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U.S. DEPARTMENT OF COMMERCE / National Bureau of Standards

COMPUTER OUTPUT MICROFORM (COM) FORMATS AND REDUCTION RATIOS, 16 mm AND 105 mm

CATEGORY: HARDWARE STANDARD
SUBCATEGORY: MEDIA

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Foreword

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The series is used to announce Federal Information Processing Standards, and to provide standards information of general interest and an index of relevant standards publications and specifications. Publications that announce adoption of standards provide the necessary policy, administrative, and guidance information for effective standards implementation and use. The technical specifications of the standard are usually attached to the publication, otherwise a reference source is cited.

Comments covering Federal Information Processing Standards and Publications are welcomed and should be addressed to the Director, Institute for Computer Sciences and Technology, National Bureau of Standards, Washington, D.C. 20234. Such comments will be either considered by NBS or forwarded to the responsible activity as appropriate.

Ernest Ambler, Director

Abstract

This FIPS PUB specifies the image arrangement, size, and reduction ratios for 16 mm and 105 mm microforms generated by Computer Output Microfilmers. It is limited to systems using business-oriented fonts similar to line printer output.

Keywords: COM formats and reduction ratios; communications; computer output microform; computer system hardware; computers; data processing; data processing equipment; information systems; microfiche; microfilm; standards.

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For sale by the National Technical Information Service, U.S. Department of Commerce, Springfield, Virginia 22161.

Preface

The use of microforms in the recording and dissemination of data and information is widespread in the Federal Government and the volume is steadily increasing, particularly for information generated by computers. Therefore, the uniformity of Computer Output Microforms is essential in order to enhance the exchange and utilization of recorded information, and to provide compatibility of processing and user equipment. It is also essential that the number of different Computer Output Microform formats and reduction ratios be kept to a minimum in order to reduce the variety of equipment required. The Computer Output Microform Standards Group (TG-18) was formed by the Federal Information Processing Standards Coordinating and Advisory Committee (FIPSCAC) to standardize certain aspects of Computer Output Microforms to meet Federal agency needs. This standard is the first in a series to be developed for this purpose.

Federal Information Processing Standards Publication 54

1978 July 15

ANNOUNCING THE STANDARD FOR

COMPUTER OUTPUT MICROFORM (COM) FORMATS AND REDUCTION RATIOS, 16 mm and 105 mm

Federal Information Processing Standards Publications are issued by the National Bureau of Standards pursuant to the Federal Property and Administrative Services Act of 1949, as amended, Public Law 89-306 (79 Stat. 1127), Executive Order 11717 (38 FR 12315, dated May 11, 1973), and Part 6 of Title 15 Code of Federal Regulations (CFR).

Name of Standard. Computer Output Microform (COM) Formats and Reduction Ratios, 16 mm and 105 mm.

Category of Standard. Hardware Standard, Media.

Explanation. This standard specifies the image arrangement, size, and reduction ratios for 16 mm and 105 mm microforms generated by Computer Output Microfilmers. It is limited to systems using business-oriented fonts similar to line printer output.

Approving Authority. Secretary of Commerce.

Maintenance Agency. Department of Commerce, National Bureau of Standards (Institute for Computer Sciences and Technology).

Applicability. This standard is applicable to those microforms which are computer generated in lieu of line-printer output using plain type faces. It does not cover engineering drawings or micro photocomposition using complex graphics or graphic arts fonts and formats, nor does it cover special systems using two-step reduction techniques. Standards for these applications will be developed as required.

The microform formats and reduction ratios specified herein are mandatory for the acquisition of new Federal Government computer output microform systems and applications.

Users of existing COM systems and applications are encouraged to utilize this standard. Systems and applications not in accordance with this standard should be evaluated periodically by Federal agencies and the merits of converting to the standard considered.

Specifications. Federal Information Processing Standard 54, Computer Output Microform (COM) Formats and Reduction Ratios, 16 mm and 105 mm (affixed).

Implementation Schedule. Microforms produced by or for Federal agencies and equipment or services acquired after the date of this FIPS PUB must be in conformance with the specifications contained herein. Exceptions to this standard are made in the following cases:

a. For microforms, equipment, or services produced, procured, or on order prior to the date of this FIPS PUB.

b. Where procurement actions are into the solicitation phase (i.e., Requests for Proposals or Invitations for Bids have been issued) on the date of this FIPS PUB.

Waiver Procedure. Heads of agencies may waive the provisions of the implementation schedule. Proposed waivers relating to the production or procurement of non-conforming microforms will be coordinated in advance with the National Bureau of Standards, Washington, D.C. 20234. These should describe the nature of the waiver request and set forth the reasons therefor.

Sixty days should be allowed for review and response by the National Bureau of Standards. The waiver is not to be effective until a reply is received from the National Bureau of Standards; however, the final decision for granting the waiver is a responsibility of the agency head.

Special Information. This standard permits only two effective reduction ratios, namely 24:1 and 48:1. It is recognized that a number of Government agencies have already acquired and are using systems at a 42:1 reduction. The implementation of this standard is not intended to cause replacement of these systems but is directed toward future COM acquisitions and applications as described. Since current technology permits adequate image quality in both image and display devices and allows for higher information density packing, the reduction ratio of 48:1 is specified in this standard instead of the 42:1 ratio. Current readers with a 42X magnification can be used effectively for viewing 48:1 recorded images made according to the following specifications.

Where To Obtain Copies. Copies of this publication are for sale by the National Technical Information Service, U.S. Department of Commerce, Springfield, Virginia 22161. When ordering, refer to Federal Information Processing Standards Publication 54 (NBS-FIPS-PUB-54), and title. When microfiche is desired, this should be specified. Payment may be made by check, money order, American Express card, or deposit account.

Federal Information
Processing Standard 54

1978 July 15

SPECIFICATIONS FOR

COMPUTER OUTPUT MICROFORM (COM) FORMATS AND REDUCTION RATIOS, 16 mm and 105 mm

1. Name of Standard. Computer Output Microform (COM) Formats and Reduction Ratios, 16 mm and 105 mm.

2. Category of Standard. Hardware Standard, Media.

3. Explanation. This standard specifies the image arrangement, size, and reduction ratios for 16 mm and 105 mm microforms generated by Computer Output Microfilmers. It is limited to systems using business-oriented fonts similar to line printer output.

4. Specifications. This standard covers microform formats and reduction ratios for Computer Output Microforms using business-oriented fonts.

4.1 The choice of microform formats and associated reduction ratio(s), from among those specified herein, for use in a particular system or application is not prescribed by this standard. These choices will be based on user needs and developed from other criteria.

4.2 Authorized Formats and Effective Reduction Ratios.

a. 16 mm roll film (24:1)
(1) A Orientation (cine mode)
(2) B Orientation (comic mode)

b. 105 mm X 148 mm microfiche
(1) 63 frame (7 rows X 9 columns) 24:1
(2) 98 frame (7 rows X 14 columns) 24:1
(3) 270 frame (15 rows X 18 columns) 48:1
(4) 420 frame (15 rows X 28 columns) 48:1

4.3 Requirements.

a. Legibility. All characters must be recorded so they are readable by the user. This means that the quality of the master recordings must be sufficiently high to allow for the normal image degradation that results when making subsequent generation copies for the end user. Typically, there is about a 10 percent loss in the ability to duplicate very closely spaced points for each subsequent generation. The images of the smallest characters should measure as a minimum 0.05 mm in height on the original microform.

b. Roll Film. See formats in figures 1 and 2.

c. Microfiche. See formats in figures 3 through 6.

(1) Pagination. Either vertical or horizontal pagination will be used in the creation of microfiche. When the microfiche is oriented so that the designated header area is upright and right reading, the first data frame will be placed in the left most position of the row immediately below the header.

(a) Vertical Pagination. When this form of pagination is chosen, frames following the first data frame will appear in sequence from top to bottom through the rows and from left to right along the columns.

(b) Horizontal Pagination. When this form of pagination is chosen, frames following the first data frame will appear in sequence from left to right along the rows and from top to bottom through the columns.

(c) Identification. Identification of the pagination method is not required. However, if used, the method will be through use of an arrow placed in the header area. Vertical pagination will be designated by an arrow pointed downward (↓). Horizontal pagination will be designated by an arrow pointing to the right (→).

(2) Identification of Sensitized Film Side of Cut Sheets. To facilitate microfiche to microfiche copying, a notch or a corner cut may be used to identify the sensitized layer of the microfiche.

When a notch is used, it shall be placed along the short dimension of the sheet and near the appropriate corner. The notch may be of any shape, but it shall not penetrate more than 1.6 mm inward from the edge of the microfiche.

When a corner cut is used, it shall appear in the appropriate corner of the header area only. The cut shall extend a nominal 6 mm along the long dimension of the microfiche and a nominal 9 mm along the short dimension of the microfiche.

The sensitized side shall be identified by one of the following methods:

Method A. When a sheet of raw film or a microfiche is held with the long sides in a horizontal position, the header area at the top, and the notch in the lower right-hand corner or the corner cut in the upper left-hand corner, the sensitized side is toward the observer.

Method B. When a sheet of raw film or a microfiche is held with the long sides in a vertical position and the notch or corner cut is in the upper right-hand corner, the sensitized side will be toward the observer as specified in American National Standard for Designation of Emulsion Side of Photographic Sheet Films, PH1.19-R1974. See Appendix B, Reference 1.

Note: Silver Original. When a camera original microfiche is without identification, hold the header upright and right reading. Then the sensitized (emulsion) side will be away from the observer.

(3) Header Area. The header area constitutes the top of the microfiche. The minimum area reserved for the header shall be used only for header and identification purposes on all microfiche and shall not be used for microimages. If additional header space is required, the area dedicated to the next entire row or rows of images shall be used. When this option is utilized, row identification shall remain unchanged. All header characters shall be upright and right reading, and at least 2 mm in height. All characters shall be readable without magnification. The minimum areas reserved for the header are indicated in the figures for the microfiche formats by shading.

(4) Frame Identification. When coordinates are used to identify the location of images, alphabetic characters shall be used to identify rows. Starting at the top left corner, under the minimum header area, the first row of microimages shall be A, the next B, the next C, and so on. Columns shall be identified numerically. Starting at the left, the first column shall be 1, the second 2, and so on.

(5) Index. If an index to the microfiche is to be provided, the placement of the last microimage of the index shall be in the bottom right corner frame of the grid area with additional index images in the preceding frames as required.

(6) Trailer Microfiche Identification. When trailer microfiche are used, each microfiche in the set, including the first one, should be sequentially identified. This information shall appear in the rightmost portion of the header.

(7) Cut Mark. A cut mark will be provided for automatic cutting of 105 mm roll film into microfiche. This cut mark shall be 3.0 mm X 3.0 mm square and the center of the square shall be located 32 mm ± 0.2 mm along the bottom edge from the reference corner of each microfiche area.

(8) Squareness. Each side of the microfiche shall be perpendicular to the bottom (reference) edge within ± 0.13 mm for each 25 mm of height of the 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 148 mm plus 0.0 mm, minus 1.0 mm.

(9) Edge Straightness. Each of the four edges of a microfiche shall be capable of falling between two straight parallel lines 0.25 mm apart.

(10) Curl and Bow. The curl or bow of a sheet of microfiche, when placed convex side down on a flat surface for at least six hours in a 21°C, 50% relative humidity atmosphere, shall have no part of the microfiche more than 6.35 mm above the surface. See ANSI Standard PH1.29-1971, Methods for Determining Curl of Photographic Film, Appendix B, Reference 2.

(11) Corner Rounding. Where corner rounding is employed, the process shall not remove at any corner more than 3 mm of either of the two sides which form the corner.

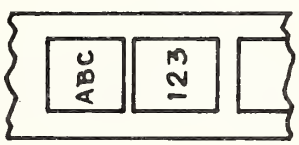
5. Definitions. The following definitions are provided for clarification and use of this standard:

Application

Any use of COM that satisfies particular information requirements.

Cine (motion picture) mode or A oriented images

A method of recording images on microfilm so that the reading sense is perpendicular to the length of the film.



Column

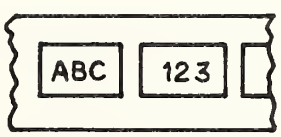
A vertical series of microimages on a microfiche.

COM

Computer Output Microform: Any microform containing images generated by a recorder, and duplicates thereof.

Comic mode or B oriented images

A method of recording images on a microfilm so that the reading sense is parallel to the length of the film.



Cut Mark

A mark added to film to permit automatic cutting of microfiche from a roll of film.

Format

A dimensioned layout containing requirements for size, arrangement and orientation of microimages upon a microform.

Frame

The total area allocated for exposure, regardless of whether or not this area is filled by the document or data image.

Header

Information, which is readable without magnification, placed at the top of a microfiche.

Microfiche

A sheet of film containing multiple microimages in a grid pattern.

Microfilm

(1) A film suitable for recording an image or images greatly reduced in size from the original.
(2) To record microimages on film.

Microform

A generic term for any form containing microimages.

Microimage

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

Notch

An indentation or cut made on one edge of sheet film to identify the sensitized side.

Reduction, Effective

A measure of the number of times a given linear dimension of a similar conventional document would be reduced to equal the size of the COM generated microimage.

Row

A horizontal series of microimages on microfiche.

Sensitized Side

The side of the microform coated with a photosensitive material.

Specification

A document which describes the essential and technical requirements for items, materials and services including procedures by which it will be determined that the requirements have been met.

Standard

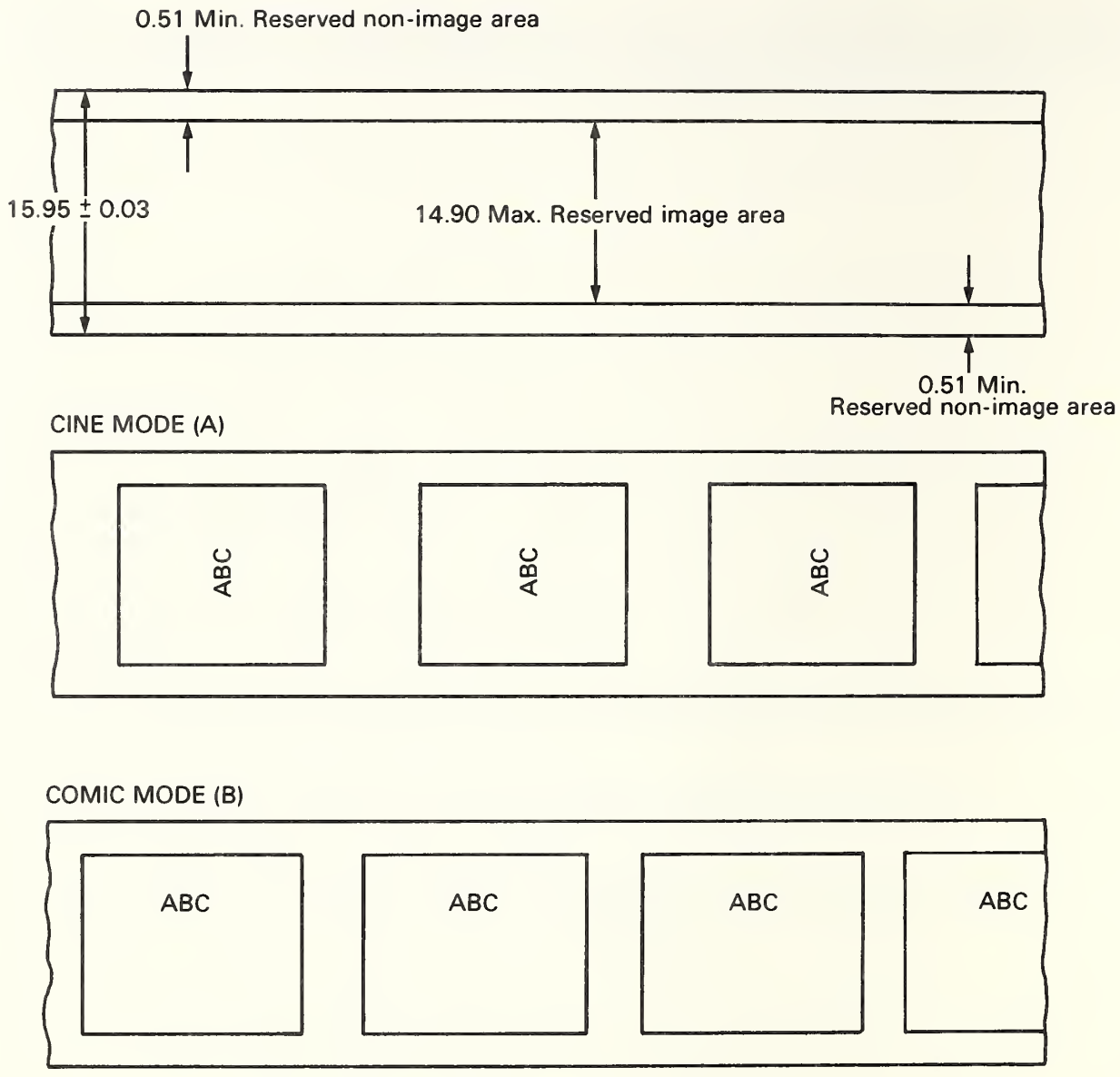
A document that establishes engineering and technical limitations and applications for items, materials, processes, methods, designs and engineering practices.

System

(1) All the hardware, software, microforms, etc., employed from production through utilization.
(2) An assembly of elements used to fulfill an application requirement.

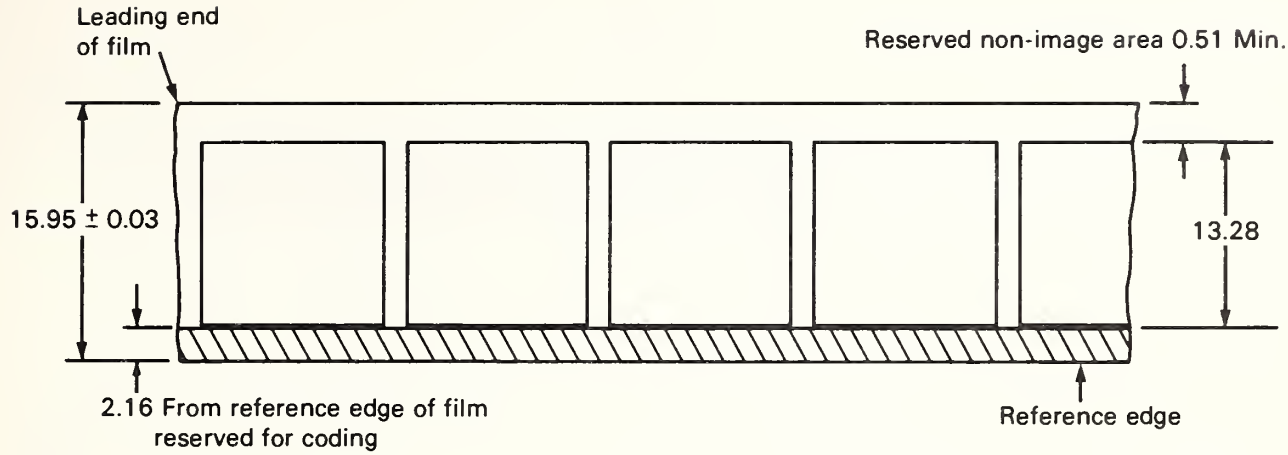
6. Dimensioning. The dimensions used in this standard are expressed in the metric system (SI), all dimensions shown being in millimeters. See FIPS PUB 34, Guide for the Use of International System of Units (SI) in Federal Information Processing Standards Publications, and Z210.1 (ASTM E380-76) ANSI Metric Practice Guide (Appendix B, References 5 and 6).

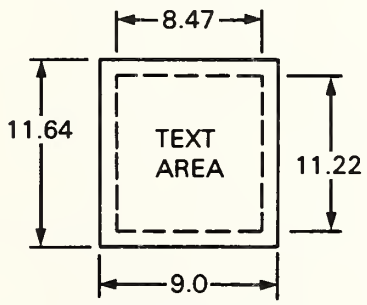
FIGURE 1. 16mm Roll Microfilm 24:1



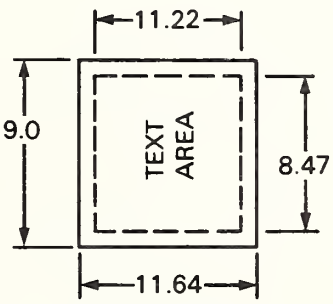
1. Effective reduction 24:1
2. Dimensions in millimeters.
3. See ANSI/NMA-MS14-1978 *Specifications for 16mm and 35mm Microfilm in Roll Form* (3)

FIGURE 2. 16mm Roll Microfilm, Document Mark (Blip), 24:1

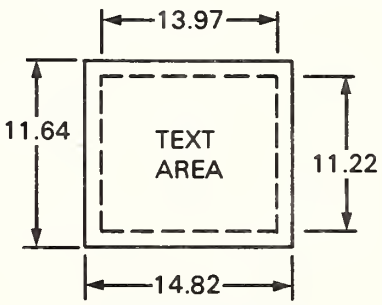




COMIC MODE (B)
Fig. 2a



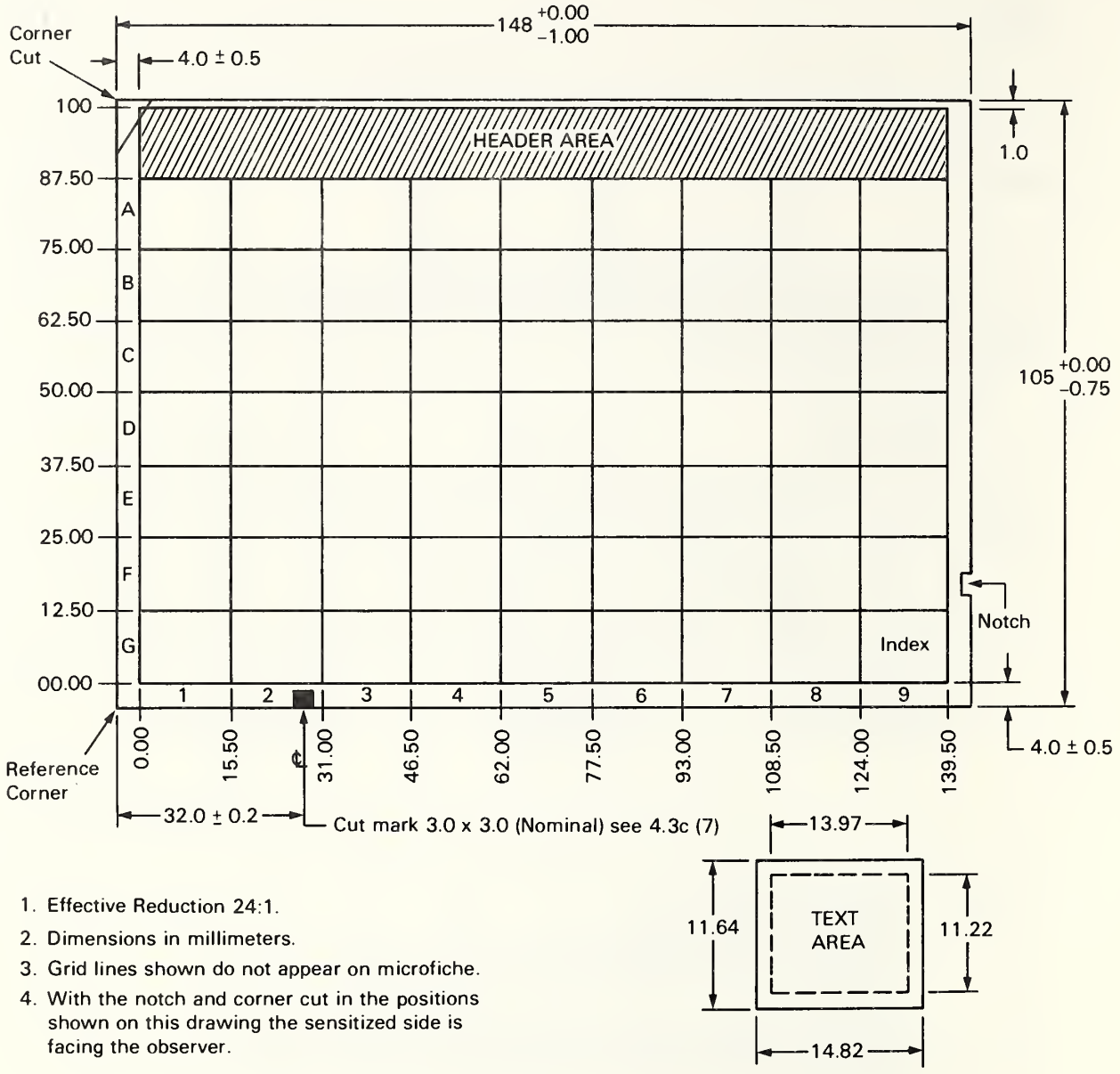
CINE MODE (A)
Fig. 2b



COMIC MODE (B)
Fig. 2c

1. Effective reduction 24:1.
2. Dimensions in millimeters.
3. The text area shown in figure 2a and 2b represents the data placed on a 215.9mm x 279.4mm (8.5 x 11 in) page (typically 64 lines of 80 characters).
4. The text area shown in figure 2c represents the data placed on a 355.6mm x 279.4mm (14 x 11) page (typically 64 lines of 132 characters).
5. See ANSI/NMA-MS14-1978 *Specifications for 16mm and 35mm Microfilm in Roll Form* (3) and PH5.20-1974 *Documents Mark (Blip) Used in Image Mark Retrieval Systems.* (4)

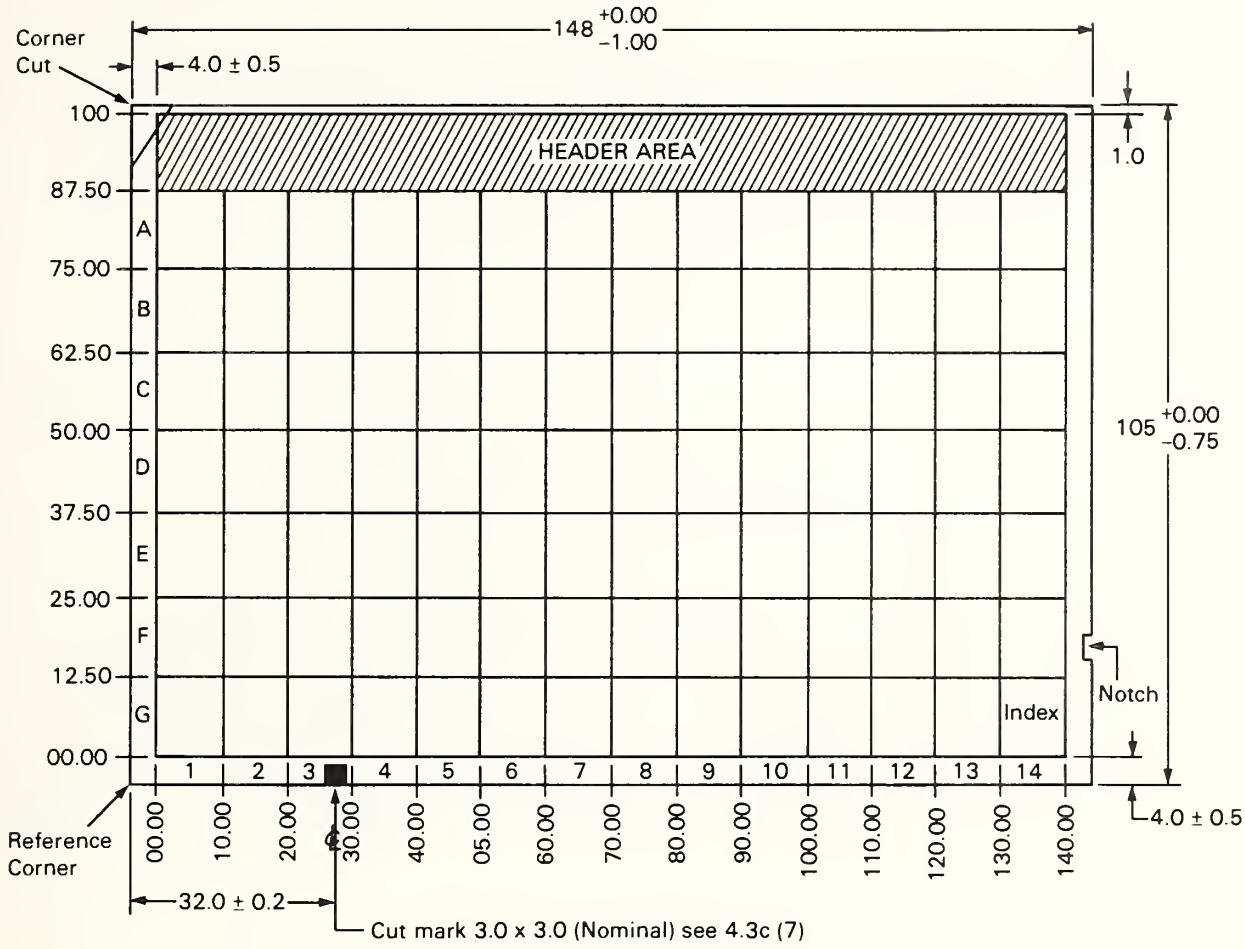
FIGURE 3. Microfiche 63 Frame (7 Rows X 9 Columns) 24:1



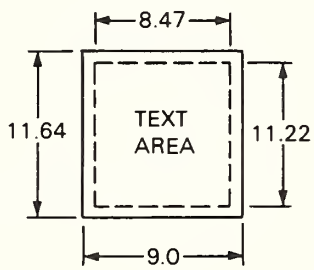
1. Effective Reduction 24:1.
2. Dimensions in millimeters.
3. Grid lines shown do not appear on microfiche.
4. With the notch and corner cut in the positions shown on this drawing the sensitized side is facing the observer.

The text area shown represents the data placed on a 355.6mm x 279.4mm (14 x 11 in) page (typically 64 lines of 132 characters).

FIGURE 4. Microfiche 98 Frame (7 Rows X 14 Columns) 24:1

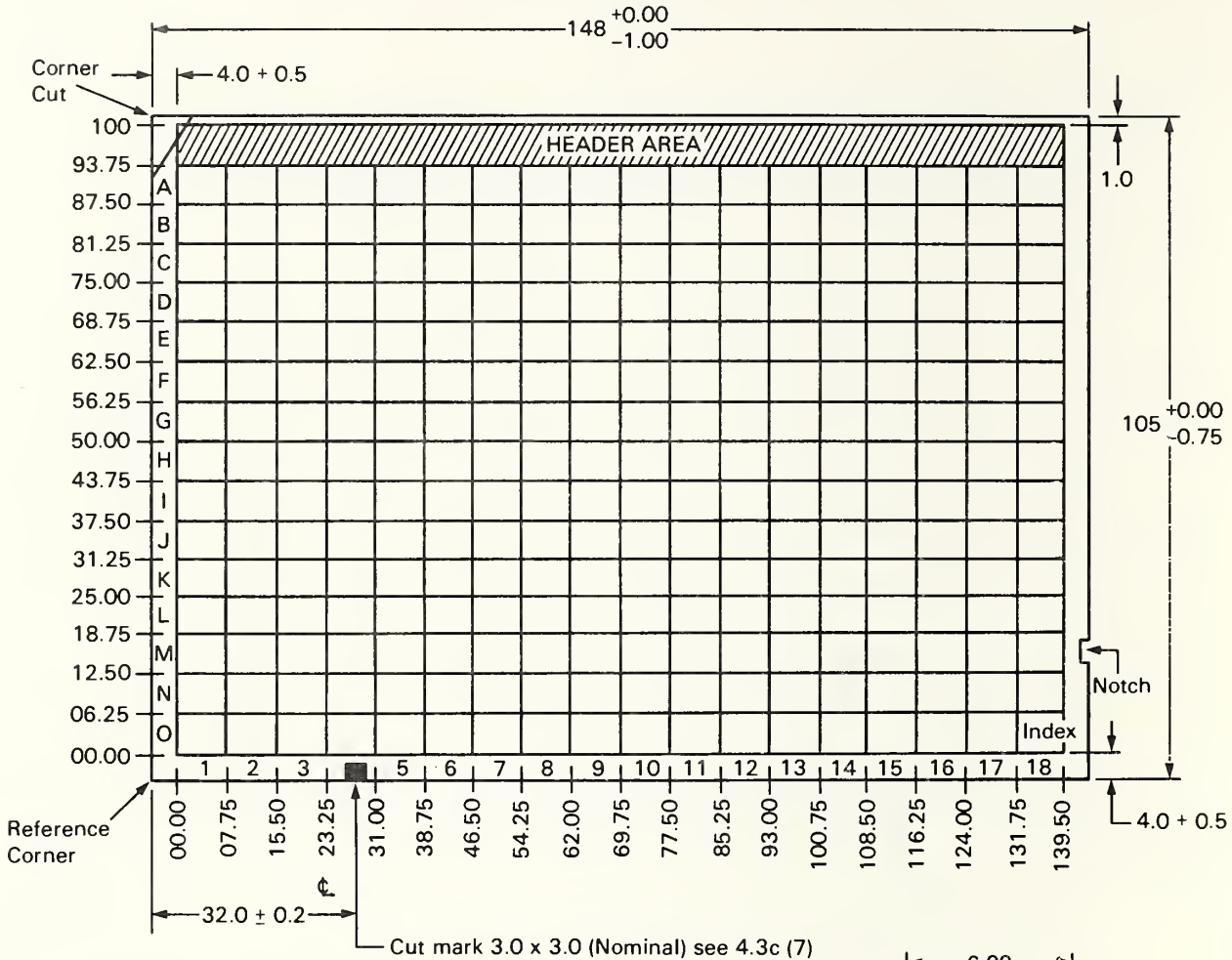


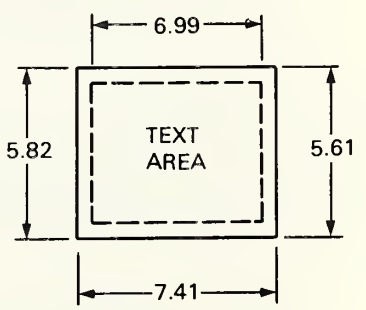
1. Effective Reduction 24:1
2. Dimensions in millimeters.
3. Grid lines shown do not appear on microfiche.
4. With the notch and corner cut in the positions shown on this drawing the sensitized side is facing the observer.



The text area shown represents the data placed on a 215.9mm x 279.4mm (8.5 x 11 in) page (typically 64 lines of 80 characters).

FIGURE 5. Microfiche 270 Frame (15 Rows X 18 Columns) 48:1

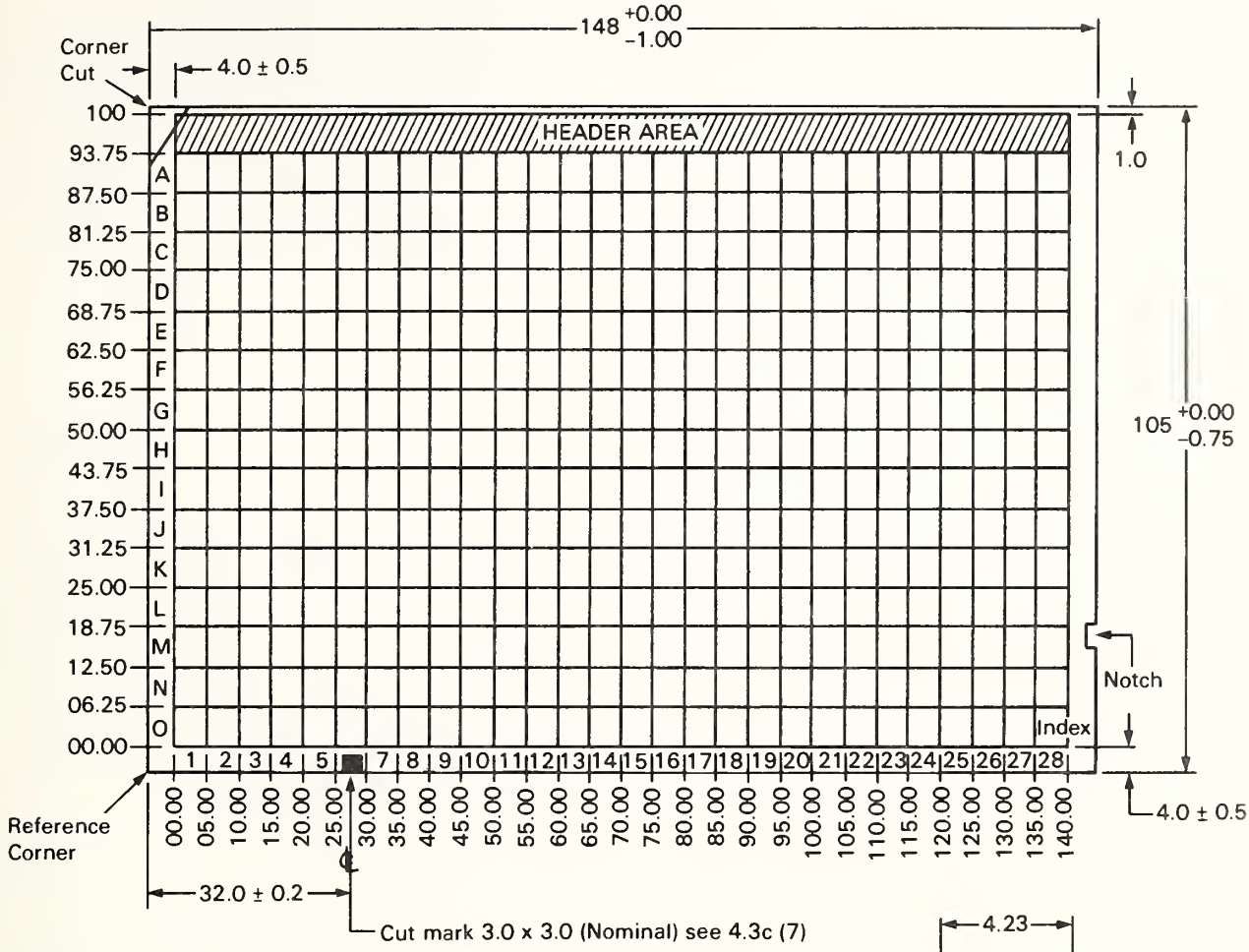


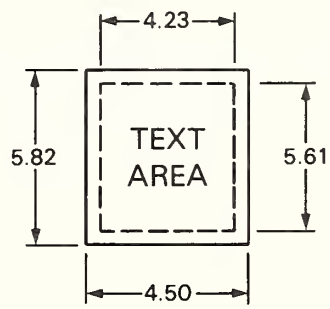


1. Effective Reduction 48:1.
2. Dimensions in millimeters.
3. Grid lines shown do not appear on microfiche.
4. With the notch and corner cut in the positions shown on this drawing the sensitized side is facing the observer.

The text area shown represents the data placed on a 355.6mm x 279.4mm (14 x 11 in) page (typically 64 lines of 132 characters).

FIGURE 6. Microfiche 420 Frame (15 Rows X 28 Columns) 48:1





1. Effective Reduction 48:1.
2. Dimensions in millimeters.
3. Grid lines shown do not appear on microfiche.
4. With the notch and corner cut in the positions shown on this drawing the sensitized side is facing the observer.

The text area shown represents the data placed on a 215.9mm x 279.4mm (8.5 x 11 in) page (typically 64 lines of 80 characters).

APPENDIX A

DIMENSIONAL CHARACTERISTICS OF MICROFICHE

The dimensions of microfiche at any time in its useful life are affected by temperature and moisture variations occurring in processing and storage of the microfiche. These changes in size affect the location of the images relative to the microfiche grid. The effect these factors have on the location of a specific image relative to the grid will be proportional to the distance the image is from the reference corner of the microfiche. Specific grid line locations are measured from this reference corner and the recommended grid line location tolerances for each grid line position are ± 0.5 mm for 24:1 and ± 0.2 mm for 48:1. It should be noted that microfiche to be used in automatic retrieval devices and printers may require tighter tolerances.

APPENDIX B

REFERENCES

1. American National Standard PH1.19-R1974, Designation of Emulsion Side of Photographic Sheet Films.

2. American National Standard PHl.29-1971, Methods for Determining Curl of Photographic Film.

3. American National Standard ANSI/NMA-MS14-1978, Specifications for 16 mm and 35 mm Microfilm in Roll Form.

4. American National Standard PH5.20-1974, Document Mark (Blip) Used in Image Mark Retrieval Systems.

5. Federal Information Processing Standards Publication 34, Guide for the Use of International System of Units (SI) in Federal Information Processing Standards Publications.

6. American National Standard Z210.1, Metric Practice Guide (ASTM E380-76).

NOTE: Microforms containing information of permanent value must be processed according to: Federal Property Management Regulations, Title 41, Code of Federal Regulations, Part 101, Subpart 101-11.5, Microfilming.

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