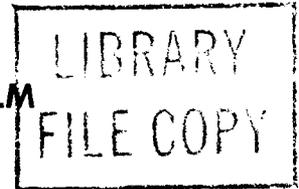


DOCUMENTS ON 16mm MICROFILM
INSPECTION PROCEDURES — SILVER MICROFILM



1. GENERAL

1.01 This section covers the inspection procedures for 16mm silver original microfilm.

1.02 This section is reissued primarily to revise the resolution test chart in 6.01. Since this reissue covers a general revision, arrows ordinarily used to indicate changes have been omitted.

1.03 Use care in handling microfilm to avoid scratching or otherwise damaging the microfilm, particularly the emulsion surface of the film. The use of clean, soft gloves in handling microfilm is recommended. All surfaces on which microfilm is placed should be wiped clean with a lint-free cloth.

2. EQUIPMENT, APPARATUS, AND MATERIALS

2.01 The following equipment, apparatus, and materials are required for inspecting silver microfilm. For densitometers, measuring magnifiers, and microscopes considered suitable for Bell System use, see Section 006-220-100.

General

Soft, White Gloves

Lint-Free Soft Cloths

General Quality, Centering, and Reduction Tests

Light Box and Rewind Unit

Measuring Magnifier

Transmission Density Tests

Densitometer

Eastman Kodak No. 3 Calibrated
Photographic Step Tablet

Resolution Test

Microscope

Archival Quality Test (It is recommended that this test be made by a commercial processor or a testing laboratory.)

3. GENERAL QUALITY

3.01 *Requirement*

(a) *Film*: All processed microfilm shall be free of scratches, foreign material, stains, or defects which make document information illegible.

(b) *Images*: All information on each document shall appear on the microfilm.

3.02 *Method of Test*: Inspect the reel 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 to determine that the film is free of scratches or foreign material which make information illegible. Examine doubtful areas of the film with the magnifier. Where document images show overlap, foldover, or missing portions, the reel should be checked to see that the same documents appear in their entirety either immediately after the defective images or in a strip of refilmed documents spliced to the beginning of the reel. See Section 006-210-100.

4. REDUCTION

4.01 *Requirement*: The reduction test strip appearing in each test target image shall indicate a reduction of minimum 23X, maximum 26X.

4.02 *Method of Test*: Position a test target image on the light box. Place the measuring magnifier over the test target image and adjust the lens for a clear, sharp image. Position the magnifier scale over the reduction test strip (see Section 006-210-100) and note the reduction read at a point 0.500 inch from the beginning of the strip. Refer to Fig. 1 for an interpretation of the reduction test strip markings and corresponding reductions. The reduction determined from this check should be mini-



Fig. 1 – Reduction Test Strip and Reductions Calibrated

mum 23X, maximum 26X. Repeat this procedure for each test target image contained on the reel of microfilm.

5. TRANSMISSION DENSITY

5.01 General: Transmission density is a measure of the opacity of the film. A densitometer which measures diffuse visual transmission density shall be used for measuring transmission density. The densitometer passes a beam of light through a selected area of film to a photoelectric cell which activates a density scale. The manufacturer's instructions should be followed in setting up the densitometer and preparing it for use. The densitometer should be calibrated for transmission density measurement using the Kodak No. 3 Calibrated Photographic Step Tablet as a standard.

Caution: Replace the photographic step tablet when it becomes scratched or otherwise damaged.

Base Plus Fog Density

5.02 Requirement: The average base plus fog density shall be maximum 0.12 after the film has been processed.

Note: Base plus fog density is the density of film which has not been exposed, but which has been developed and fixed.

5.03 Method of Test: Measure the transmission density of an unexposed area between document images. Take readings on three such areas, one from the beginning, middle, and end of each reel of film. Where image spacing is too small to permit taking readings between images, two readings, one at the beginning and end of the reel may be used. The average of these readings shall not exceed 0.12. This test should be performed initially and at least once a month thereafter. It also should be performed when

changes in chemicals, film type, or significant changes in processing speed or temperature are made.

Document Image Background

5.04 Requirement: The average transmission density of the document image background (the area of the document image exclusive of linework, lettering, or other information) shall be minimum 0.90, maximum 1.30.

5.05 Method of Test: Measure the transmission density of the document image background with the densitometer. Take readings on three document images, one from the beginning, middle, and end of each reel of film. The images chosen should contain sufficient background area to accommodate the full light beam. Take readings through at least three separate background areas in each image. The average of the three readings taken on each image shall be minimum 0.90, maximum 1.30.

6. RESOLUTION

6.01 General: Resolution is a measure of the sharpness of an image and is expressed in the number of lines per millimeter which can be distinguished. To assure uniform test conditions in checking resolution, measure the average transmission density of the test target image background with a densitometer. The average density of each target image background should be between 0.90 and 1.30. The density of this background has no bearing on the resolution requirement other than to provide uniform test conditions, and failure to meet this density shall not be cause for rejection. Resolution is measured by examining a microfilmed resolution test chart (see Fig. 2) under a microscope to determine which of the 21 patterns on the test chart is 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 photo-

graphed indicates the resolution in number of lines per millimeter. On a rotary camera, recurrent loss of synchronism between film and document during microfilming will usually be indicated by a resolvable small pattern accompanied by one or more unresolvable larger patterns. Such synchronism losses may be due to excessive vibration, line voltage fluctuations, improperly cleaned or maintained camera, and/or other factors.

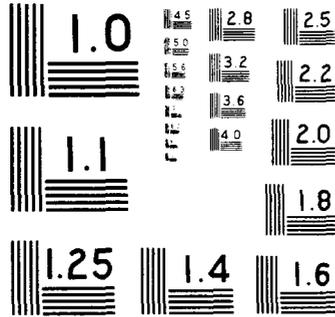


Fig. 2 - Resolution Test Chart

6.02 Requirement

- (a) **Resolution:** The processed microfilm shall have sufficient resolution to permit resolving the following test chart pattern.

| TYPE OF CAMERA (See Note 2) | TEST CHART PATTERN (See Note 1) |
|--------------------------------|------------------------------------|
| Planetary | 4.5 |
| Rotary | 2.8 |

Note 1: This will insure a resolution of minimum 64.4 lines per millimeter on rotary cameras and minimum 103.5 lines per millimeter on planetary cameras at 23X reduction.

Note 2: 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, one in each corner and one in the center, is indicative of microfilm produced on a planetary camera. A target containing three diagonally arranged resolution test charts indicates microfilm produced on a rotary camera.

- (b) **Synchronism:** All resolution test patterns from 1.0 to 2.8, inclusive, shall be resolvable on processed microfilm produced on a rotary camera.

6.03 Method of Test: Check the resolution of each of the resolution test charts which appear on the test target images on each reel of film with a microscope of approximately 60X magnification. Place one of the test target images on the stage of the microscope and position it so that one of the resolution test charts is centered in the stage. Adjust the microscope to obtain a clear, sharp image and determine whether lines can be distinguished both horizontally and vertically in the required test chart pattern. On film exposed in a rotary camera, check that lines can also be distinguished in each of the successively larger patterns. This test should be repeated on each of the other resolution test charts in the test target image. The lowest resolution obtained from the resolution test charts should meet requirement 6.02. The test should then be repeated on each of the other test target images on each reel of film.

7. ARCHIVAL QUALITY

7.01 General: Archival quality is a characteristic which refers to the permanence of the image on the film. The permanence of the image is adversely affected if excess ammonium or sodium thiosulphate (hypo) remains on the processed film. In view of the complexity of the archival quality test and since it involves the use of poisonous solutions, it is suggested that a testing laboratory or the commercial processor (if involved), perform this test and certify that the processed microfilm meets the archival quality requirement specified herein.

7.02 Requirement: The residual thiosulphate content of exposed and processed silver microfilm shall not exceed 0.005 milligram per square inch of film. The test of archival quality shall be performed within 24 hours after the microfilm has been processed. These requirements and the method of test are specified in USA Standards PH 1.28 and PH 4.8. This test should be performed initially and at least once a month thereafter. It also should be performed when changes in chemicals, film type, or significant changes in processing speed or temperature are made.

8. IMAGE CENTERING

8.01 Requirement: Document images shall be centered across the film width such that a space of minimum 0.020 inch exists between all parts of the image and the film edges.

8.02 *Method of Test:* Inspect the reel of film for document images which have edges or corners close to either film edge. Any image appearing near the film edge should be checked on

the light box with the measuring magnifier. Measure the shortest distance between the edges of the document image and the film to determine that requirement 8.01 is met.