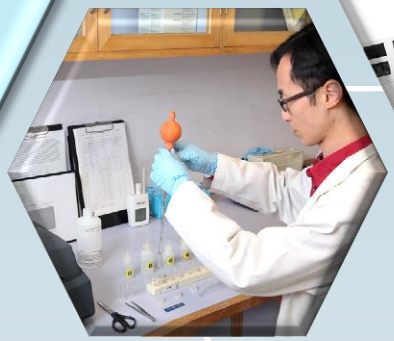
RECORDS MANAGEMENT PUBLICATION NUMBER FIVE

The Microfilming User Manual



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The Microfilming User Manual

Government Records Service
March 2018
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Preface

The Microfilming User Manual is intended for managers who do not have technical training in micrographics but wish to use microfilming technology to improve the management of government records. Officers-in-charge of departmental micrographic operation will also benefit from this publication which gives the details of current government microfilming policy, guidelines and requirements. Further technical information and advice can also be obtained from the Government Records Service and from the section on “Suggested Reading” listed in this manual.

Purpose of the Manual

This manual is for government bureaux and departments (B/Ds) to follow in considering and carrying out microfilming operations. Its objectives are to:

a. Provide an overview of basic microfilming operation;

b. Explain the criteria of selecting records for microfilming;

c. Provide guidelines and standards for microfilming records;

d. Define the general procedures to be followed by B/Ds in microfilm production;

e. Introduce the microfilm services provided by the Government Microfilm Centre of the Government Records Service (GRS) and the procedures in using its services; and

f. Provide guidelines for the storage, handling and use of microfilm records and the selection of retrieval equipment.

The provisions and processes set out in this manual are applicable primarily to silver gelatine film. They are recommended for B/Ds when producing microfilm records in-house or contracting for microfilm services from external service provider in order to achieve image quality and stability.

B/Ds using microfilm records as court evidence should refer to sections 39 and 40 of the Evidence Ordinance (Cap. 8). Please refer to Chapter 6 for more details regarding the requirements of destroying the original documents after the production of microfilm copy.

This manual does not include specific procedures to microfilm books, bound materials or engineering and cartographic materials, nor does it cover the details of diazo, vesicular, colour or computer output microfilm. B/Ds may contact the GRS for advice on microfilming any type of records.

Definitions, procedures and technical requirements found in this manual are made with reference to the standards and publications by the International Organization for Standardization (ISO), and the American National Standards Institute/Association for Information and Image Management (ANSI/AIIM) standards. A glossary of terminology is provided at the end of the manual.

CHAPTER 1

The Basics of Microfilming

1.1 General Characteristics of Microfilm

Microfilm is a valuable tool in records management. It is a very stable medium for recording documentary information and it is second only to good acid-free paper in its permanence under suitable storage condition. Moreover, microfilm is well standardised, court admissible and a technology-obsolescence proof medium for long-term storage in both the government and private sectors.

Nevertheless, the photographic material nature of microfilm remains relatively fragile. Microfilm will be unreadable if it is not produced correctly. It will deteriorate if it is not processed properly. It is easily damaged when it is handled carelessly and it will decay if it is stored in unsuitable conditions. Thus we need some basic understanding of microfilming technology before we can make full use of it to meet specific needs and requirements.

1.2 What is Microfilm

Microfilm is a fine grained high resolution film that can store images from textual, graphic and computer records with the use of microphotography. It is a traditional photographic material: a plastic, transparent support (base) coated with a photosensitive material (emulsion) on one side.

1.3 What is Microfilming

Microfilming involves the use of a specialised type of camera to photograph records and reduce them in size for storage. To be used, microfilm images must be magnified and projected on a viewing screen known as microfilm-reader, or captured by electronic means in a scanner and viewed on computer display.

1.4 What is Micrographics

Micrographics involves techniques and processes associated with the production, handling and use of microfilm of different types and in different formats.

1.5 Microfilm Production Methods

There are primarily two types of microfilm production methods:

a. **Source Document Microfilming** in which microimages on film are produced by photographing paper records.

b. **Computer-Output-Microfilming (COM)** in which microimages on film are produced from digitally encoded data from computers without the use of paper.

This manual covers mainly the operation and control of source document microfilming systems.

1.6 Types of Microfilm

Five types of microfilm are commonly used: Silver gelatine Film, Diazo Film, Vesicular Film, Transparent Electrophotographic Film and Dry Silver Film. Table 1-1 gives a comparison of the five different types of microfilm.

a. Silver Gelatine Film

Silver gelatine film is used as original camera film and may also be used to make duplicates. It requires wet processing and produces a reversed image (negative). Only silver gelatine film is recommended for filming permanent records or records which requires to be preserved for a long period of time.

Microfilm for permanent preservation must use polyester based silver gelatine film which is chemically inert, dimensionally stable, resistant to tearing and inflammable. When silver gelatine film on polyester base is properly processed and stored, it has a life expectancy of 500 years.

b. Diazo Film

Diazo film contains layers of diazonium salt as dye in the emulsion. It is used exclusively for duplicating and is a direct printing film (producing a negative duplicate from a negative master and a positive duplicate from a positive master). Because of its lower cost, high resolution capability and scratch resistance, it is often used for making reference copies.

Diazo film, however, is relatively unstable and will fade especially when exposed to light (e.g. prolonged exposure in a microfilm reader). It is not a permanent storage medium.

Table 1–1 Comparison of Five Different Types of Microfilm

Film Type	Durability (Life Expectancy)	Application	Wet Processing	Cost
Silver gelatine on polyester base	Long term (500 years)	Original and duplicate	Yes	Expensive
Diazo	Short to medium term (10 years)	Duplicate	No	Inexpensive
Vesicular	Short to medium term (10 years)	Duplicate	No	Inexpensive
Transparent Electrophotographic	Short to medium term (10 years)	Updatable microfiche	No	Inexpensive
Dry Silver	Short to medium term (10 years)	COM	No	Fair

c. Vesicular Film

Vesicular film consists of small bubbles within a plastic layer and the bubbles scatter light and thus producing a visible image. It is sign reversing which means it produces a positive duplicate from a negative master and vice versa. Although it is commonly used for the duplication of silver gelatine film, it is not recommended as permanent storage medium for the bubbles in the film can be deformed upon the effect of elevated temperature and pressure.

d. Transparent Electrophotographic Film

Transparent electrophotographic (TEP) film is a kind of microfiche with the advantage of being updatable. Unlike the conventional silver gelatine microfilms which cannot be changed once they are produced as the image forming process is irreversible, the production of TEP film uses a photo-conductor to capture the latent images. Visible images are formed by depositing and fixing carbon particles onto a polyester film base. The newer images can be added onto the old images and therefore it is updatable. It allows rapid processing and almost instant access to recorded information.

e. Dry Silver Film

Dry silver film or thermal-processed silver (TPS) film is used in specific COM technologies to speed up image processing. As it does not require wet processing, the turnaround time is faster. However, it does not meet the strict permanent storage requirements established for wet processing and silver gelatine microfilm.

1.7 What is Microform

Microform is a generic term used to describe any of the various formats used in micrographics.

1.8 Common Formats of Microform

The common formats of microform widely used by the government, academic institutions or commercial organisations include the following:

a. 16mm and 35mm Roll Film

Roll film is an inexpensive microform containing a series of images like a motion picture film but with no perforation along the edges. While roll length varies, 100 feet in 0.005 inch in thickness and 215 feet in 0.0025 inch in thickness are most common.[1] It is normally used for filming information that needs to be kept in sequence. This type of packaging provides file integrity as it ensures that documents filmed in sequence are not lost or misfiled.

Roll Film

Roll film may be placed into a plastic film case known as cartridge which protects the film from dust, fingerprints or other damage. Cartridge also permits automatic threading of the film into some microfilm readers with such function.

Cartridge

Rolls of microfilm with width of 16mm are commonly used for filming correspondence, cheques, invoices and forms which are of relatively small size such as B5 and A4. The wider 35mm films are often used for microfilming larger documents such as maps, newspapers, engineering drawings and records of archival value that require clearer and higher image quality.

[1] Microfilm in roll film format available commercially are commonly measured in imperial units.

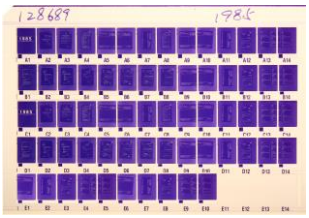
b. 35mm & 105mm Aperture Card

Aperture card is made of a single frame of 35mm roll film inserted into an aperture window in a card. Aperture cards are primarily used for engineering drawings. The larger 105mm film is sometimes used for extremely large engineering drawings and maps. The common size of an aperture card is 83mm x 188mm.

Aperture card with 35 mm film

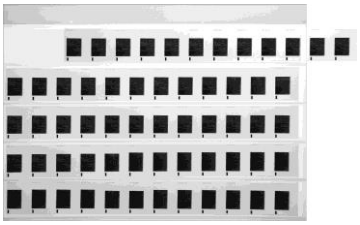
c. Microfiche

Microfiche comes in different sizes. A typical microfiche is a sheet of 105mm x 148mm microfilm on which a series of images are arranged in rows and columns. A header is also provided for human-readable identification. The number of images that can be captured on a microfiche depends on the reduction ratio. For example, 98 pages of A4 documents can be stored on one microfiche with 7 rows x 14 columns at a reduction ratio of 24X.



Microfiche format is most suitable for applications such as manuals, catalogue, engineering files and micropublishing.

1.8.1 Microfilm Jacket



A microfilm jacket is a transparent, plastic or card-stock carrier with single or multiple horizontal channels into which strips of 16mm or 35mm microfilm are inserted. With the use of a jacket, strips of film are protected and easily organised into units of information similar to microfiche. The films may be duplicated without removing the jacket. New microfilm records can be inserted into the jacket for information updating. Jackets are widely used for correspondence, legal, customers and insurance policy holder files.

1.9 Microfilm Hardware

The basic hardware of a micrographic system includes equipment for filming, processing, quality inspection, duplication, viewing, making hardcopies and storage. The minimum piece of equipment needed in an office to use microfilm records is a microfilm reader.

a. Filming Equipment

Planetary and rotary cameras are used in source document microfilming. The 35mm type planetary cameras produce films with excellent image quality, as the records being filmed are stationary and do not move through the camera. It also allows filming of small size documents of different thickness to large documents such as maps and plans. However, the throughput rates of planetary cameras are much lower than rotary cameras.

Planetary Camera

Rotary Camera for 16mm Roll Film

Rotary cameras are used with 16mm film and are designed for applications where throughput is the primary consideration. They are widely used in filming different types of business records including correspondence, forms and computer printouts. In filming, loose paper documents of up to A3 size are fed into an opening of the camera and are transported past a lens and a light source where images are recorded on microfilm moving at a synchronised speed. It is the fastest method of filming source documents. Filming speed can be raised with the use of automatic feeding and stacking attachments to the camera.

b. Processing Equipment

Microfilm processors develop, fix, rinse and dry film in an automatic process as the film passes through the machine. Microfilm processors for silver gelatine film come in different sizes, speeds and capabilities. Most of them can accommodate 16mm, 35mm and 105mm film. They generally fall into two categories: tabletop and floor standing.

Deep Tank Processor

Tabletop processors are self-threading and can operate in normal office lighting. They provide a convenient way to develop exposed microfilm, particularly in a small-volume application, and can meet permanent image processing requirements. Floor standing (deep tank) processors, on the other hand, attain excellent microfilm development consistency, achieve permanent retention quality and maintain efficient use of development chemical compared to tabletop processors.

c. Quality Inspection Equipment

Microfilm quality control equipment should be used to check developed film for image quality. A high quality image is largely based on the complete capture of the documents on film and the levels of image density and resolution.

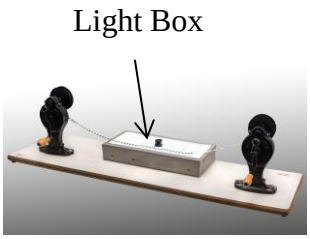
Density is the light-absorbing or light-reflecting characteristic of the film. Densitometer is the device used to measure if the film is too light or too dark for clarity of reading and for production of paper copies.

Resolution is the ability of film to record fine details clearly. Microscope, eye loupe/ magnifier and inspection table/light box are typically used to check the clarity of images of the developed film to ensure that acceptable levels of resolution are maintained.

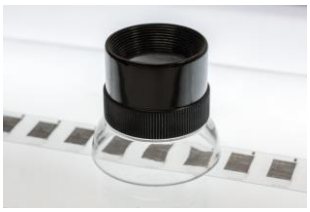
In addition, a methylene blue test kit is used to check the level of residual chemicals on the film. Figure 1-1 shows the equipment required for conducting quality inspection. The inspection procedures are explained in Chapter 5.

Figure 1-1 Quality Inspection Equipment

Inspection Table



Inspection Station



Eye Loupe/Magnifier

Densitometer

Microscope

Methylene Blue Test Kit

d. Duplicating Equipment

Microfilm duplication is the production of microfilm copies from a microfilm master. The master film is usually the camera original film. An intermediate master may be created from the camera original film and be used as the printing master for further duplication. Unlike original microphotography which is an optical process, microfilm duplication relies on contact printing technologies using silver gelatine, diazo or vesicular film.

Duplicating different kinds of film for different microforms often requires different types of duplicator. There are machines which combine duplicating with reformatting capabilities such as card-to-roll duplicators and microfiche-to-roll duplicators.

Duplicating Equipment

e. Viewing and Printing Equipment

i. Microfilm Reader

Microfilm Reader

Microfilm images must be magnified and projected for viewing. Basic types of readers to magnify and view microfilm include desk readers and free standing units. Availability of extra lenses and accessories for viewing different microforms vary according to models and user needs. Readers for 16mm and 35mm roll film require reel mounting and film threading. Readers for 16mm cartridges are typically self-threading.

ii. Microfilm Reader-printer

Microfilm reader-printer combines the functions of a reader and a copying machine to produce a hard copy of the documents.

For automated retrieval units, they are applicable to 16mm cartridge film. They combine a reader or a reader-printer with a device that automatically retrieves the desired image. In retrieval, the operator enters the frame number of the image on the keyboard and the film will then be advanced to the required image. The film, however, must be image-marked (blipped) by the camera during filming before it can be used in any automated retrieval unit. Details on image indexing are discussed in Chapter 5.

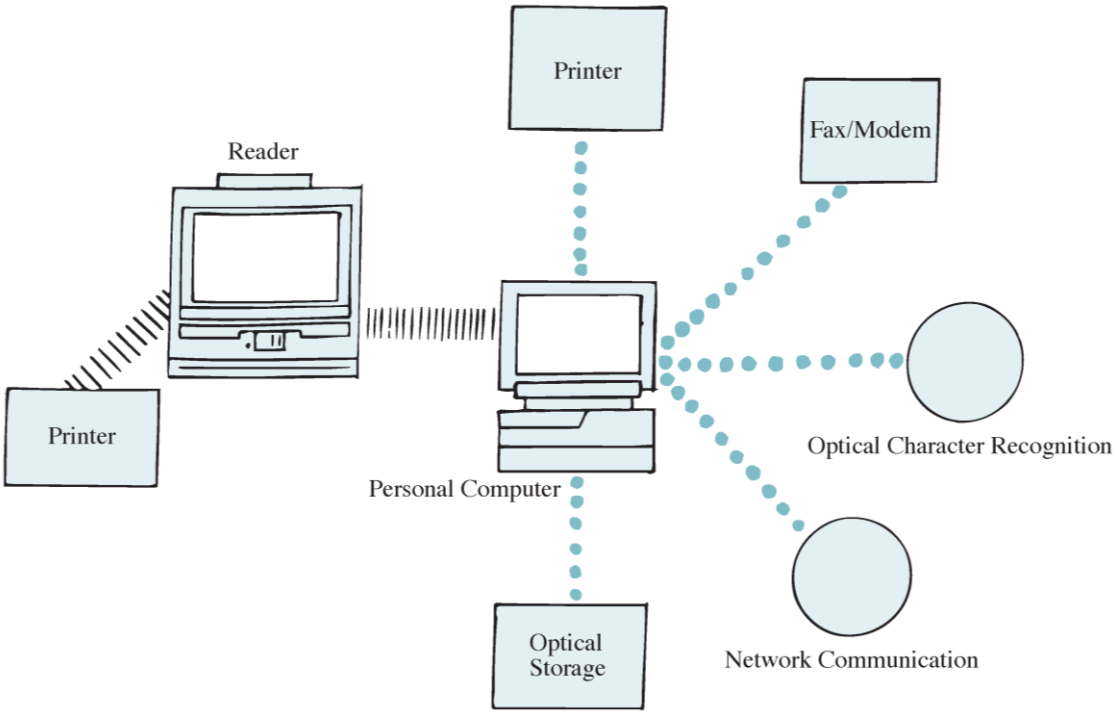
Reader-printer

iii. Digital Microfilm Scanner-printer:

Digital microfilm scanner-printer supplements the function of a microfilm reader with digital imaging and printing technology. It scans microimages directly from the microfilm and displays the images on the monitor of the PC. The digitalised images can be processed and stored in different media, including CDs, flash memory, and printed out with the use of a printer. The images can be sent to fax machines or to other PC users by E-mail. Figure 1-2 shows the workflow of digital microfilm retrieval system.

Digital Microfilm Scanner-printer

Figure 1-2 Digital Microfilm Retrieval System



f. Storage Equipment

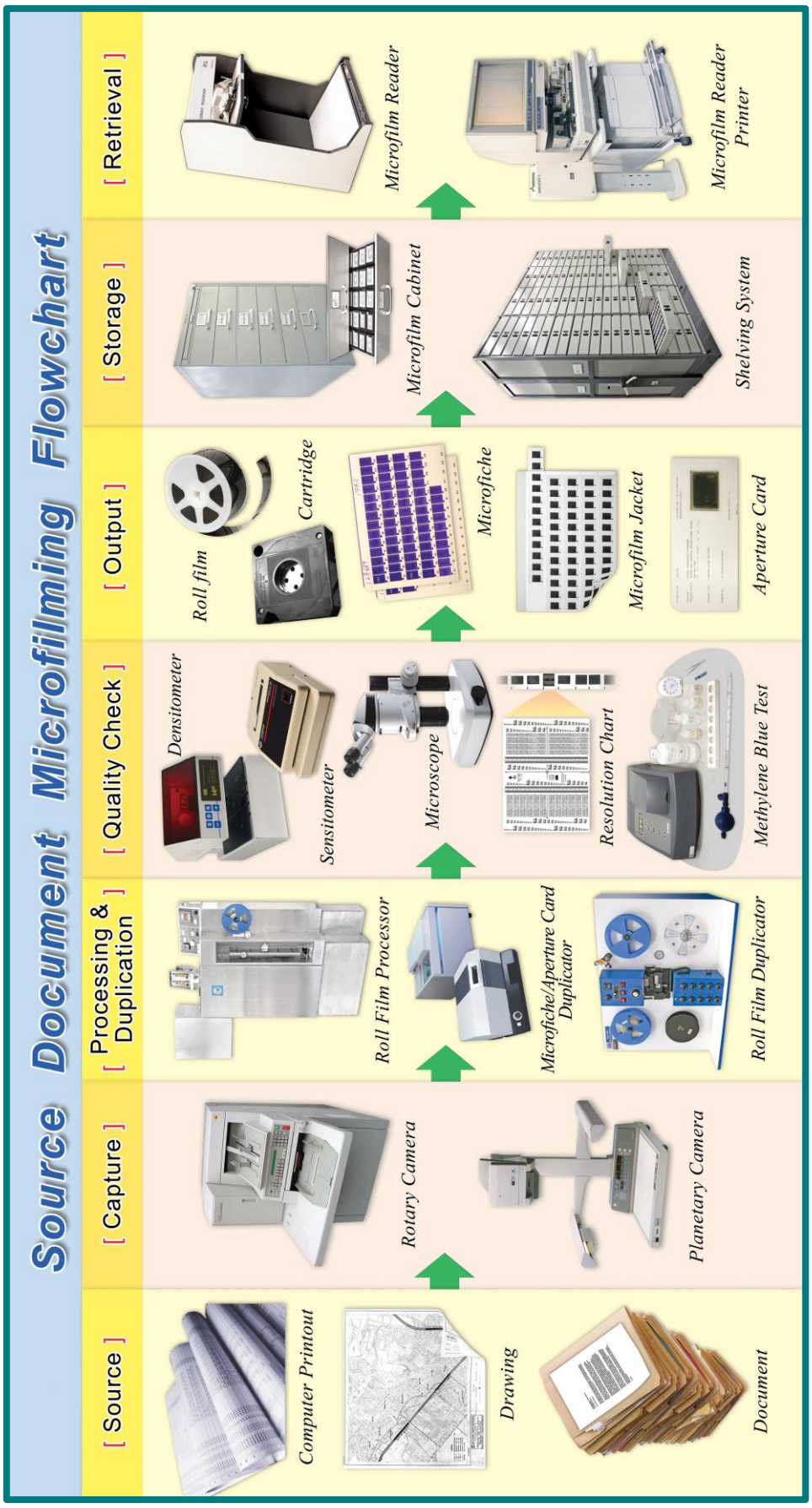
Microfilm Cabinet

Microfilm storage cabinets, specialised shelves and units of different configurations are available from a variety of manufacturers. Cabinets, metal shelves and carrousels are frequently used for housing roll film and cartridges whereas trays and cabinets are used for storing microfilm jackets, microfiche and aperture cards. Further information about microfilm storage equipment can be found in Chapter 6.

Mobile Microfilm Storage System

Figure 1-3 summarises the workflow and the equipment used in source document microfilming operation.

Figure 1–3 Workflow in Source Document Microfilming



CHAPTER 2

Choosing Microfilming Applications

2.1 Microfilm Versus Other Records Media

Not many people like to use microfilm when they can afford to work with piles of paper. Some may avoid the use of microfilm completely as they believe it is an outdated technology. While paper and optical disk/CD may continue to have certain advantages (and disadvantages), one should not overlook the many benefits of microfilming which not only justify the applications but keep the microfilming industry going for decades. Table 2-1 gives a brief comparison of paper, electronic and microfilm records.

Table 2–1 Comparison of Paper, Electronic and Microfilm Records

Factors	Paper	Electronic	Microfilm
Quantity stored	Fair to poor	Excellent	Excellent
Visual quality	Excellent	Excellent to good	Excellent to good
Durability	Excellent to fair	Good to poor	Excellent to fair
Security	Excellent to good	Excellent to fair	Excellent to good
File integrity	Excellent to poor	Excellent to fair	Excellent to good
Legality	Excellent	Excellent to good	Excellent
Retrieval	Good to poor	Excellent	Good to fair
Transmission ease	Fair to poor	Excellent	Good to fair
Duplication ease	Good	Excellent	Excellent to good
Ease of maintenance	Excellent to good	Fair	Excellent to good
Human-eye readability	Excellent	Poor	Good
Familiarity of users with system	Excellent	Excellent	Good
Costs of (re)production	Good to poor	Excellent to good	Fair

2.2 Advantages of Microfilming

The advantages of microfilming are numerous. The following are the prime reasons for the popularity of micrographic systems:

a. **Storage Space Savings** - Microfilm records typically save up to 95% of the space occupied by paper originals. Using microfilm records to replace paper originals helps reduce records storage requirement and operating costs.

b. **Durability** - Microfilming is a proven technology for storing records of long retention period. When microfilms are properly produced, handled and stored, they can have a life expectancy up to 500 years.

c. **Preservation of Information Integrity** - As documents are placed in their proper arrangement in a fixed unalterable sequence and captured on film, they are most likely to stay in correct order despite heavy and prolonged use.

d. **Cost-effective Records Protection** - Duplicate sets of film can be made and stored off site cost-effectively. Microfilm is a popular storage medium for the back-up copies of vital records.

e. **Prolonged Durability of Valuable Original Records** - With availability of the microfilm copy, valuable original records can be retired from active use so that damage and loss of information caused by constant or excessive handling can be avoided.

f. **Easy Access and Distribution** - Light weight duplicates can be produced and distributed easily.

g. **Court Admissibility** - If the filming, processing and disposal of records are properly conducted, microfilm by law is admissible as court evidence.

2.3 Common Microfilming Applications

Common applications include newspaper-clippings, personnel records, accounts receivable/payable, purchase orders, service records, reports and publications, health care records, contracts, payroll records and income tax returns, etc. The list is virtually endless. These applications are relevant to all B/Ds. While there are few paper work situations where the application of modern micrographic techniques can be ruled out as a way of improving information storage and access, there are limitations which potential users should be aware of before deciding on conversion.

2.4 Limitations of Microfilm

Microfilm is not a cure-all. The technology in a basic application does not normally bring dramatic improvement for the records system already in place. Microfilm should not be expected to eliminate weaknesses such as poor file organisation or indexing in a recordkeeping system. Depending on individual applications and circumstances, microfilming may have the following limitations:

a. Microfilming requires labour, equipment and supplies. For microfilm users, a microfilm reader is required for viewing the images and a microfilm reader-printer for the production of hard copies.

b. Physical conditions of records have to be good for microfilming.

c. Microfilm records are mostly not updatable except for the use of updatable microfiche technology.

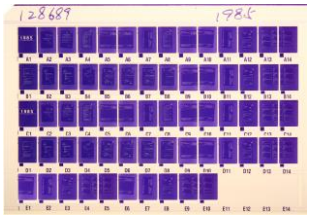
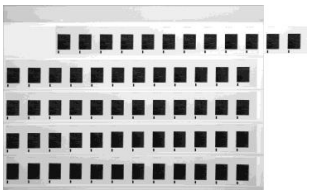
d. Durability and usability of film is governed by many factors such as the quality of film used, proper processing control, appropriate storage condition and handling.

e. User resistance may be encountered for those who are not familiar with the microfilm equipment.

2.5 The Choice of Microforms

The basic microfilm formats should be understood clearly and considered, as the selected format of a micrographic application can greatly facilitate the use of the microfilmed images. Table 2-2 summarises the advantages and characteristics of various microforms.

Table 2–2 Characteristics of Various Microforms

Microform	Characteristics	Application	Costs
 35mm Roll Film	Excellent image quality and file integrity	Archival and/or oversized records	Expensive
 16mm Roll Film	Good to fair image quality, high speed production and excellent file integrity	Business correspondence, invoices, cheques, cards and forms	Inexpensive
 35mm Aperture Card	Insertion of single frame of 35mm roll film into aperture window; having the same image quality as 35 mm roll film	Large engineering/ architectural drawings and maps	Expensive
 Microfiche	Sheet of microfilm containing a series of microfilm images and may be updatable; good to fair image quality	Manuals, catalogues, indexes and finding aids	Inexpensive
 Microfilm Jacket	16/35mm film strips inserted into transparent plastic carrier, allow information updating	Correspondence files, press cutting files and customers and policy holder files which are required to be updated	Expensive

2.6 Factors to Consider in Microfilming Conversion

Microfilming all types of records is not cost-justifiable. Some types of records such as fragile documents and records with colour variations or illustrations are difficult or even unsuitable for microfilming as silver gelatine microfilm cannot record the colour information. Moreover, blurred copies of records do not microfilm well. Defects on the original documents may distort the information on the microfilm. Decisions as to what should be microfilmed must come from careful consideration of the following:

a. **Physical Characters of Records to be Microfilmed** - Records in loose formats are much easier and faster to microfilm than bound volumes. Depending on the resolution characteristic of the camera used, records with very small characters may not be clearly captured on microfilm.

b. **Overall Quality of Documents** - Records must be legible and in good physical condition to permit clear capture of image and withstand handling during microfilming. Torn pages require costly and time-consuming pre-filming preparation work before they can be microfilmed properly.

c. **Retention Period of Records** - Usually it may not be cost-effective to microfilm unless a record is to be kept for at least 7 years.

d. **Volume of Records** - Microfilming is more cost-effective if it is applied for large quantity of records because it involves investment in equipment and supplies.

e. **Update Requirements and Frequency** - Records which require constant updating are not generally suitable for microfilming.

f. **Access Frequency and Number of Copies Required** - These affect indexing requirements, the choice of equipment and overall costs.

g. **Inactive Status of Records** - Microfilm only closed records unless you are willing to invest in a computer assisted retrieval system.

h. **Legal Requirements** - Records required as court evidence should be microfilmed rather than converted into other media of which legality is not clear.

i. **Quality Requirements** - Users should not ignore the importance of image quality characteristics of different microfilm formats. If the microfilm is intended for preserving the information of the source document for a long period of time, high image quality is a must.

2.7 Where to Microfilm

The fundamental choice is to decide whether the work should be done in-house or through outsourced service by external service providers.

2.7.1 In-house Filming

The acquisition of all the equipment and supplies, personnel and space required for a microfilming operation can be very expensive and specialised. But the advantages include better security and confidentiality, availability of records in emergency during filming, and better quality control.

2.7.2 Filming by External Service Provider

Since a service provider is a commercial microfilm business, employing its service may offer the distinct benefits of expertise and experience, cost savings in production equipment, and avoidance of specialised personnel of an in-house operation. However, service provider's work may have problems in terms of quality deficiencies, slow turnaround time, interruption of office routine by the activity of the service provider, and loose security control of records.

If a B/D employs an external service provider to carry out its microfilming programme, the B/D concerned must be satisfied that the operation of the service provider provides adequate security for the documents, and adequate documentation and procedural control to ensure that the produced films are usable, durable and court admissible as required. There should be full documentation which describes the types and categories of records to be microfilmed, the microform to be used, the indexing techniques, the appropriate reduction ratio of each application, specifications of microfilming and quality control procedures, and technical standards to be used. The service provider's services should be reviewed from time to time and the microfilm output should be checked systematically and regularly.

2.7.3 Microfilming by the Government Microfilm Centre

The Government Microfilming Service Centre of GRS was set up in April 1997 to provide centralised microfilming services for B/Ds. It was renamed as the Government Microfilm Centre (GMC) in July 2004. The benefits of centralised filming are a combination of those enjoyed by in-house filming and using a service provider. A centralised programme whose sole task is to microfilm is more likely to provide quality work than those where micrographics is merely one of the many functions. Moreover, it will be able to provide a broader range of services than what can normally be supplied within an office itself. Further, staff members of GMC are full time trained staff, their expertise and efficiency should result in cost savings and better quality work.

Finally, records security and confidentiality can be better assured. GMC's functions and services are detailed in Chapter 3.

2.8 Checklists for Conversion

Regardless of who will conduct the microfilming, the user and the microfilming party should be clear about the terms under which the microfilm will be provided and their respective responsibilities. In particular, the following issues should be considered:

- ❑ The quantity of records to be microfilmed;
- ❑ The price to be paid if that applies;
- ❑ The responsibilities and the extent of document preparation;
- ❑ The responsibilities for identifying the records to be microfilmed;
- ❑ The types of microform to be used;
- ❑ The types of film and reduction ratios to be used;
- ❑ Film indexing requirement and preparation;
- ❑ The filming and processing standards required;
- ❑ The number of film copies required;
- ❑ The custody or ownership of the master negative;
- ❑ Post-filming source documents preparation/arrangement; and
- ❑ Records disposal requirements for both source documents and the microfilm records.

2.9 How to Start a Microfilming Project

A microfilming project must be accessed and weighed in terms of its costs and benefits. To ensure the economical and operational feasibility of the project, a detailed system analysis should be conducted for the planning, design, evaluation and implementation of the proposed application.

The following work steps are suggested for the system analysis:

a. Determine user needs;

b. Examine documents and data files that will serve as input into the micrographic system;

c. Select the appropriate microform;

d. Determine the records retention period, film quality, microfilm standards requirements and number of copies to be produced;

e. Plan for microfilm production capabilities including equipment specifications, workflow and training;

f. Gather information about the requirements and costs of in-house production, contracting out to a service provider and using the microfilming service of GMC;

g. Plan for microfilm retrieval and storage equipment and facilities;

h. Prepare system cost estimates and cost justification analysis for equipment and furniture costs, supplies, facilities, personnel time and consultants' assistance where applicable; and

i. Consider a "test run" of the planned conversion process in order to decide on the procedures needed and to determine how long the entire conversion will take place.

A comprehensive and accurate system analysis is critical for a successful microfilming application. B/Ds requiring assistance are welcome to contact GRS for information and advice.

CHAPTER 3

Government Microfilm Centre (GMC)

3.1 Establishment of GMC

Arising from a feasibility study by the Records Management Strategy on the need of establishing centralised microfilming facilities within the Government, the Government Microfilming Service Centre was established in April 1997 under GRS. It was subsequently renamed as GMC in July 2004.

3.2 Functions and Services of GMC

GMC aims at providing customer oriented microfilming services for B/Ds where substantiated requirements are identified. GMC adopts ANSI/AIIM standards in its microfilming operations to ensure the usability, durability and court admissibility of the microfilm records it produces. GMC's functions and services include the following:

a. **Technical Advice** - To provide technical advice and information on microfilming procedures and systems including assistance in indexing design to facilitate microfilm retrieval.

b. **Filming of Source Documents** - To provide filming services on 16 mm silver gelatine polyester roll film according to the needs and requirements of B/Ds.

c. **Processing and Duplication** - To provide film processing and duplicating services on silver gelatine film for B/Ds.

d. **Quality Control** - To conduct quality control including laboratory tests on the microfilm produced.

e. **Arrangement of Records and Microfilm Delivery** - To assist B/Ds in arranging the delivery of source documents to GMC for microfilming; and to deliver processed microfilm to B/Ds.

f. **Storage Facilities for Microfilm** - To provide microfilm storage for the master microfilm in accordance with international standards.

g. **Coordination of Records Disposal** - To coordinate with Records Management and Administration Office and the Public Records Office to dispose of the filmed source documents after quality inspection of the microfilm copy.

3.3 Records Filming Criteria of GMC

GMC provides free microfilming services for B/Ds primarily on 16mm silver gelatine roll film format. The selection criteria for filming are as follows:

a. Size and Weight

i. Document should be in A4 size while small quantity of records from A6 to A3 may also be accepted.

ii. Paper in each document/folder/batch should preferably be of uniform size and weight.

b. Paper Format

Documents should be in loose sheets. Small quantity of other formats such as books, journals, computer printouts may be accepted.

c. Legibility and Paper Condition

i. Original records (source documents) should be of reasonable legibility.

ii. Imperfections on records such as stains and obliteration that affect legibility may not be accepted.

iii. Paper should be legible with little variations in the colour of paper and ink used.

iv. Fragile documents and documents with torn pages and/or corners may not be accepted.

d. Records Integrity

Records used as legal evidence must be the original/official copy produced from official transactions in natural accumulative order. Any missing pages or file-weeding/culling prior to filming must be specified.

e. Retention Periods

B/Ds must clear the records retention and disposal schedule for the records to be filmed with the Records Management and Administration Office and the Public Records Office. Records should preferably be of retention period of at least 7 years.

f. Requirement for Updating

Records should require minimum or no additions, deletions or alterations.

3.4 Procedures in Using GMC's Services

B/Ds interested in using GMC's services should follow the procedures below:

a. B/Ds should forward request for microfilming services to GMC using form GMC 1 (Appendix A).

b. If requirements for microfilming application are substantiated, GMC will assist the B/D in clearing the records disposal requirements with the Records Management and Administration Office and the Public Records Office.

c. Technical filming details and indexing requirements will be specified by GMC in consultation with the B/D.

d. The B/D should arrange to send records to GMC at its own cost.

e. Records to be microfilmed must be packed in filming order. A filming list showing the exact filming order should be attached using form GMC 2A & 2B (Appendix B).

f. The records will be microfilmed, checked, boxed, indexed, labelled and delivered to B/Ds for inspection together with the standard memo form GMC 3A (Appendix C).

g. The B/D should check the quality and the accuracy of the microfilms delivered, and confirm with GMC acceptance of the microfilms using the standard memo form GMC 3B (Appendix D). If the B/D is not satisfied with the microfilms and requires retake, it should make a request within the specified period by GMC after receipt of the microfilm copy using form GMC 3B (Appendix D).

h. GMC will confirm with the B/D to undertake suitable disposal action for the source documents according to their records retention and disposal schedule(s).

i. GMC will provide an additional duplicate microfilm copy for the B/D on a need basis.

j. The B/D will be responsible for purchasing its own microfilm reader or reader-printer and other micrographic system hardware.

3.5 Pre-filming Preparation of Source Documents

Document preparation is one of the most important components of a successful micrographic project. Attention must be given to this crucial step to ensure that efficient and quality filming can be achieved.

Records are often microfilmed in the order in which they were originally created and maintained. Unless a random file arrangement is used, special care should be taken to

retain that order. Before records are filmed by GMC, B/Ds should be responsible for undertaking the following preparation procedures:

a. Inspect original documents for illegible area or stains;

b. Remove clips, staples, rubber bands and fasteners from the source documents;

c. Repair or photocopy torn and damaged documents. Use frosted or invisible sticky tape to repair rips and tears;

d. Flatten rolled, folded and creased documents;

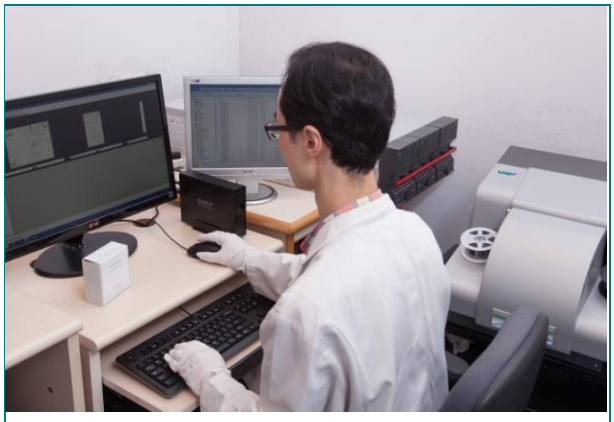
e. Identify illegible documents and insert a transcription of the record where applicable;

f. Identify missing pages or documents and insert a document missing target stating "Missing Page(s) at Time of Filming" into the records (Appendix E);

g. Arrange documents in sequential filming order facing the same heading direction; and

h. Pack documents in bundles with package labels, place in numbered boxes and deliver to GMC.

3.6 Request for Digitised Copy of Microfilmed Images



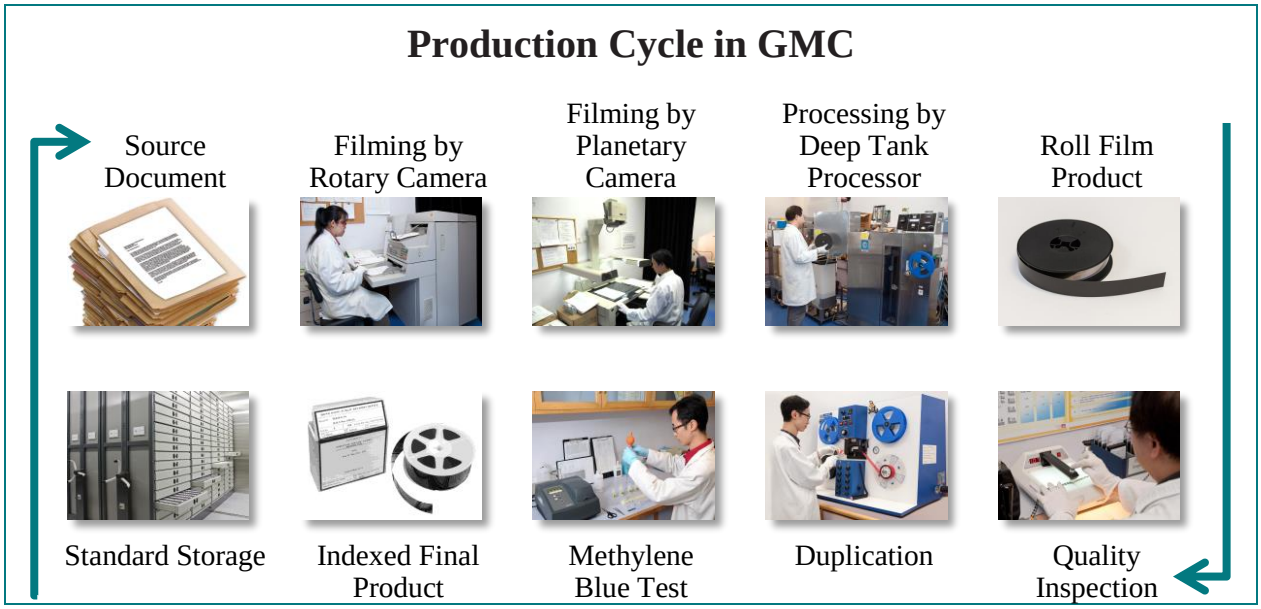
High-speed Microfilm Scanner

In addition to the microfilm copy which is the default deliverable of a typical GMC project, the B/D can also request a digitised copy of the microfilmed images. The purpose of the digitised copy is to facilitate easy access to the document images. The digitised copy will be in Portable Document Format (PDF) file which is accessible in most computer environments. Depending on the set-up of the network environment, the digitised copy can be accessed by more than one computer at the same time. Unlike the microfilm copy, GMC would not keep any back-up of the digitised copy and it is the responsibility of the B/D to properly protect the digitised copy from any accidents and disasters (such as data corruption, storage media deterioration and technological obsolescence) that may arise in the future.

Despite the high resolution and image quality of today's digitisation technology, the digitised copy produced from scanning the microfilm copy of the source documents can

only capture the source document images in black-and-white, all colour information, if any, in the source document will be lost. Should the B/D require colour digital images of the source document as in a typical digitisation project, they should seek service from external service providers.

Figure 3-1 Production Cycle in GMC



CHAPTER 4

Production Filming and Processing Control

4.1 General Requirements

Microfilming should be undertaken in such a way to ensure the full legibility of the resulting microform. This involves using the correct balance of lighting and exposure to achieve optimum density and resolution, and selecting the reduction ratio appropriate to the sizes of the documents to be microfilmed and the line densities of their text. Whether documents are microfilmed in-house, by external service providers or by GMC, appropriate filming standards and proper filming procedures must be established and followed to ensure consistent quality of the microfilm output.

4.2 Filming Archival Records, Permanent Records and Records for Legal Acceptance

Microfilm applications that capture records of archival/permanent and legal value should meet the requirements listed below to ensure film life and long term preservation of the information contained therein.

Sections 39 and 40 of the Evidence Ordinance (Cap. 8) stipulates that microfilm of government and business records are court admissible provided they are produced as permanent records and the source documents are disposed of afterwards. Thus the following should be noted and adhered to:

a. Silver gelatine polyester film is the required film type for generating microfilm records of archival/permanent value and records which require legal admissibility.

b. Conventional wet processing is recognised as the most stable processing method to achieve microfilm permanence.

c. All films including the microfilm master (also known as camera microfilm or first generation of microfilm), duplicate master (also known as print master or second generation of microfilm) and reference copy (also known as viewing copy or working copy is printed from the print master) should be inspected thoroughly to ensure image quality, stability and usability.

d. The microfilm master should be stored in proper storage conditions at all times to ensure that the information stored on microfilm is not distorted, retrievable and usable in the future.

e. To ensure longevity and court-admissibility of the microfilm records, there should be clear and well-documented operating procedures in document preparation, filming, processing, inspection, duplication, storage and disposal. Further information concerning microfilming standards and requirements for records with legal implications is given in Chapter 6.

4.3 Proper Microfilming Procedures

All stages in the microfilming process must be carried out under controlled conditions. The purpose is to ensure both microfilm quality and the credibility of the microfilming application/programme as well as to assist the responsible B/D to prove, if required, that the microfilmed image is a true reproduction of the original. To achieve these ends, whether or not the records to be microfilmed are of archival, permanent or legal value, the following microfilming guidelines and procedures are recommended:

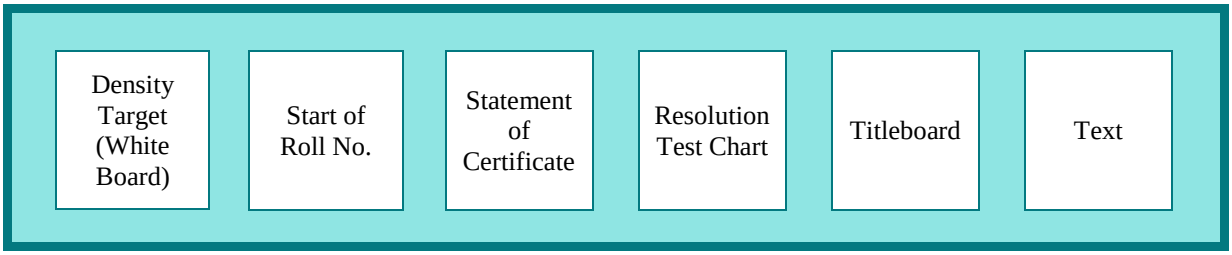
4.3.1 Preparation before Microfilming

a. Only trained operators who understand the capabilities of the equipment used and are familiar with the required operating procedures are allowed to microfilm documents.

b. Operators should perform equipment calibration and maintenance tasks regularly.

c. When documents arrive at the camera, they should be checked for the correct order with all the page headings in the same direction.

d. Insert and check targets (Appendix E) in the correct place for the proper filming order. Certain basic targets should be filmed on every roll to assure legality, and to aid in measuring film quality and identifying film contents. Suggested target filming order is as follows:



e. Additional targets such as indexing target, reduction ratio target, correction target and retake target should be filmed where needed (see Appendix E for samples).

f. Conduct step test to determine the correct exposure setting in order to achieve the desired film density. According to ISO and ANSI/AIIM standards, the recommended densities for microfilm images are divided into 4 groups. They fall between 0.75 and 1.30 in negative appearing silver gelatine microfilm that has a minimum or clearest density of the film not exceeding 0.10. Table 4-1 gives the density range for different conditions of documents.

Table 4–1 Density Table

Group	Description of Documents	Density
1	High quality, high contrast printed books and periodicals, black type face, fine-line originals, black opaque pencil writing, and documents with small, high-contrast print.	1.00 - 1.30
2	Pencil and ink drawings, faded and very small print such as footnotes at the bottom of a printed page, scenic cheques, documents with printed pictorial images, and newspapers.	0.90 - 1.10
3	Low-contrast manuscripts and drawings, graph paper with pale, fine-coloured lines, letters typed with a worn ribbon, and poorly printed, faint documents.	0.80 - 1.00 (1:24 reduction or less)
4	Very low contrast (worst case) documents can require extremely low background	0.75 - 0.85 (1:24 reduction or less)

Source: ANSI/AIIM MS23-2004 Standard Recommended Practice - Production, Inspection, and Quality Assurance of First-Generation, Silver Microforms of Documents.

g. Determine the image orientation. Roll film is generally produced in 4 formats for arranging the images:

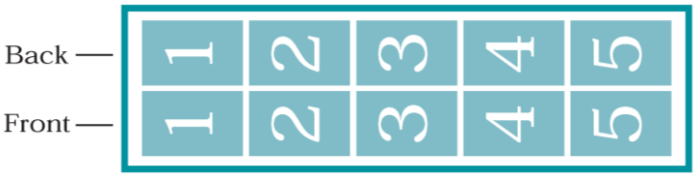
(1) simplex-comic orientation, where the images are filmed side by side, like a comic strip;

Simplex-comic orientation

(2) simplex-cine orientation where a single line of images is continuous, like motion picture film;

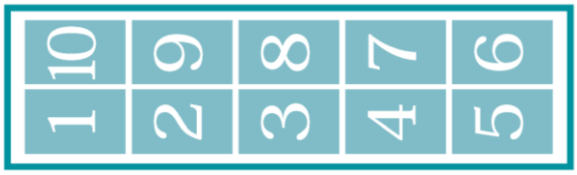
Simplex-cine orientation

(3) duplex mode, where both sides of a document are filmed simultaneously side by side; and



Duplex mode

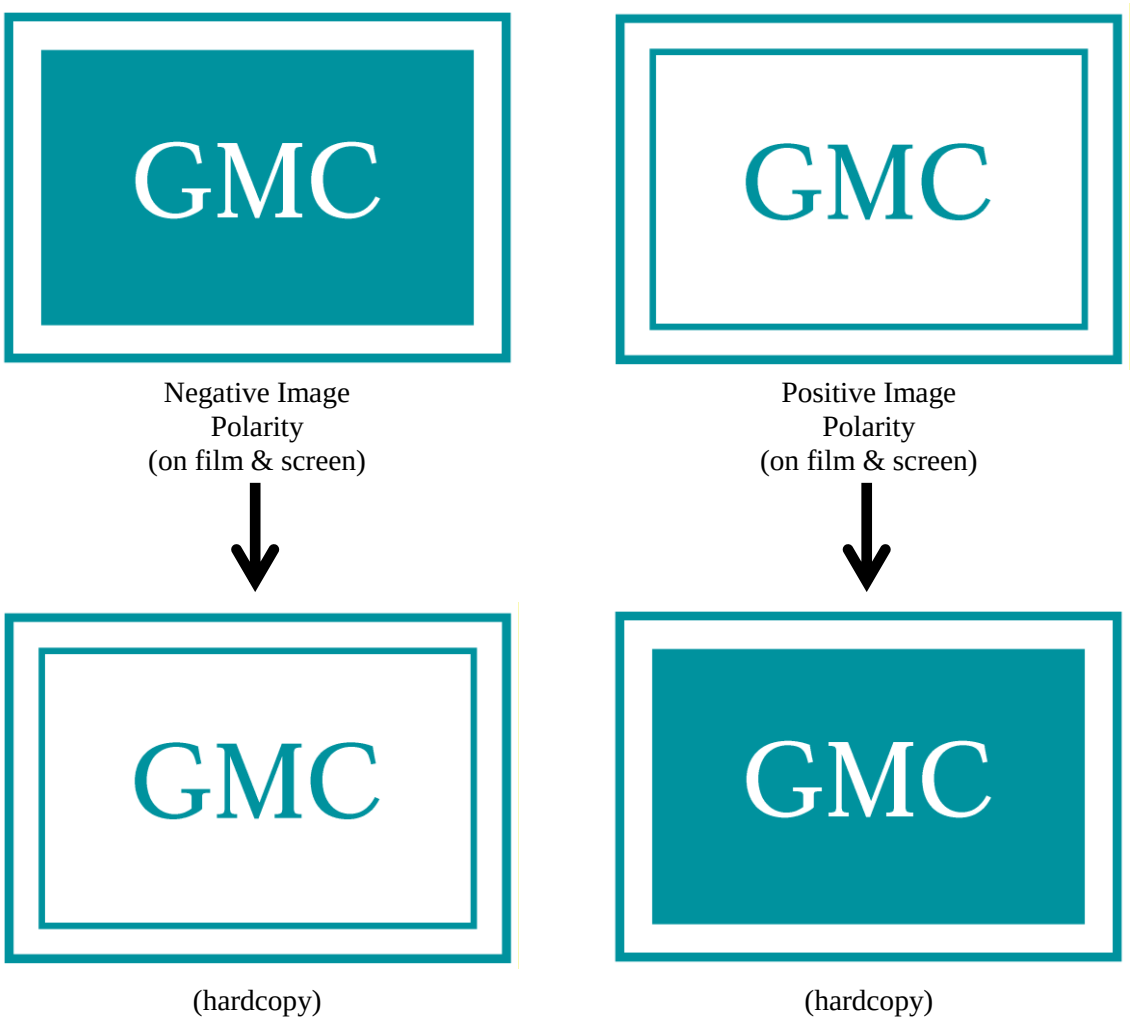
(4) duo mode, where the images run up one half of the film and back down the other half.



Duo mode

h. Determine the image polarity (negative or positive-appearing images). Negative-appearing image is a photographic image in which the lines and characters appear light against a dark background. Positive-appearing image is a photographic image in which the lines and characters appear dark against a light background. Figure 4-1 shows the difference between negative- and positive-appearing images.

Figure 4-1 Negative and Positive Images



Negative images have higher contrast, cause less eyestrain and generally produce higher-quality printouts than positive images. Positive images cause greater eyestrain.

i. Select an appropriate reduction ratio of the microfilm which is the number of times the size of the original document is reduced to form the image on microfilm. For example, a reduction of 24:1 means that the image on the microfilm is 1/24 the size of the original document.

The reduction ratio to be used in a microfilm system is determined by the size and contrast of the original documents, the size of text characters, the microfilm formats chosen, and the type of camera used for filming. User should determine the desired image quality and the reduction ratio that can achieve this quality. In general, lower reduction ratios provide higher image quality and larger images. A larger image is more tolerant of poor-quality original documents and resolution loss. Thus, a lower reduction ratio is preferable to a higher reduction ratio. The following reduction ratio chart showing the recommended reduction ratio for different document sizes is a useful reference.

Planetary roll-film camera (with adjustable film advance) — Approximate number of frames for 30.5 m (100 ft) roll of 16 mm or 35 mm film

Document dimension along length of film		Reduction ratio (simplex format)														
mm	in	1:8	1:10	1:12	1:14	1:16	1:18	1:20	1:22	1:24	1:26	1:28	1:30	1:32	1:34	1:36
102	4.0	2180	2670	2820												
152	6.0	1500	1850	2180	2510	2820										
203	8.0	1140	1410	1670	1930	2180	2430	2670	2820							
216	8.5	1070	1330	1570	1820	2070	2290	2530	2750	2980						
254	10.0	920	1140	1360	1570	1780	1980	2180	2380	2570	2760	2820				
305	12.0	770	960	1140	1320	1500	1670	1850	2020	2180	2350	2510	2670	2820		
356	14.0	670[1]	830	990	1140	1300	1450	1600	1750	1900	2040	2180	2320	2460	2600	2730
406	16.0		730[1]	870	1010	1140	1280	1410	1540	1670	1800	1930	2060	2180	2300	2430
457	18.0			770	900	1020	1140	1260	1380	1500	1620	1730	1850	1960	2060	2160
508	20.0			700[1]	810	920	1030	1140	1250	1360	1470	1570	1670	1780	1880	1980
559	22.0				740[1]	840	940	1040	1140	1240	1340	1440	1530	1630	1720	1820
610	24.0				680[1]	770	870	960	1050	1140	1230	1320	1410	1500	1590	1690
660	26.0					720[1]	800	890	970	1060	1140	1230	1310	1390	1470	1550
711	28.0					670[1]	750[1]	830	910	990	1070	1140	1220	1300	1370	1450
762	30.0						700[1]	770	850	920	1000	1070	1140	1220	1300	1370
813	32.0							730[1]	800	870	940	1010	1080	1140	1210	1280
864	34.0							690[1]	750[1]	820	880	950	1010	1080	1140	1210
914	36.0								710[1]	770	840	900	960	1020	1080	1140
965	38.0								680[1]	740[1]	790	850	910	970	1030	1080
1020	40.0									700[1]	760[1]	810	870	920	980	1030
1070	42.0									670[1]	720[1]	770	830	880	930	980
1120	44.0										690[1]	740[1]	790	840	890	940
1170	46.0											710[1]	760[1]	810	860	900
1220	48.0											680[1]	730[1]	770	820	870
1270	50.0												700[1]	750[1]	790	840
1320	52.0												670[1]	720[1]	760[1]	810

NOTES

1 Number of frames per roll = [Length of roll (less leader and trailer)]/[Film advance (pulldown)] = (1200)/(0.403 in) = 2980. Use either inches or millimeters, but *do not mix* the units of measurement.

[1] The numbers shown below the rule apply only to 35 mm film.

Source: ANSI/AIIM MS23-2004 Standard Recommended Practice - Production, Inspection, and Quality Assurance of First-Generation, Silver Microforms of Documents.

4.3.2 Actual Filming

a. To film, load the microfilm in the camera unit according to the manufacturer's instructions for film direction. The emulsion side must be facing the camera lens for images to be captured on the film.

b. After film loading, create a film leader by advancing the film between 600mm and 900mm before filming the beginning targets to prevent fogging on the film images.

c. In addition to the film leader, a minimum length of 1000mm film should be left at the beginning of the roll to accommodate for some reader machines with automatic threading capability. Where applicable, a minimum length of 140mm of film should be reserved for the methylene blue test. The latter should be conducted within 14 days after processing to ensure the film is washed properly. Details of the test are given in ISO 18917:1999.

d. When using a planetary camera, documents should be filmed flat to avoid losing information to shadows or creases. Where necessary, use glass plates or clear

plexiglass to achieve desired results. The entire documents should be placed in the photographic field of the camera. For oversized documents, they shall be microfilmed in sections with a minimum of 100mm overlap of the original material.

e. When using a rotary camera, the leading edge of documents must be as straight as possible. Trimming should be minimal so that no information is lost. Heavily taped documents should be fed through manually.

f. The integrity of the original records and the order of the record collection should be maintained during filming. Microimages of the records should be arranged, identified and indexed so that any individual documents or components of the records can be located easily.

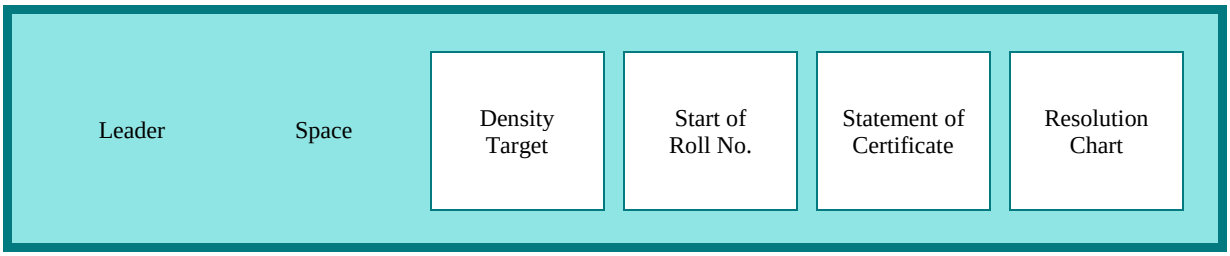
g. Occasionally a filming mistake may be noticed during filming operation and may be corrected on the spot, a film correction target must be used. This is to ensure that the original continuity of the documents has been maintained during refilming. If a filming error is found after the film is processed, amendment should be filmed with an amendment target and spliced to the start or the end of the roll it belongs to.

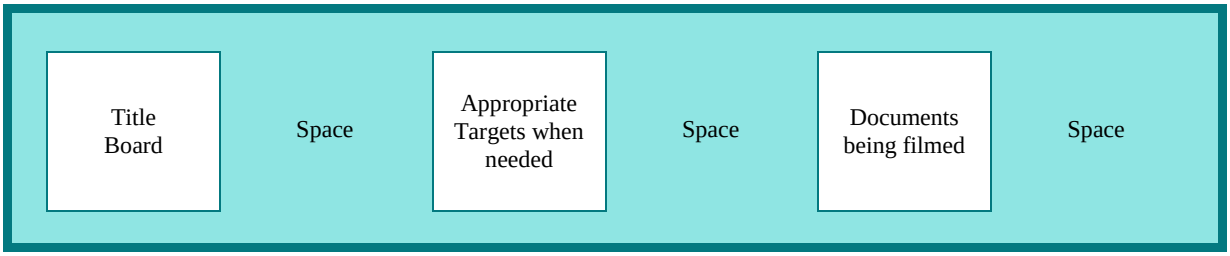
h. When the end of roll alarm sounds, be sure to wind all the film onto the take-up reel before unloading the camera. This film trailer prevents fogging in loading the film into the processor.

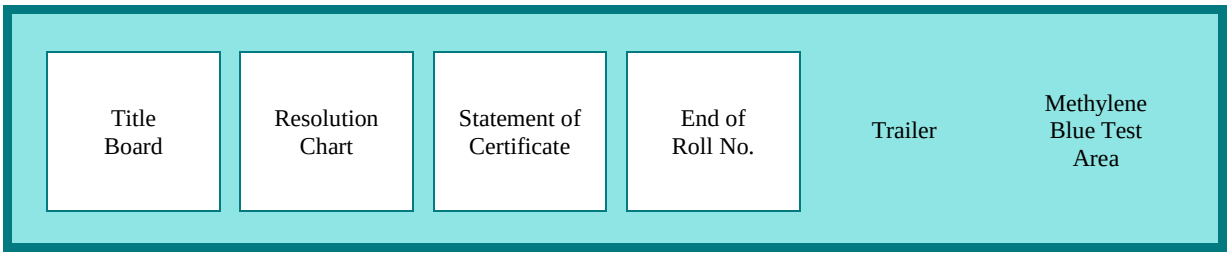
i. A minimum length of 700mm film should be provided at the end of the roll as a reader/duplicator trailer so that the last image can be viewed or duplicated steadily.

4.3.3 Filming Sequence

Filming should be conducted in the following suggested sequence:







4.4 Film Processing

Processing of different types of film requires different processors and procedures. This manual deals mainly with silver gelatine film. It involves the use of a processor, a mechanical device, which provides the exposed film with a series of chemical and physical treatments to produce photographic images.

4.4.1 Processing Elements

Conventional wet processing involves the following elements:

a. Film development which causes the exposed image to appear;

b. Stop bath or rinse which arrests development, prevents stains and helps preserve the life of the fixing bath;

c. Fixing which removes all undeveloped silver halide from the film emulsion layer;

d. Washing which removes residual processing chemicals from the film; and

e. Drying which removes moisture from the film. Drying needs to be carefully controlled to ensure the film is not damp or brittle.

4.4.2 Choosing a Processor

Processing affects image quality and whether the residual processing chemicals are properly removed from the developed film. The major factors include temperature, strength of the chemicals used and the processing speed. The following should be considered in choosing a processor:

a. Consistent density of film from roll to roll and day to day;

b. Uniform density;

c. Complete edge to edge processing;

d. Thorough washing to meet ANSI or ISO specifications on residual processing chemicals level;

e. Free from scratch, dust, water spots and physical deformation; and

f. Precision temperature control that should not exceed ±3°C from the temperature established as optimum for the film and processor.

4.4.3 Processing Control

To achieve quality results, processing control should be established where processor should be monitored regularly by using processing control strips to ensure consistent quality. The strips should be used at the start of processing each day, after changing chemicals and three or four times a day if a high volume of film is being processed.

CHAPTER 5

Microfilm Inspection, Duplication, Indexing and Retrieval

5.1 Quality Control Procedures

Microfilm must be inspected after processing to ensure that it meets the established standards for complete capture of image, clarity, usability and durability. Such flaws as blurs, poor resolution or density and photographic streaks must be detected immediately because they are often caused by equipment failures. They must be corrected promptly so that such defects will not be repeated in other films. In conducting film inspection, the following practices are recommended:

a. The microfilm after processing should be inspected as soon as possible to ensure technical specifications are met.

b. Film inspection should include measuring (i) resolution by a microscope and specialised resolution chart, (ii) density by a densitometer and (iii) amount of residual processing chemicals on the film by methylene blue test. The film should also be examined for image legibility.

c. Wear clean, lint free white cotton or nitrile gloves to handle microfilm with care. Do not leave the microfilm exposed to overhead lighting or direct sunlight which will cause fading of the image.

d. Conduct inspection in minimum ambient light and avoid fluorescent lighting which is notorious of significant ultra-violet light content.

e. Visually inspect the microfilm for the following by using a hand-held photographic measuring magnifier (6X to 15X loupe) and a light box while manually advancing the film on rewinds:

   - Evenness of focus and density across the frames;

   - Sharpness and clarity of the images;

   - Proper titling information;

   - Proper targeting of faults and any omission;

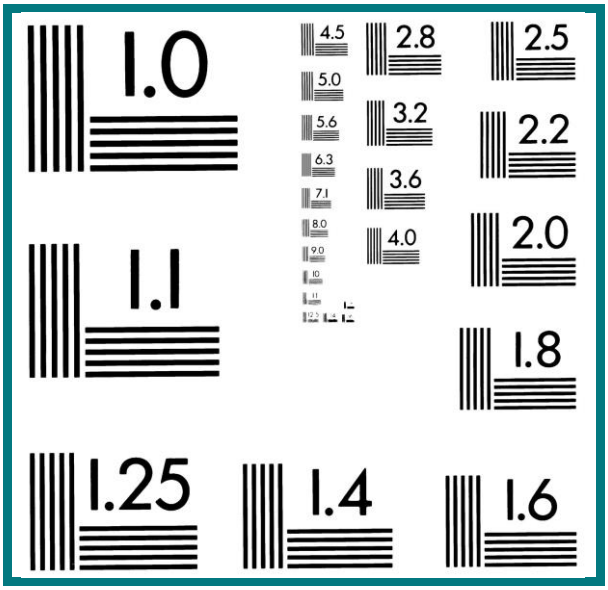
   - Proper sequence of documents and absence of any unintentional omission;

- Absence of mechanical damage such as scratch resulting from faulty camera or processing equipment.

f. Prepare and maintain an inspection report to note results of the quality check of each roll of film. The inspection report shall be signed and dated. Samples of the inspection report and defects guide are attached in Appendices F & G.

g. Use a quality 100X magnification microscope to check the smallest clear pattern shown on the filmed image of ISO Resolution Test Chart. This pattern number's numeric value multiplied by the reduction used is the resolution of the film. For example, if the pattern number is 5.0 and the reduction ratio is 24X, the resolution is 120 lines/mm (5.0 x 24X = 120). Values below 120 lines/mm indicate substandard resolution. The resolution of each roll of film must be estimated.

For the first generation of microfilm, the quality index at level 5[2] should be aimed at as the minimum. Detailed discussion of the Quality Index can be found in ANSI/AIIM MS 23-2004. Samples of resolution test chart are attached in Appendices H & I.



Resolution Test Chart

(NOTE: This chart is for illustrative purpose only and cannot be used for test purpose.)

Resolving power = Pattern Number x Reduction Ratio

e.g.	Resolving power Lines/mm		Pattern No. Lines/mm		Reduction Ratio
	113		7.1		16X
	120	=	5.0	X	24X
	135		4.5		30X

[2] Quality index at level 5 means the image quality is considered acceptable because on the final generation, all number and letter characters are legible. For more details on quality index, please refer to pages 46 to 51 of ANSI/AIIM MS 23-2004.

h. Measure the background and image density of the film with a densitometer. There should be general check of density evenness across a few sampled frames and between frames. The density of the images on a microfilm roll will vary depending on the type, age and condition of the original documents. Some poor quality, low contrast documents may require a density range of 0.75 to 1.00 while high contrast prints could be filmed at 0.90 to 1.30. The maximum allowable difference between highest and lowest density across a document of even background or between different documents of identical background should be +/– 0.08 on the density scale. If wide density variations occur, a retake of film will be necessary.

i. The excessive amount of residual processing chemicals (thiosulphate or fixer) left on microfilm will create blemishes and may adversely affect the images. Thus methylene blue test should be conducted to ensure that the microfilm is free from this condition. Details regarding the test are found in ISO 18917:1999. The maximum thiosulphate ion concentration allowed is 0.014 grams/square metre. The test shall be conducted within 14 days after processing of film. If the producer is an external service provider, it is advisable for the test to be conducted by an independent agency and relevant records be kept. All microfilm rolls that are found to have too high residual processing chemicals concentration must be re-washed until they meet the standard for preservation.

j. Completely unsatisfactory roll of microfilm should be rejected and refilmed all over. When individual frames of microfilm are defective, the related items/pages should be refilmed and the new film after rechecking should be spliced with the use of an ultrasonic splicer at the beginning or the end of the film with appropriate targets to instruct the viewer where the retaken images should appear in the document. Not more than three splices (six cuts) are allowed in a roll of film. The correct practice in splicing the correction is to include both the two images or frames before and following the correction in addition to the correction itself. There should not be any splices between the technical targets and the first or the last 10 images on a roll.

k. All images should preferably be visually inspected. Alternatively, the film should be checked every 3 metres for any major or minor defects to determine if retakes are necessary. A minimum of 10% visual inspection of randomly selected microfilmed images should be performed.

5.2 Microfilm Duplication

The original camera film is usually considered the preservation copy for the information the original documents contain. As silver gelatine film can be easily scratched with use, the creation of a microfilm duplicate for information retrieval and distribution is necessary to protect the preservation copy.

5.2.1 Different Generations of Microfilm

The original camera film is considered the microfilm master and each duplicate is considered a generation of the film. The master is the first generation, the duplicate made from the master is the second generation and the duplicate produced from the second generation duplicate is the third generation and so on.

Each successive generation of microfilm loses resolution or image clarity which may cause legibility problems. Thus duplicates for distribution and retrieval should be made from the master or the second generation film to achieve consistent legible quality. With good quality control practices during microfilming and processing, duplicates from the master and the second generation film should be of sufficient quality to ensure complete image legibility.

One fundamental strategy of preservation microfilming is to produce three generations of each microfilm. The first generation master is given long term secure storage while the second generation is used for generating duplicates and the third generation as the working or reference copy.

5.2.2 Factors to Consider in Making Film Duplicate

a. The master camera film should never be used for viewing. Its only purpose is to produce second generation copies, normally called intermediate masters or printing masters. The latter is used for making further copies or as reference copies.

b. Direct duplicating film (silver gelatine) is recommended to create a printing master. Reference or duplicate copies can be created using silver gelatine, diazo or vesicular film. The type of duplicate will depend on the quality and polarity requirements of the reference copy as determined in the information and system planning study.

c. Diazo film duplication produces a polarity maintaining copy, that is a positive appearing master produces a positive appearing duplicate of diazo microfilm. In contrast, the vesicular film duplication will produce a negative appearing duplicate from a positive appearing master. Though not easily damaged with use, both diazo and vesicular film are sensitive to elevated temperature and light, and may lose up to 40% of the master resolution in third generation duplication. They are generally selected because of their lower cost and when permanent storage of copies is not required.

d. Duplicate microfilm should be subject to the appropriate chemical tests and physical checks though detailed frame to frame inspection is not often necessary if the quality of the master is assured, its density has been measured and the duplicator is working properly.

5.3 Microfilm Indexing and Retrieval

Conversion of paper-based files to microfilm involves an analysis of the indexing system used, an evaluation of that system and its suitability for microfilm organisation and retrieval.

Applications that involve well organised, logically arranged paper records can be sequentially replicated on microfilm, and the original arrangement of the paper files can be retained. Microfilming random or unorganised records presents a greater challenge. If the records lack organisation due to ineffective records management, they have to be put into order to facilitate identification for indexing and retrieval.

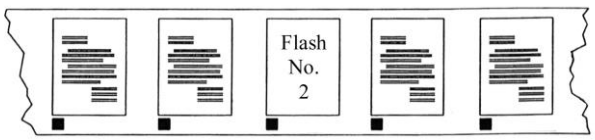
Accurate indexing of microfilm is thus necessary for both identifying the contents of the film and for locating specific images.

5.3.1 Different Types of Microfilm Indexing and Retrieval Methods

Microfilm indexing methods, including manual and automated retrieval techniques, are used to facilitate the location of desired document images. Basic format indexing includes labelling the roll film boxes with identification information such as roll number, titles and dates of the records and documents filmed on the roll, dates of filming and the owner or custodian B/D(s) of the records. All roll film indexing methods must include some type of written or computerised index that indicates the specific roll number and location of segments or individual images on the film. Roll film indexing methods include the following:

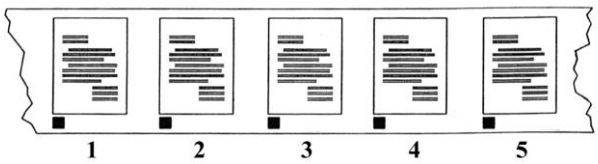
a. Flash Target Indexing

Flash target indexing involves filming a large target between the documents to assist the viewer in determining the breaks in the film file. The flash target may be letters or letter combinations for alpha sequence filming, dates or years for chronological sequence filming, numerical sequence filming, etc.



b. Sequential or Frame Number

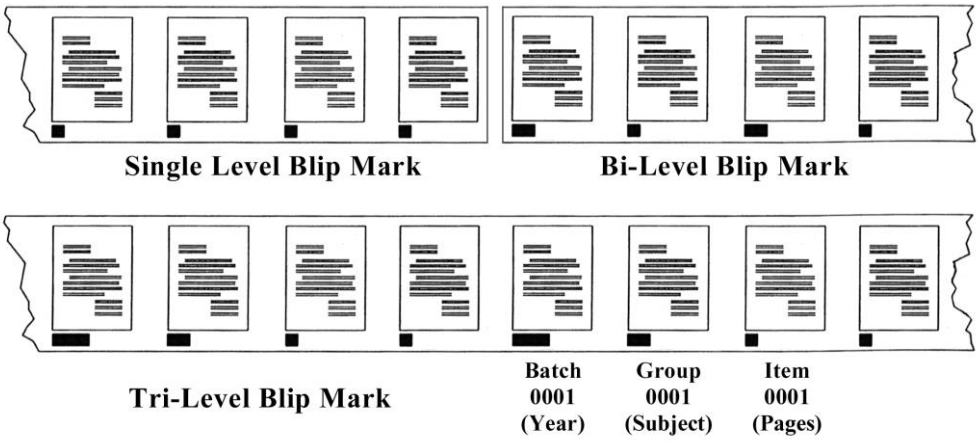
Sequential frame numbering involves filming a sequential number on every film image frame. The number may be placed on each document either manually or with a document imprinter, or placed adjacent to each frame as the documents are filmed.



c. Image Mark (Blip Mark) Indexing

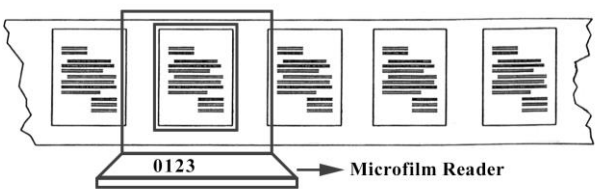
Image mark (blip mark) indexing involves filming a camera-generated mark under each image frame. The mark is counted by a photoelectric cell on the viewing equipment to retrieve the required image. This indexing method is used in association with sequential frame number indexing for developing a workable retrieval system. The image marked film can be retrieved using either a calculator-style keypad retrieval device on the microfilm viewing equipment or fully automated Computer Assisted Retrieval system (CAR). Sample of blip mark indexing is given in Figure 5-1 below:

Figure 5-1 Blip Mark Indexing



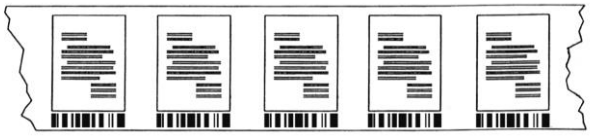
d. Odometer Indexing

Odometer indexing indicates the distance of each image from the beginning of a roll of film to a particular document on the film. It involves measuring inches or millimetres along the length of the film. An index is prepared by examining processed images on a microfilm reader or reader-printer equipped with an odometer.



e. Photo-optical Bar Code Indexing

Bar code indexing is based on optical codes recorded on the film to represent a numerical identifier. The bar code is either used directly on the film for image retrieval or is scanned from the document during filming to create a computer index to the image location.



f. Computer Assisted Retrieval (CAR)

CAR system is a method of microfilm retrieval using a computer index to locate a specific index by referencing location identifiers (roll and frame number). In the filming stage of microfilm production, the CAR system requires the camera to put marks (computer encoded information) together with the document images on a roll of 16mm microfilm which are then inserted into a cartridge. In addition, there are other essential components for image retrieval as follows:

- a database index containing reference to an image identifier;

- a roll number location and a frame number location; and

- a computer for access to the database and a cartridge reader or reader-printer with appropriate image mark level recognition which is either database driven or has a input device for entering frame number.

CAR is the fastest retrieval method available for roll film format and the system can be very simple or as sophisticated as necessary to meet high level, complex retrieval needs. The easiest method of establishing a CAR system is to buy a packaged system. It is also possible to establish a CAR system using simple integrated components which may include existing personnel computer access and/or purchased software. If in-house programming is available, the cost of establishing a unique CAR program will be reduced.

CHAPTER 6

Microfilm Maintenance

6.1 General Requirements

Proper handling and storage of microfilm are important to ensure that the film will last for the life span it is intended. Although working or reference copies of microfilm need not be stored and handled under the stringent conditions set for the care of the master film or the print master, reasonable care in handling will extend their usable life.

6.2 Proper Microfilm Handling

a. The master negatives and intermediate masters intended for making further copies can be damaged through improper handling and they should be handled as infrequently as possible and always with care. They must not be handled with bare hands. Always wear gloves in handling microfilm especially for master microfilms.

b. Microfilms should be handled only by their edges and equipment should be clean and well maintained.

c. Microfilm should not be left on the reader machine exposing to overhead lighting or direct sunlight because they cause fading of the images, especially for prolonged period of time.

d. Roll film should be wound tightly but not under extreme tension on spools or reels. The film should not be wound beyond the edges of the flanges of the spools or reels and may be secured by a thin card collar tied with string. Rubber bands must not be used to fix loose ends.

6.3 Proper Microfilm Storage Conditions

a. Microfilm will decay if they are stored in unsuitable or fluctuating environmental conditions, especially under high temperature and high relative humidity level.

b. Microfilm should be stored in conditions specified in ISO 18911:2010 Imaging materials - Processed safety photographic films - Storage practices.

c. Generally speaking, for long term storage of polyester based silver gelatine films, temperature should be 13°C ± 2°C and relative humidity ranged between 30% and 40%. The maximum temperature should not be higher than 21°C.

d. For medium term storage of polyester based silver gelatine films, the maximum temperature can be up to 25°C, and relative humidity can be allowed to fluctuate between 30% and 60%. To avoid mould growth, the films should never even for a short period be stored in a relative humidity above 60%. Table 6-1 summarises the storage conditions for microfilm.

Table 6–1 Storage Conditions for Microfilm

Temperature for the storage of silver gelatine films

Long-term Storage (Life expectancy of 100 years+)	13°C ± 2°C	Maximum temperature without risk of damage to the film is 21°C
Medium-term Storage (Life expectancy of 10 years)	25°C	Normal maximum peak temperature not to exceed 32°C

Relative humidity for the storage of silver gelatine films

Long-term Storage (Life expectancy of 100 years+)	Silver gelatine	30-40% (polyester base)
Medium-term Storage (Life expectancy of 10 years)	Silver gelatine	30-60% (polyester base)

e. Viewing or working copies of film should also be preserved in a stable and controlled environment if their continued usability is to be guaranteed.

f. The storage environment should also be free of dirt, dust and pollutants, especially sulphur dioxide fume from automobile emissions, power stations or plants which consume fossil fuels.

g. When environmental conditions in the area in which microfilms are to be copied or consulted cannot be maintained at the same levels as the storage area, the microfilms should be allowed to readjust to new conditions before use.

h. A representative sample number of the microfilm rolls in the storage should be inspected at regular intervals. Deterioration should be noted and the cause of problems should be ascertained. Once deterioration has been identified, copy

should be made from the roll of deteriorating film, if no master film is available and the roll of deteriorating film should be removed from other stock.

i. Diazo and vesicular films should not be stored near silver gelatine films as they give off gases harmful to the latter.

6.4 Microfilm Storage Equipment and Supplies

Microfilm Cabinet

a. Microfilm should be stored in appropriate cabinets or shelves made of non-corrosive metal and treated with chemically inert coating. Wooden or plastic cabinets should not be used.

b. Microfilm reels, spools and containers should be constructed of inert and non-corrosive material free from acidic, oxidising and reducing agents. Non-ferrous metals such as anodised aluminium are acceptable. Master film may be stored in acid free boxes.

Microfilm Supplies

c. Only conservation materials (paper, glues, labels and adhesives) that have been approved or tested under photographic activity test (PAT) should be used to store microfilm of long term retention. For details of PAT, please refer to ISO 18916:2007.

6.5 Disposal Requirements for Source Documents and Microfilm Records

a. For any micrographic project involving the conversion of paper records to microform, the records should be scheduled as part of the process of approving the project. Scheduling of the records shall be undertaken in conjunction with the Records Management and Administration Office and the Public Records Office of GRS. A Retention and Disposal Authority which approves the agreed retention and disposal arrangement should be obtained from the GRS Director.

b. After microfilming is completed, source documents are usually destroyed and only the microfilm copy is retained. Destruction of the hard copies of documents should be undertaken in accordance with the relevant Records Retention and Disposal Schedule and subject to prior agreement of the GRS Director.

c. Both inactive source documents and microfilm copies are eligible for disposal when they are no longer required for use and after the retention period as set out in the relevant Records Retention and Disposal Schedule.

6.6 Microfilm Standards

The establishment and application of microfilm standards can insure the image longevity, image quality, and legality of microfilm records. When microfilm becomes the substitute for paper, this assurance is necessary to ease the transition of the record media.

a. Image Longevity

The life expectancy and stability of microfilm means the image and quality will last as long as the record is needed. Image longevity and stability requirements are set forth in ISO 18901:2010.

b. Image Quality

The quality of film is determined by its density, resolution and general legibility. An excellent source of image quality guideline is ANSI/AIIM MS 23-2004 that discusses equipment, supplies, and recommended practices necessary to establish and operate a satisfactory micrographic programme for silver gelatine film.

c. Court Admissibility

Microfilm of both business and government records is generally court admissible according to the Evidence Ordinance (Cap. 8).

The following are some microfilming standards widely adopted in countries in North America, Europe and Australia:

ANSI/AIIM TR13-1998	Preservation of microforms in an active environment - Guidelines
ISO/TR 10593:1997	Micrographics - Use of microfilm jackets
ISO/TR 12031:2000	Micrographics - Inspection of silver-gelatin microforms for evidence of deterioration
ISO/TR 18931:2001	Imaging materials - Recommendations for humidity measurement and control
ANSI/AIIM MS14-1996	Specifications for 16mm and 35mm Roll Microfilm
ANSI/AIIM MS18-1992 (R1998)	Micrographics - Splices for Imaged Film - Dimensions and Operational Constraints
ANSI/AIIM MS19-1993	Recommended Practice for Identification of Microforms

ANSI/AIIM MS23-2004	Recommended Practice - Production, Inspection, and Quality Assurance of First-Generation, Silver Microforms of Documents
ANSI/AIIM MS35-1990	Recommended Practice for the Requirements and Characteristics of Original Documents That May Be Microfilmed
ANSI/AIIM MS48-1999	Recommended Practice for Microfilming Public Records on Silver Halide Film
ISO 6199:2005	Micrographics - Microfilming of documents on 16 mm and 35 mm silver-gelatin type microfilm - Operating procedures
ISO 6200:1999	Micrographics - First generation silver-gelatin microforms of source documents - Density specifications and method of measurement
ISO 8126:2019	Micrographics - Duplicating film, silver, diazo and vesicular - Specifications and measurement for visual density
ISO 11962:2002/ Cor 1:2006	Micrographics - Image mark (blip) used with 16 mm and 35 mm roll microfilm
ISO 18901:2010	Imaging materials - Processed silver-gelatin type black-and-white films - Specifications for stability
ISO 18902:2013	Imaging materials - Processed imaging materials - Albums, framing and storage materials
ISO 18911:2010	Imaging materials - Processed safety photographic films - Storage practices
ISO 18916:2007	Imaging materials - Processed imaging materials - Photographic activity test for enclosure materials
ISO 18917:1999	Photography - Determination of residual thiosulfate and other related chemicals in processed photographic materials - Methods using iodine-amylose, methylene blue and silver sulfide

Glossary

Aperture card
Aperture card is a card with a rectangular hole(s) specifically prepared for the insertion or mounting of a frame of microfilm.

Archival film
A processed film that is suitable for permanent preservation of records when properly processed and stored.

Archival quality
The ability of a processed film to permanently retain its original characteristics and the ability to resist deterioration for a lengthy specified time.

Background density
The opacity of the non-information area of an image.

Bar code
An array of vertical rectangular marks and spaces in a predetermined pattern.

Blip mark
An optical mark within the recording area below or above the image on a roll film. The mark is used to locate images or frames on microfilm.

Camera film
Camera film is the first-generation film used in capturing the image of source document in the microfilm camera; also known as the master film.

Cartridge
Cartridge is a container enclosing processed roll microfilm. A cartridge is designed to be inserted into readers, reader-printers and retrieval devices and used with a single core for roll microfilm.

Cellulose ester
It is a film base composed mainly of cellulose esters of acetic, propionic or butyric acids or mixtures thereof.

Cine mode
Cine mode is filming mode in which orientation of images are arranged in the same direction as the length of the microfilm (as in a motion picture film).

Comic mode
Comic mode is filming mode in which orientation of images are perpendicular to the length of the microfilm (as in a comic strip).

Computer assisted retrieval system (CAR)
The capability of having micrographic images located or identified by a command initiated through a computer terminal.

Computer input microfilm (CIM)
Computer input microfilm is the process of reading data contained on microfilm by a scanning device and transforming this data into a form readily for computer processing.

Computer output microfilm (COM)
Microforms containing data produced by a recorder from computer-generated electrical signals. A computer output microfilmer converts data from a computer and records it into microfilm.

Conventional processing
Conventional processing is a series of steps consisting of developing, fixing, washing, and drying.

Correction target
A target used to notify that a filming error has been made and that a correction will follow.

Densitometer
An instrument used to measure the optical density of an image by measuring the amount of incident light transmitted by the film.

Diazo film
A photographic film containing light-sensitive layers composed of diazonium salts that react with couplers to form diazo dye images after film processing. It is a duplicating film using an ultraviolet light and ammonia process to produce non-reversing images, i.e., a positive image will produce a positive image and a negative image will produce a negative image.

Direct image film
A film that retains the same polarity as the original material; that is, negative for negative, or positive for positive with conventional processing.

Document preparation
The process of preparing documents readily to be microfilmed. This includes sorting and flattening documents, and removing staples and paper clips.

Dry silver film
A non-gelatine silver film which is developed by application of heat.

Duo
A method of capturing images on each half of the usable width of the microfilm in which the microimages are made first on one half and then continued on the other half in the reverse direction.

Duplex
A method of capturing images in one exposure that the front and back of a document are filmed at the same time. The microimages appear side by side across the width of the microfilm.

Emulsion
Emulsion is a single or multi-layered coating of light-sensitive material on the microfilm surface that creates a latent image during exposure.

Emulsion number
Number used by film manufacturers to identify coating data for each roll of film.

Endorser
Endorser is a camera accessory that automatically stamps documents as they are filmed.

Film base
Film base acts as a support for the film and provides an area for the emulsion to reside.

Film leader
Blank microfilm at the beginning of a roll that is used for protection and for threading the film into camera, reader, or processing equipment.

Film strip
Film strip is a short strip of processed film containing a number of frames.

Film trailer
Blank microfilm at the end of a roll that is used to thread film into equipment.

Flash target
Flash target is a target with distinctive markings to facilitate indexing of the film.

Frame
The area of a photographic film exposed to light in a camera during one exposure no matter whether this area is filled by the document.

Generation
A measure of the successive stages of photographic reproduction from an original or master. The first generation is the camera film. Copies made from this generation are second generation, from the second generation are third generation, etc.

Image
A representation of an object on microfilm produced by light rays.

Image mark
Image mark is a rectangular mark either above or below the image that can be sensed and counted by reader /reader-printer for fast frame retrieval.

Image orientation
Image orientation is the arrangement of images with respect to the edges of the film.

Jacket
Jacket is a transparent plastic carrier with pockets made to hold microfilm in flat strips.

Microfiche
Microfiche is a transparent sheet of film (usually 105mm) with microimages arranged in a grid pattern, with a heading area across the top.

Microfilm reader
Microfilm reader is a device for viewing enlarged microimages of microfilm.

Microfilm reader-printer
Microfilm reader-printer is a machine which combines the functions of a reader and a printer.

Planetary camera (flatbed camera)
A type of microfilm camera that produces either 16mm or 35mm film. It is a camera in which the document being photographed and the film remain in a stationary position during filming. A planetary camera is designed to make precision microimages of detailed manuscripts.

Polyester
It is a transparent plastic made from polyesters and used as a film base because of its stability, strength, resistance to tearing and relative non-inflammability.

Printing master
A microfilm used to make duplicates. Printing master is usually the second generation film made from processed camera master film.

Processing
Processing is the treatment of exposed photographic material to make the latent image visible. It involves a series of steps consisting of developing, fixing, washing, and drying.

Quality Index (QI)
QI is the relationship between legibility of printed text and the resolution pattern resolved in a microimage.

Reduction ratio
It is the relationship between the dimensions of the original document and the corresponding dimensions of a microimage, usually expressed as 16X, 24X, etc.

Residual thiosulphate ion
Residual thiosulphate ion is a chemical component (ammonium or sodium thiosulphate) remaining in film after processing. High level of residual thiosulphate would cause fading of the microimages in the microfilm. The level of residual thiosulphate is determined by methylene blue test.

Resolution
Resolution is the ability of a photographic system to record fine details of an object; a measure of sharpness of an image, expressed as the number of lines per millimetre.

Rotary camera
A type of microfilm camera that produces 16mm film only. It photographs documents when they are being moved by a transport mechanism. It is used to film loose papers and forms quickly.

Silver gelatine film
Silver gelatine film is a photographic film coated with a silver halide emulsion. Silver gelatine film is used to create microfilm originals.

Silver halide
Silver halide is a compound of silver and one of the following elements known as halogens: chlorine, bromine, iodine and fluorine.

Splicer
A device for joining strips of microfilm.

Step and repeat camera
A type of microfilm camera that produces 105mm film in the same manner as planetary cameras. This type of camera produces images in orderly rows and columns on microfiche.

Target
Target is a chart containing identification information or coding photographed on the film preceding or following the document. Targets include titleboards, technical targets (resolution test chart), control targets and quality targets.

Titleboard
A target containing a description of the records being filmed and technical information about the filming.

Updatable microfilm
A microfilm that permits the addition or deletion of images.

Vesicular film
A film containing photosensitive layers composed of diazonium salts in a thermoplastic material. On exposure the salts are decomposed to create optical vesicles (bubbles) which form the latent image, which is developed by the application of heat.

Appendix A

ISO 9001 : 2015
Certificate No.: CC 2267

RETURN FOR MICROFILMING SERVICES

(Please use separate form for each type of records and return to Government Microfilm Centre, Government Records Service by email: psoinfo@grs.gov.hk)

I. PARTICULARS OF AGENCY:	
Department:	Responsible Officer:
Branch:	Post Title:
Division:	Telephone:
Section:	Fax:

II. PARTICULARS OF RECORDS TO BE FILMED:

1. Subject Matter:

2a. Any Existing Records Disposal Schedule? (Yes/No)	2b. If 'Yes', Please Give Agency Records Series No. or Other Relevant Information:
3. Approximate No. of Pages Requested for Microfilming:	4. Annual Growth Rate (%) of Records for Filming:

5. Physical Characteristics of Records to be Filmed:

Format	☐ Files	☐ Forms	☐ Computer Printouts		
	☐ Books	☐ Others (please specify):			
Record size	☐ A4	☐ A3	☐ Computer Printouts (37 cm X 28 cm)		
	☐ Others (please specify):				
Paper colour	☐ White	☐ Yellow	☐ Pink	☐ Blue	☐ Mixed
	☐ Others (please specify):				
Printing	☐ One Side	☐ Both Sides	☐ Mixed		

GMC 1

Appendix A

III. SERVICES REQUESTED: (please tick either A or B)

☐ A.	Source Document Microfilming and Storage of the Microfilm Master Copy (the Microfilm Working Copy will be Provided to the Agency for Use)

1. No. of Microfilm Working Copy Requested:	2. Requested Completion Date:

☐ B.	Microfilm Storage (for the Microfilm not Produced by GMC)		
Format	☐ 16 mm Roll-film	☐ 35 mm Roll-film	☐ Microfiche
	☐ Aperture Card	☐ Others (please specify):	
Quantity	_____ reels of microfilm (16 mm / 35 mm)	_____ sheets of microfiche / aperture card	
Annual Growth	_____ reels of microfilm (16 mm / 35 mm)	_____ sheets of microfiche / aperture card	

IV. USER READINESS*:

When Are the Records Ready for Filming?

* Agency is requested to carry out the pre-filming document preparation before transferring the records for microfilming.

V. REQUEST PROCESSING (for office use only):

1. Request Date:	2. Reply Date:	
3. Request Approved/Disapproved? Remarks: _____ Date: _____		
4. Technical Instructions: _____		
5. Proposed Transfer Date:	6. Bring-up Date:	7. Actual Transfer Date:
8. Project Schedule:	9. Centre Manager's Signature:	10. Date:
11. Order Amendments (Please provide date and description of amendment(s)) _____		

Appendix B

Project No. MS

RECORDS MICROFILMING LIST

Page No.: .....

Department:		Division:	
Branch:		Section:	
Agency Records Series No.:		Disposal Authority No.:	
Records Series Title:			

Box/ Bundle No.	Original Reference	Description of Records & Covering Dates	(for GMC use only) Deposit/ Roll No.

List of records compiled by the agency

Name: .....

( )

for Head of Department

Date: .....

Filmed and quality checked by the Government Microfilm Centre

Name: .....

( )

for Government Records Service Director

Date: .....

GMC 2A

Appendix B

Project No. MS

RECORDS MICROFILMING LIST (CONTINUATION)

Page No.: .....

Box/ Bundle No.	Original Reference	Description of Records & Covering Dates	(for GMC use only) Deposit/Roll No.

GMC 2B

Appendix C

MEMO

From Government Records Service Director	*To* _____
Ref. _____ *in* _____	*(Attn.:* _____ *)*
Tel. No. _____	*Email* _____
Fax. No. _____	*Your Ref.* _____ *in* _____
Email _____	*dated* _____ *Fax. No.* _____
Date _____	*Total Pages* _____

Despatch of Records Microfilming List and Microfilm Records
Project No. MS and Deposit/Roll Nos.

Enclosed are the Records Microfilming List and ___ rolls of microfilm records for your "_____***on"*** of ***ARS No.*** _____, ***DA No.*** _____ filmed under ***Project No.*** _____ and ***Deposit/Roll Nos.***_____ to_____. Shall you require a duplicate film copy in the future, please kindly quote the project and deposit/roll number(s) of the record(s) as listed.

2. To assist us in promptly disposing of the filmed source documents, I should be grateful if you would complete and return the attached documents* to me within _____ weeks.

a) Standard memo of GMC 3B
b) A copy of the first page of the Records Microfilming List (GMC 2A)
c) Questionnaire of Customer Service (GMC 5)
(*Delete the above document(s) where inapplicable)

( )
for Government Records Service Director

GMC 3A

Appendix D

MEMO

From _____	*To* Government Records Service Director
Ref. _____ *in* _____	*(Attn.:* _____ *)*
Tel. No. _____	*Email* _____
Fax. No. _____	*Your Ref.* _____ *in* _____
Email _____	*dated* _____ *Fax. No.:* _____
Date _____	*Total Pages* _____

Receipt of Records Microfilming List and Microfilm Records
Project No. MS and Deposit/Roll Nos.

* I acknowledge receipt of the captioned records and confirm that they have been checked for acceptance. I further agree to the immediate disposal of the filmed source documents as scheduled under ***Disposal Authority No.(s)*** .

* I acknowledge receipt of the captioned records and confirm their acceptance except for Deposit/roll No. & Blip Mark(s) _____ for the following reasons :

- ❑ incomplete capture of image
- ❑ blur images
- ❑ scratches of images
- ❑ other defects _____

I should be grateful for the following arrangement:

- ❑ retakes
- ❑ others _____

_____
( )
for Head of Department

* Please delete where inapplicable.

GMC 3B

Appendix E

Samples of Filming Targets

GOVERNMENT
MICROFILM CENTRE

All documents images which follow on this microfilm file are accurate reproductions of records created and maintained by the XX Unit, Department of XX in the normal course of official business and were microfilmed according to the established practice of the Department. It is the policy of the Department of XX to microfilm and dispose of the paper records in accordance with the Records Retention and Disposal Schedule issued by the Government Records Service Director.

Microfilming procedures are in compliance with the Department policies and applicable standards.

_____ _____
( ) ( )
Camera Operator **Records Custodian**

Statement of Intent and Purpose

GOVERNMENT
MICROFILM CENTRE

Name of Operator		Department:
Project No.		Branch:
Deposit/Roll No.		Division:
Date Filmed		Section:
Batch No.		Records Series Title:
Reduction Ratio		Inclusive Reference:
Light Metre Setting		ARS No.:
Camera No.		Disposal Authority No.:

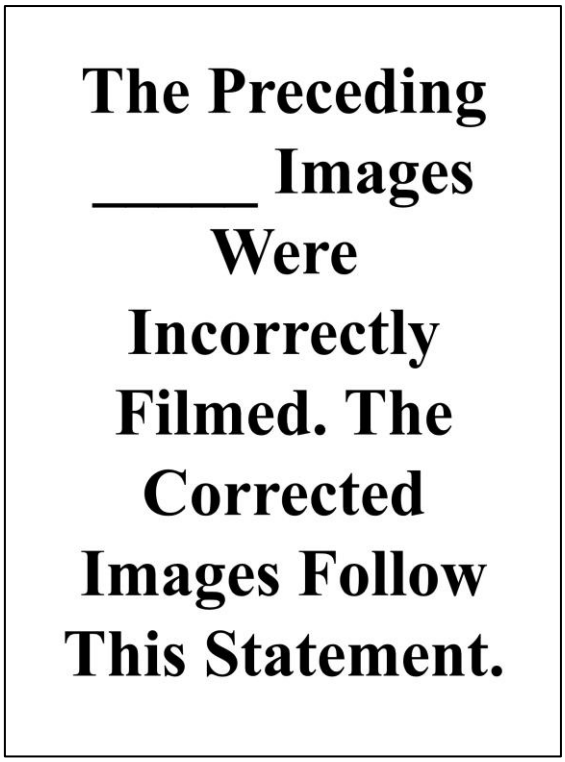
Titleboard

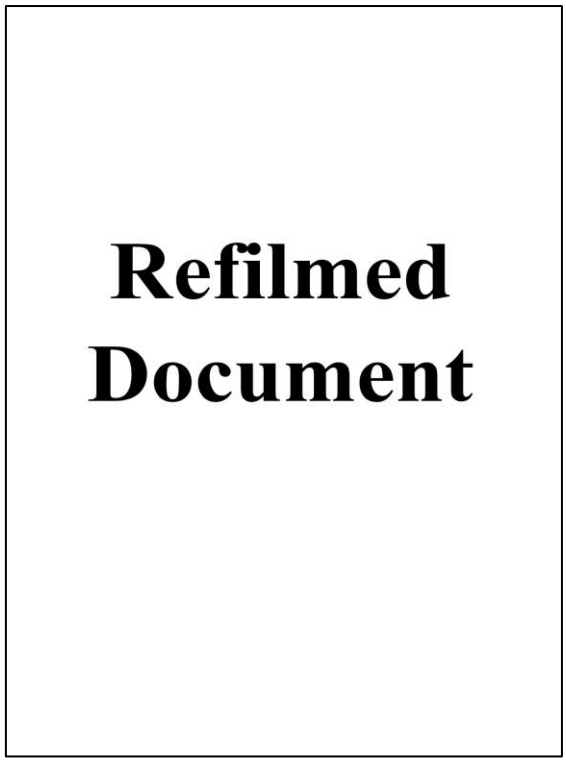
Next Document is in Poor Physical Condition

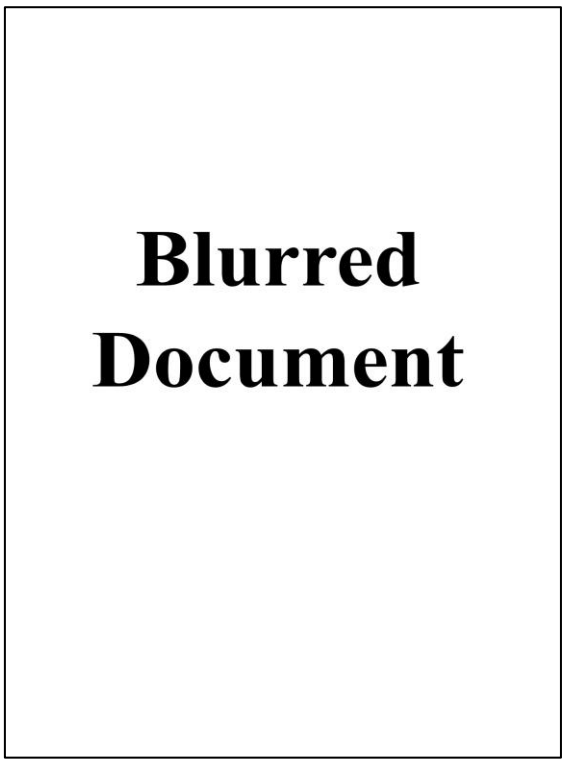
Missing Page(s) at Time of Filming

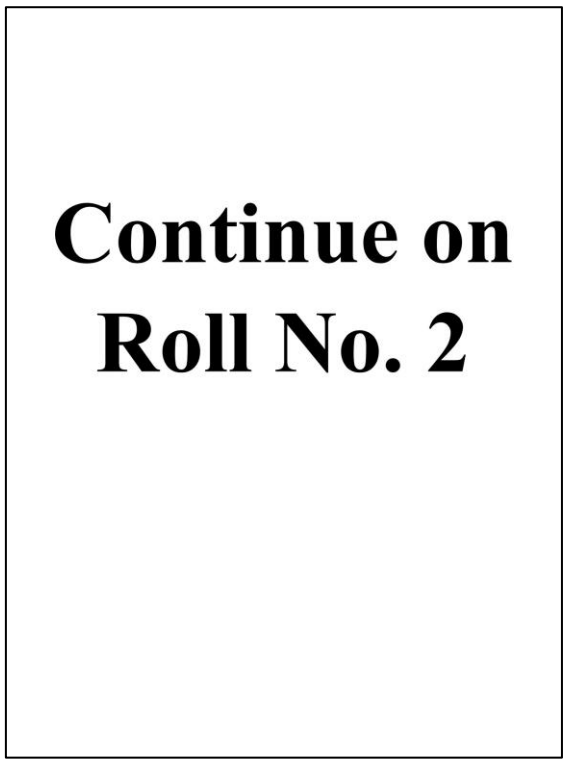
Appendix E

Samples of Filming Targets









Appendix F

Microfilm inspection report

Code: X = Reject PX = Partial reject F = Fault not in image area

Program Inspector Date of Inspection

Type: ☐Silver ☐Diazo ☐Vesicular Generation☐1 Emulsion wound out ☐2 Emulsion wound in ☐3

Defect	Roll/fiche number						
1. Summary							
2. Leader							
3. Fogged Start							
4. Targets							
a) Start							
b) Roll/fiche number							
c) Identification							
d) Date filmed							
e) Reduction ratio							
f) Certification							
g) Resolution							
h) Density							
i) End							
5. Fogged center							
6. Fogged end							
7. Density							
8. Base plus fog							
9. Resolution							
10. Process damage							
11. Splices							
12. Scratches							
13. Spacing							
14. Fingerprints							
15. Object in frame							
16. Skewing							
17. Foreign matter							
18. Contractions							
19. Centering							
20. Overlap							
21. Blips							
22.							
23.							

Source: ANSI/AIIM MS23-2004 Standard Recommended Practice - Production, Inspection, and Quality Assurance of First-Generation, Silver Microforms of Documents, p. 98.

Appendix G

Defects classification and source guide

	Major	Minor[1)]	Possible sources[2)]
Blank film, clear	X		F,C,P
Blank film, black	X		F,C,P
Blurred images	X		C,O
Bromide streaks		X	P
Contraction	X		C
Density to high/too low		X	C,P
Density uneven		X	C
Double exposure	X		O
Fingerprints		X	O
Fog, chemical		X	P
Fog, edge		X	O
Fog, safelight		X	O
Fog, accidental exposure		X	O
Folded document	X		O
Foreign material of film		X	P
Frilling (peeling emulsion layer)	X		F,P
Illegible text	X		S,O
Jam	X		C
Milky appearance	X		P
Mottled density		X	P
Out of focus	X		C,O
Overlap	X		C
Pressure marks		X	C,P
Raw film stock defects		X	F
Residual anti-halation dye		X	P
Reticulation		X	P
Scratches (all types)		X	P
Static marks		X	C,P,O
Streaks		X	P
Stretch	X		C
Synchronization, out of	X		C
Thiosulfate, excessive	X		P
Washboard, high/low density cycling		X	C
Water spots		X	P

NOTES

1 Major defects negatively impact life expectancy and may either cause loss of data or interfere with making and using final generations.

2 Minor defects are cosmetic only and do not negatively impact life expectancy or interfere with making and using final generations.

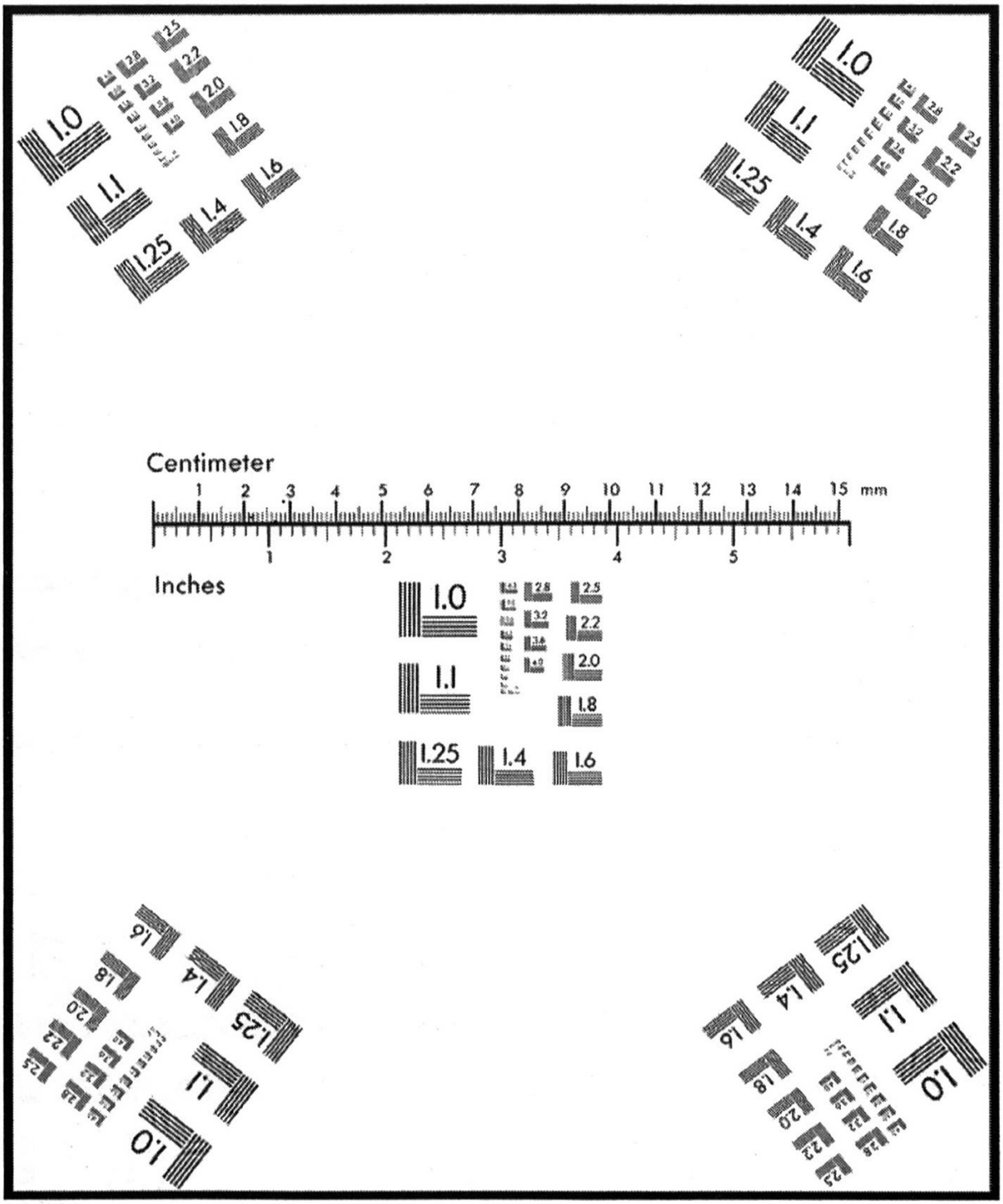
1) May be major depending upon severity and the impact on usability and life expectancy.

2) S = Source document
F = Raw microfilm
C = Camera
P = Processing machine
O = Operators

Source: ANSI/AIIM MS23-2004 Standard Recommended Practice - Production, Inspection, and Quality Assurance of First-Generation, Silver Microforms of Documents, p. 79.

Appendix H

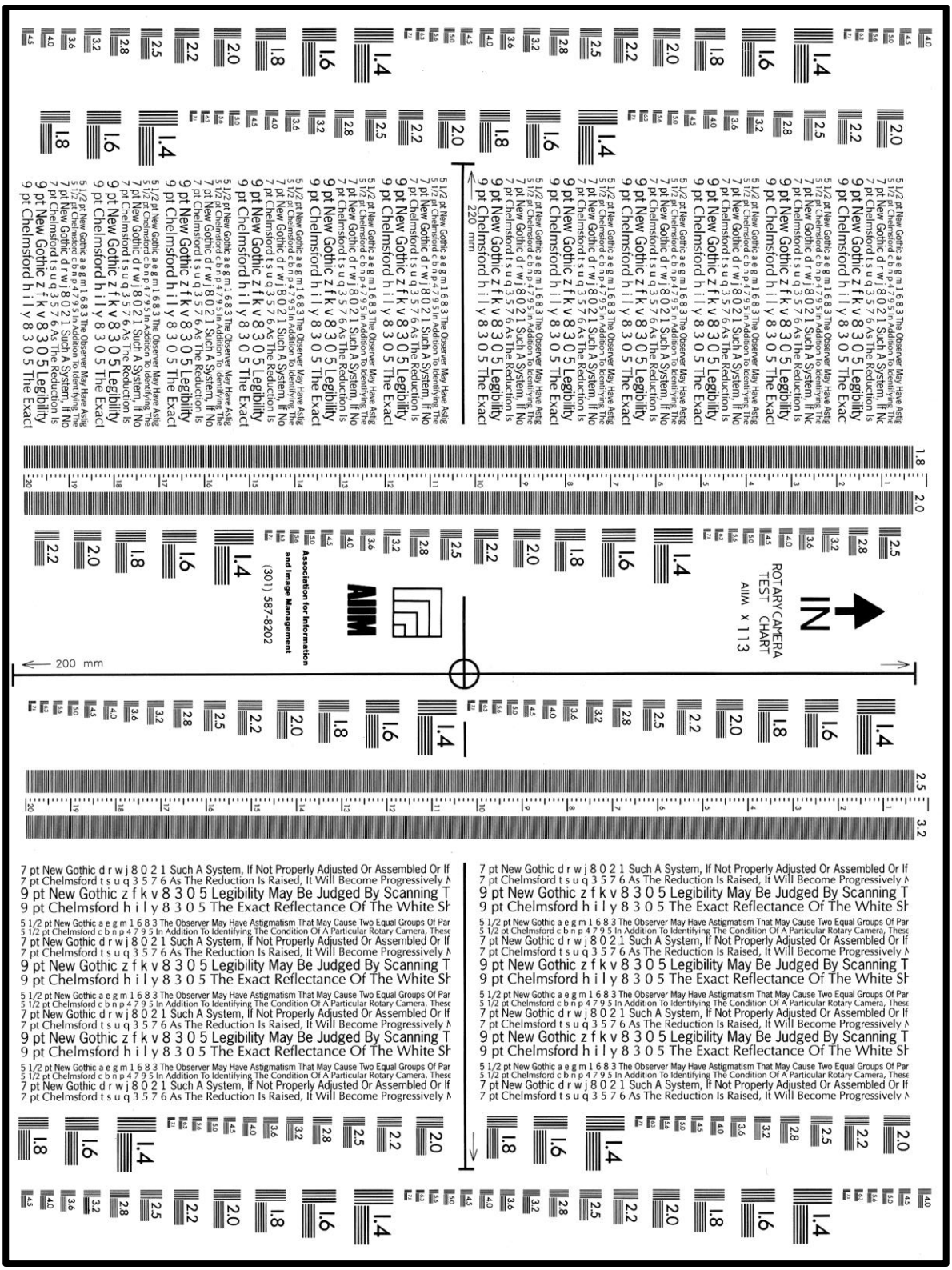
Resolution Test Chart for Planetary Camera



Source: ANSI/AIIM MS23-2004 Standard Recommended Practice - Production, Inspection, and Quality Assurance of First-Generation, Silver Microforms of Documents, p. 35.

Appendix I

Resolution Test Chart for Rotary Camera



Source: ANSI/AIIM MS23-2004 Standard Recommended Practice - Production, Inspection, and Quality Assurance of First-Generation, Silver Microforms of Documents, p. 36.

Suggested Reading

Books

Avedon, Don M. and Rodd Exelbert, ***All About Micrographics*.** Avedon Associates Inc. Maryland 1990.

Fox, Lisa L., ***Preservation Microfilming: A Guide for Librarians and Archivists***, 2nd edition. American Library Association, Chicago and London 1996.

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Justrell, R., Michael Roper and Herbert White, ***Guidelines for the Preservation of Microforms***. International Council on Archives, Paris 1996.

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Ricks, R., Ann Swafford and Kay Gow, ***Information and Image Management - A Records Systems Approach,*** 3rd edition. South-Western Publishing Co., Ohio 1992.

Saffady, William. ***Micrographics Systems,*** 3rd edition. Association for Information and Image Management, Maryland 1990.

Vilhauer, Jerry. ***Introduction to Micrographics***. Association for Information and Image Management, Maryland 1991.

Standards

ANSI/AIIM MS14-1996 Standard Recommended Practice - Specifications for 16mm and 35mm Roll Microfilm. Association for Information and Image Management International, Maryland, 1996.

ANSI/AIIM MS17-2001 Micrographics - Rotary (Flow) Microfilm Camera Test Chart and Test Target - Description and Use. Association for Information and Image Management International, Maryland, 2001.

ANSI/AIIM MS23-2004 Standard Recommended Practice - Production, Inspection, and Quality Assurance of First-Generation, Silver Microforms of Documents. Association for Information and Image Management International, Maryland, 2004.

ANSI/AIIM MS43-1998 Standard Recommended Practice - Operational Procedures - Inspection and Quality Control of Duplicate Microforms of Documents and from COM. Association for Information and Image Management International, Maryland, 1998.

ANSI/AIIM MS45-1990 Recommended Practice for Inspection of Stored Silver - Gelatin Microforms for Evidence of Deterioration. Association for Information and Image Management International, Maryland, 1990.

ANSI/AIIM MS51-1991 (ANSI/ISO 3334-1991) Micrographics - ISO Resolution Test Chart No. 2 - Description and Use. Association for Information and Image Management International, Maryland, 1991.

ANSI/AIIM TR13-1998 Technical Report - Preservation of Microforms in an Active Environment - Guideline. Association for Information and Image Management International, Maryland, 1998.

ISO 18901:2010 Imaging materials - Processed silver-gelatin type black-and-white films - Specifications for stability. International Organization for Standardization, 2010.

ISO 18911:2010 Imaging materials - Processed safety photographic films - Storage practices. International Organization for Standardization, 2010.

ISO 18916:2007 Imaging materials - Processed imaging materials - Photographic activity test for enclosure materials. International Organization for Standardization, 2007.

ISO 18917:1999 Photography - Determination of residual thiosulfate and other related chemicals in processed photographic materials - Methods using iodine-amylose, methylene blue and silver sulphide. International Organization for Standardization, 1999.