observer, the upper right-hand corner shall be clipped. The cut shall extend 6 mm (1/4 inch) along the top of the microfiche and 9 mm (3/8 inch) along the side of the microfiche.

Corner Rounding

6.10 The corners of microfiche may be rounded. When corners are rounded, the process shall not remove more than 3 mm (0.12 inch) of either of the two edges that form the corner.

Cutting Mark

6.11 Each microfiche should have a 3 by 3 mm (0.12 by 0.12 inch) cutting mark located on its bottom edge when required for automatic cutting machinery in high volume production operations. The mark should be positioned so that its center is 32 mm (1.3 inch) from the reference corner. (See Fig. 3.)

Header

6.12 The header (title area) is the area on the microfiche reserved for title and other information readable without magnification. The header may be either positive or negative. (See Fig. 3.) Headers with colored backing can serve to code microfiche, thereby facilitating retrieval. The header shall conform to the following specifications:

(a) ***Location:*** The header shall be at the top of each microfiche.

(b) ***Microimages:*** No microimages shall appear in the header area.

(c) ***Additional Header Space:*** When additional header space is required, the entire area dedicated to the first row of images (Row A) shall be used and the first microimage shall appear in frame B1.

(d) ***Header Backing:*** If an opaque or semiopaque backing material is used behind the header, it shall not increase the thickness of the microfiche by more than 0.013 mm (0.0005 inch). Header information is not usually reproducible when opaque or semiopaque backing is used. Accordingly, header backing may be used on user microfiche where appropriate but should not be used on master or intermediate microfiche.

(e) ***Header Entries:*** The header on each microfiche should contain a company name, a project or system title, eg, SPC No. 1A, an identification of the contents of the particular microfiche, an issue number and/or date, rating, the microfiche number, the first and last page numbers appearing on the microfiche, and/or the first item in the first image and the last item in the last image appearing on the microfiche. The Bell symbol and appropriate logotype which together make up a company signature may be

included in the header at the discretion o the originating organization. All entries in the header shall be upright and right-reading and shall be readable without magnification. Recommended header entries, orientation, and character sizes are shown in Fig. 3.

(f) Where identification information such as document number, issue, rating, etc is required, the most relevant information shall be entered as the topmost characters and kept to the left side of the header area. Identification information that appears in the header area shall agree with the information contained within the frames of a microfiche. Sequential information such as the microfiche number, distribution code, or the first and last page numbers appearing on the microfiche shall be kept to the right side of the header area.

Certificate of Authenticity

6.13 Where microfiche is intended to serve as a corporate record, the legal staff should be consulted with regard to the filming of a Certificate of Authenticity or any other practice which may apply.

7. MICROFICHE QUALITY AND INSPECTION

7.01 All microfiche shall meet the following requirements, as applicable, when tested in accordance with the specified methods of test. Where high production levels exist, other test methods and facilities which assure the same test results may be employed.

TEST MATERIALS AND EQUIPMENT

7.02 Test materials and equipment shall include:

(a) Soft, light-colored, nonlinting gloves.

(b) Measuring magnifier with case, Bausch and Lomb Company, Catalog No. 81-34-35, equipped with millimeter scale No. 81-34-38, and inch scale No. 81-34-37, or equivalent.

(c) Densitometer, (See 8. for specifics.)

(d) Eastman Kodak No. 3 Calibrated Photographic Step Tablet, or equivalent.

(e) Microscope, Bausch and Lomb Optical Company, Model ST-23, Catalog No. 31-21-28, less one No. 31-10-24 43× objective lens. Equip with a single nosepiece, a 6× objective lens No. 31-10-18, a 10× high eyepoint Huygenian eyepiece, and an Optilume Illuminator, or equivalent.

(f) Microfiche reader as specified in 8., or equivalent.

MICROFICHE TEST TARGET

7.03 An image of a microfiche test target which contains five NBS Microcopy Resolution Test Charts No. 1010 (modified per Fig. 9), an accurately drawn reduction ratio test strip, and a 103 mm (4-inch) square 50 $\pm$1 percent reflectance target should be included on a microfiche (or on a separate microfiche) at the beginning and end of a production run just prior to the index for checking resolution, reduction, and transmission density requirements. (See Fig. 10 and 11.)

PHYSICAL DEFECTS

Requirement

7.04 All processed microfiche shall be free of scratches, foreign material, stains, or defects which make information illegible.

Method of Test

7.05 Inspect each production run of film for faulty processing. This can be recognized by such defects as stained or discolored areas, excessive curl of film edges, brittleness, and softness or tackiness of the film surface. Check the film on a light box or reader to determine if the film is free of scratches or foreign materials which make information illegible. Examine doubtful areas of the film with a magnifier. Use soft, clean, nonlinting gloves when handling the microfiche.

FILM BOW

Requirement

7.06 Each microfiche shall not evidence a bow (departure from film flatness) in any direction greater than 6.4 mm (0.25 inch).

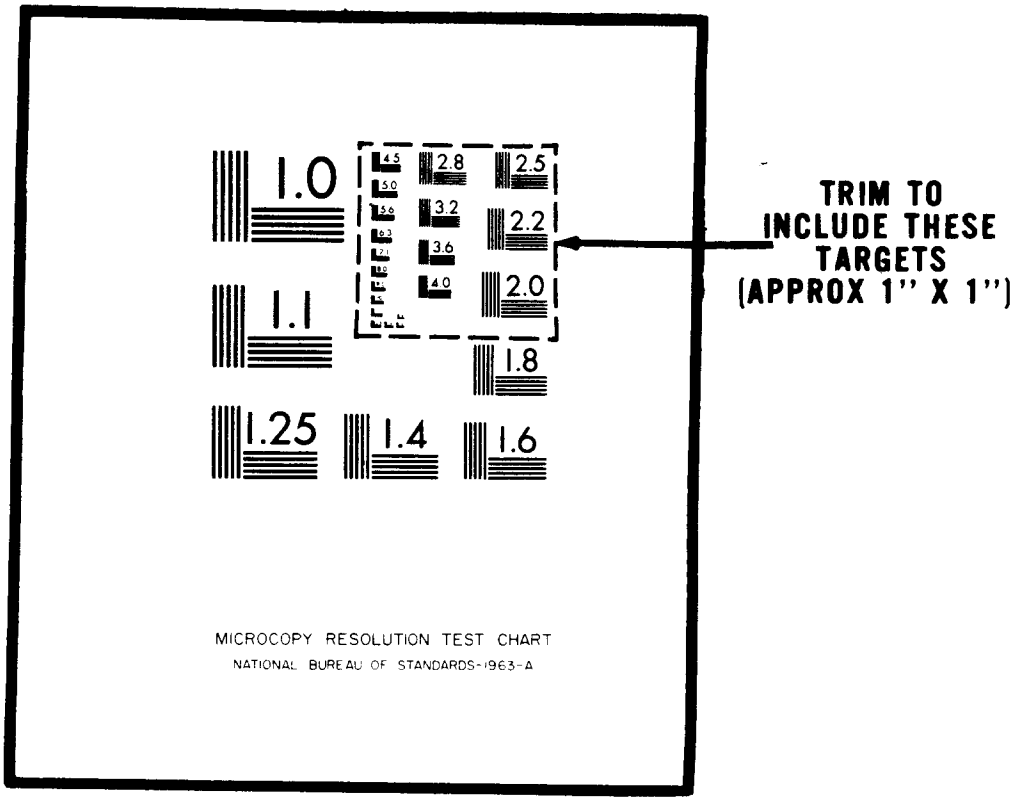


Fig. 9—Modification of Standard NBS Chart

Method of Test

7.07 Inspect freshly processed microfiche after it has been placed, convex side down, on a flat surface for at least 6 hours in a 21°C (70°F), 50 percent relative humidity atmosphere. No part of the microfiche shall be more than 6.4 mm (0.25 inch) from the flat surface.

REDUCTION

Requirement

7.08 The image of the reduction test strip appearing on a master microfiche test target shall not be greater than 6.491 mm (0.2555 inch) in length and shall not be less than 6.091 mm (0.2398 inch) in length. (See Fig. 10 and 11.)

Method of Test

7.09 Position the microimage of the microfiche test chart on a light box and measure the length of the reduction test strip. The length shall meet the requirements of 7.08.

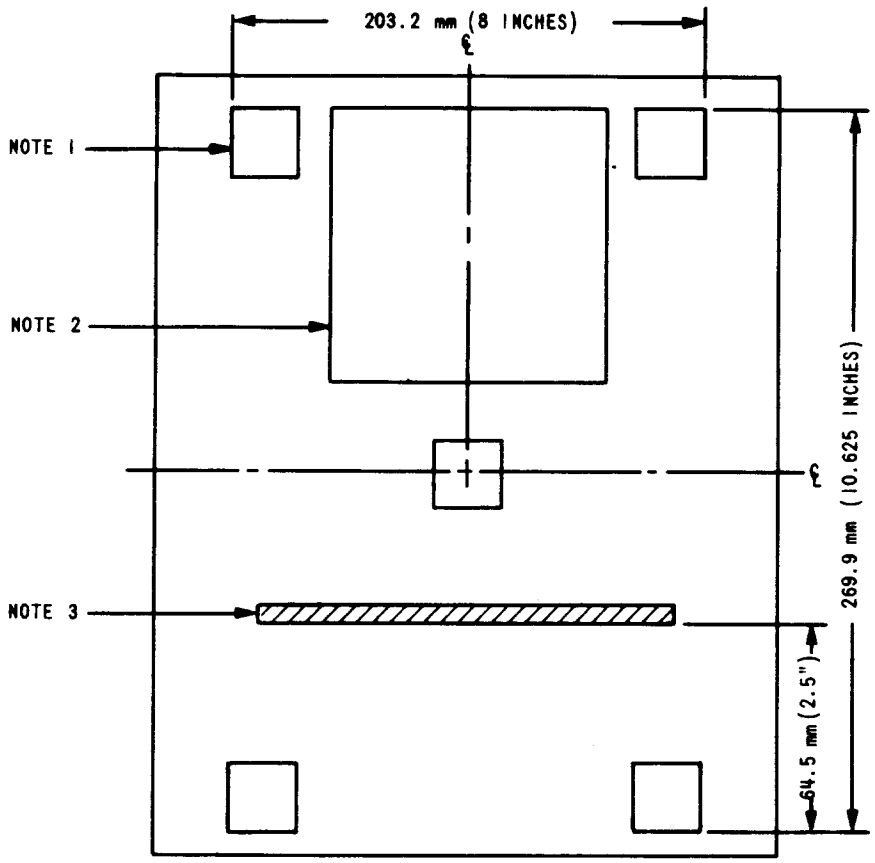
TRANSMISSION DENSITY

Requirement

7.10 The background density of silver emulsion microfiche images shall be minimum 0.90, maximum 1.30.

Method of Test

7.11 Measure the visual transmission density of the document image background with a densitometer. Take readings on three images, one from the beginning, middle, and end of each microfiche. The images chosen should be representative of the range of densities encountered and should contain sufficient background area to accommodate the full light beam of the densitometer. Take readings through one background area of each image. None of the three readings taken shall be less than 0.90 or more than 1.30.



NOTES

1. NBS RESOLUTION TEST CHARTS MODIFIED PER FIG.9.
2. REFLECTANCE PAPER: 50 ±1 PERCENT, 101-6 MM (4-INCH) SQUARE. MUNSELL COLOR COMPANY OR EQUIVALENT.
3. REDUCTION TEST STRIP PER FIG. 11.

Fig. 10—Microfiche Test Target

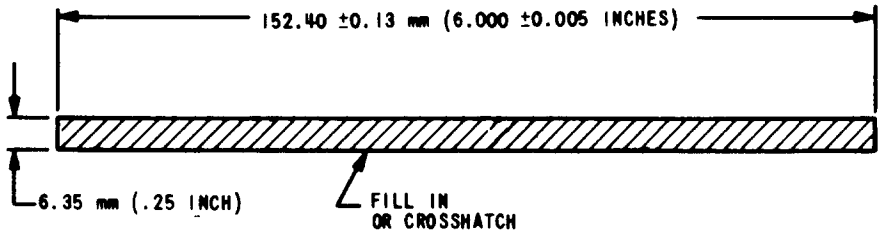


Fig. 11—Reduction Test Strip Dimensions

BASE PLUS FOG DENSITY

Requirement

7.12 The average base plus fog (d-Min) density of silver emulsion microfiche shall be maximum 0.10.

Method of Test

7.13 Measure the transmission density of the clear (nonimage) areas between microfiche images in three places along a diagonal from the upper left to the lower right on the microfiche. Where nonimage areas are too small to permit use of the 1 mm or 1/32-inch aperture probe of the densitometer, readings may be randomly taken on any three clear areas on the microfiche. None of these three readings should be more than 0.10.

CONTRAST

Requirement

7.14 The line to background density difference for diazo microfiche shall be minimum 0.70.

Method of Test

7.15 Measure the transmission density of a clear area on the microfiche. Such area shall permit use of the 1 mm or 1/32-inch aperture probe of the densitometer. Record the reading. Then measure the transmission density of the background areas in three random places on the microfiche. The difference between the information area densitometer reading and any of the three background area readings shall be minimum 0.70. The microfiche selected for this measurement should also be checked for legibility. (See 7.20).

RESOLUTION

Requirement

7.16 All processed silver master microfiche images shall have a minimum resolution of 108 lines per millimeter. All user microfiche images shall have a minimum resolution of 86 lines per millimeter. These resolutions assume a reduction of 24×.

Method of Test

7.17 Using a microscope of approximately 60× magnification, check the resolution of each of the five test charts which appear in the microfiche test target image to determine the smallest pattern in which lines can be distinguished both horizontally and vertically. The number adjacent to this pattern multiplied by the reduction ratio at which it was photographed indicates the resolution in number of lines per millimeter. The lowest resolution obtained from the five test charts should meet the requirement specified in 7.16. On master microfiche microfilmed at 24× reduction, the pattern designated 4.5 on the test chart pattern indicates acceptable resolution and, on user microfiche, the 3.6 pattern indicates acceptable resolution. (See Fig. 9.)

ARCHIVAL QUALITY

Archival Microfilm

7.18 Processed microfiche to be used for archival storage should meet the requirements for residual thiosulfate concentration as outlined in Table 3 of ANSI Standard PH1.28-1973, Specifications for Photographic Film for Archival Records, Silver-Gelatin Type, On Cellulose Ester Base, or the latest revision thereof. The ANSI classification for class 1 microfilm specifies a maximum sodium thiosulfate content of 1.0 microgram/cm^2 (0.7 microgram/cm^2 of the thiosulfate ion). When a density difference of 0.02 or less is found by the Silver Densitometric method, ANSI Standard PH4.8-1971 has been met.

> ***Note:*** In end user applications where silver halide microfiche will be kept for a limited time only and will never be used as file masters to produce copy, a maximum limit of 4 micrograms/cm^2 of sodium thiosulfate or 0.08 density difference in the Silver Densitometric method may be tolerated.

Method of Test

7.19 See ANSI Standard PH4.8-1971 or latest revision thereof.

LEGIBILITY

Requirement

7.20 All information shall be legible when viewed in an approved microfiche reader or when viewed on prints produced on an approved enlarger-printer.

Method of Test

7.21 View randomly selected images on user microfiche, representative of all images included on the same microfiche, on an approved microfiche reader, or on prints produced on an approved printer to determine whether the information is legible. Information shall be considered legible if complete intelligence can be abstracted without reference to other information.

8. APPROVED EQUIPMENT AND MATERIAL

GENERAL

8.01 This section covers equipment accessories and materials considered suitable for the production, inspection, and reproduction and use of 105 mm microfiche. In selecting an equipment item, consideration should be given to availability of authorized dealer service. Approved equivalents of listed equipment and material items may be used.

8.02 In order to ensure that the ordering information specified in this section is still in good standing, the appropriate WE Service Center should be contacted through local purchasing service departments before orders are placed.

8.03 Information in regard to supplies required in the operation of equipment such as enlarger-printers and reader-printers is covered in the manufacturer instructions.

EQUIPMENT AND MATERIAL

8.04 Duplicators

Manual, Cut Sheet Film (Low Volume Production)

		BELL AND HOWELL MODEL 404A ROTARY	
		PRINTER	PROCESSOR
Approximate Dimensions (inches)	Width	21	15
	Depth	26	19
	Height	16	21
Approximate Weight (pounds)		90	85
Power Requirements	Volts	115	115
	Hz	60	60
	Amperes	6	6
Developer		None	Anhydrous Ammonia
Ordering Information		Purchase locally	

8.05 Film Processors

Medium-Production (See Notes 1 and 2)

		ITEK 335 TRANSFLO (See Note 3)
Approximate Dimensions (inches) (all covers and doors in place)	Width	73
	Depth	22-1/2
	Height	38-3/8
Approximate Weight (pounds) (without solutions)		365
Power Requirements	Volts	115
	Hz	60
	Amperes	25
	Phase	Single
Plumbing Requirements		Tempered water supply. 1-1/2 gallons per minute. Gravity drain required.
Operation		Continuous, automatic, daylight
Speed		Variable (See Note 4)
Cooling Provision		(See Note 3)
Film Capacity (feet)		100
Ordering Information		Purchase locally

Notes:

1. As notes in 8.01, in selecting an equipment item, considerations should be given to the availability of adequate dealer service. This is especially important for processors.
2. Processors involve installation costs for water supply, drainage, and power.
3. Processing temperatures recommended by the manufacturer should be used when processing any of the films recommended for Bell System use. If processor is operated in an area in which, because of high ambient temperature, the recommended processing temperatures cannot be maintained, it will be necessary to provide air cooling facilities to reduce the ambient temperature in the area.
4. Typical processing speed is 5 feet per minute.

8.06 Readers

Single Page

		MICRO DESIGN COM 100A
Input		Microfiche
Screen Size (inches)		11 x 8-1/2
Approximate Dimensions (inches)	Width	16
	Depth	19
	Height	24
Approximate Weight (pounds)		29
Power Requirements	Volts	115/120
	Hz	60
	Amperes	1/2
Magnification		20
Ordering Information (See Note 1)		Purchase locally

Note:

1. Orders should specify 3-wire grounded conductor cord.

Intermediate Size Screen, Double Page

		EASTMAN KODAK RECORDAK EASAMATIC MODEL PFCD	MICRO-MASTER DOCUMENT VIEWER MODEL II	DIETZGEN MODEL 4316 OR BELL & HOWELL DUO	NCR MODEL 456-200	MICRO DESIGN COM 400
Input		Microfilm cards and Microfiche (See Note 1)				
Screen Size (inches)		11 x 16-1/4	14 x 22	14 x 20	12-3/8 x 14-3/4	15-1/2 x 11-1/2
Approximate Dimensions (inches)	Width	19	23	20-5/8	16	16-1/2
	Depth	21	18-1/2	18-3/4	18	25
	Height	19	25	24-1/2	21-1/2	20
Approximate Weight (pounds)		20	75	56	46	32
Power Requirements	Volts	115/120	115/120	100/125	110/120	110/120
	Hz	60	60	60	60	50/60
	Amperes	2.5	3.5	5	1	1
Magnification		21.5	24	22	21	21
Ordering Information (See Note 2)		See BSES Item 3416-2 (See Notes 3 and 6)	See BSES Item 3415 (See Notes 4 and 6)	See BSES Item 3419 (See Notes 5 and 6)	See BSES Item 3429 (See Notes 6 and 7)	Purchase locally

Notes:

1. Orders for readers capable of accepting microfiche should specify equipped with index card or image position indicator suitable for Bell System application.
2. Orders should specify 3-wire grounded cord.
3. Orders should specify 21.5× magnification and 4- by 6-inch holder.
4. Orders should specify 24× magnification.
5. Orders should specify 22× magnification.
6. BSES (Bell System Evaluation and Standards Catalog). Available from Bell System Evaluation and Standards Department, Western Electric Co., 222 Broadway, New York, New York.
7. Approved for 21×. Readers with 24× lens have not yet been approved.

8.06 Readers (Cont)

Intermediate Size Screen, Double Page

		GAF MODEL 7502 OR MICRO DESIGN COM 200	NCR MODEL 456-822	REALIST MODEL HA3332	WSI MINI-CAT 1114
Input		Microfilm cards and Microfiche (See Note 1)			Microfiche only
Screen Size (inches)		11-1/2 x 15-1/2	19-3/4 x 13-5/8	19 x 12-3/4	11 x 14
Approximate Dimensions (inches)	Width	16-1/2	21-1/2	20	18-1/2
	Depth	25	19	21	17
	Height	19	24	24	23-1/2
Approximate Weight (pounds)		33	65	55	22
Power Requirements	Volts	110/120	110/120	115	117
	Hz	60	60	60	60
	Amperes	1.5	1.5	2	2
Magnification		24	22	24	21
Ordering Information		See BSES Item 3432 (See Note 3)	See BSES Item 3425 (See Note 4)	See BSES Item 3433 (See Note 3)	Purchase locally

Notes:

1. Orders for readers capable of accepting microfiche should specify equipped with index card or image position indicator suitable for Bell System application.
2. Orders should specify 3-wire grounded cord.
3. Orders should specify 24X magnification.
4. Orders should specify 22X magnification.
5. Orders should specify 21X magnification.

8.07 Strip-Up Devices

		EASTMAN KODAK, RECORDAK	
		MASTER FILM TRIMMER	MASTER COMPOSING STATION
Input		35 mm perforated film	
Slit Size		12.5 or 16.5 mm	None
Approximate Dimensions (inches)	Width	20	25-3/4
	Depth	6-1/2	14-1/4
	Height	9	8-5/8
Approximate Weight (pounds)		8	13
Power Requirements	Volts	None	117
	Hz	None	50/60
	Amperes	None	1/2
Ordering Information		See BSES Item 3451	

8.08 Films

	SILVER	DIAZO ANHYDROUS			
	EASTMAN KODAK RECORDAK AHU TYPE SO-136 (See Note 1)	SCOTT P7-206 & P7-216	BRUNING 91-3745	DIETZGEN A7	XIDEX DMC 200
Storage	Store in a cool, dry place	See Note 2			
Packaging	100-foot (roll)	Roll or cut			
Ordering Information (See 1.03)	Purchase Locally (See Note 3)	Purchase locally			
Shelf Life	Expiration date on box				

Notes:

1. Bell System approval pending.
2. Store in a cool (60 to 75° F) dry place away from ammonia and ammonia fumes. Film should be kept in original containers until ready to use.
3. Orders should specify processing if desired.

8.09 Densitometers

		MACBETH INSTRUMENT CORP QUANTALOG TRANSMISSION DENSITOMETER	
		TD-500	TD-102
Will Measure		Silver and Diazo film	Silver and Diazo film
Power Requirements	Volts	115/230	115/120
	Hz	60	60
	Amperes	1	4
Voltage Regulator		None	60 volt-amperes
Ordering Information (See Note 1)		See BSES Item 3403-7	See BSES Item 3403-2

Note:

1. Order should specify that densitometers be calibrated for diffuse visual transmission density to a Kodak No. 3 Calibrated Photographic Step Tablet with a 1 mm aperture in place.

9. GLOSSARY

Column—A vertical series of images on a microfiche.

Frame—A rectangular area on the microfiche, bounded by intersecting grid lines, within which a microimage may be recorded.

Generation—The remoteness of a film image from the source document. The first film image of a document is called the first generation film; succeeding reproductions of the first generation film are called second generation, third generation, etc.

Grid, Microfiche—A matrix formed by the vertical and horizontal boundaries of frames.

Header—Area at the top of a microfiche used to identify its contents.

Header Backing—A light-colored material or reflecting treatment applied to the back of the header to make the header information more readily visible.

Information Area—The maximum area on a document in which information is normally shown.

Intermediate Microfiche—A microfiche or other reproducible used to make distribution copies; intermediate microfiche are usually made from camera microfilm.

Microfiche—A sheet of microfilm containing multiple microimages in a grid pattern. It usually contains a header and/or other identification of its contents which can be read without magnification.

Master Microfiche—A microfiche composed of first generation film images. (See Generation.)

Microimage—A unit of information on film, such as a page of text or a drawing, normally too small to be read without magnification.

Reduction—A measure of the number of times a given linear dimension of an object is reduced when photographed, expressed as 16×, 24×, etc.

Reference Corner, Reference Edge—Data from which the positions of frames and other fixed areas on a microfiche are determined.

Resolution—The ability of optical systems and photo-materials to render visible images of fine detail of an object; a measure of sharpness on an image, expressed as the number of lines per millimeter, discernible in an image. Resolution in processed microfiche is a function of film emulsion, exposure, camera lens, camera adjustment, camera vibration, and film processing.

Right-Reading—Orientation of text or images which are legible in a normal reading position.

Row—A horizontal series of microimages on microfiche.

Stripping-up—The joining of strips or frames of film by tape or other means to make up a microfiche capable of reproduction on a solid sheet of standard sized microfiche film (105 by 148 mm).

User Microfiche—A microfiche intended for distribution to users as distinct from master microfiche whose function is to create user microfiche. Normal usage of user microfiche involves display on a reader and preparation of enlarged prints.

Additional Micrographic Terms—See National Microfilm Association "Industry Standard, Glossary of Micrographics" MS-100-1971 or latest revision thereof.