

Microform Quality Control Inspection

TRAINING *in* PRESERVATION MICROFILMING

Module Eight of Ten

Microform Quality Control Inspection

Heather Brown

National Library of Australia
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Introduction

Welcome to Microform Quality Control Inspection.

This module introduces you to the procedures involved in the quality control of microforms.

Prerequisites

This is the eighth module of training materials about preservation microfilming. In order to work through this module you need to have satisfactorily completed the modules, **Preservation Microfilming—Basics** and **Preservation of Materials**.

It will also help if you have completed modules 3, 4, 5, 6 and 7:

- | **I Preparation for Microfilming**
- | **I Maintaining Microfilming Equipment**
- | **I Operating Microfilming Equipment—Cameras**
- | **I Jacketing and Splicing Microfilm**
- | **I Processing and Duplicating Microforms.**

These will give you useful related information before you start on this module.

Learning outcomes

When you have successfully completed this module, you will be able to:

- | inspect completed microforms to determine proper packaging and winding
- | make a technical check of completed microforms to determine correct processing, resolution, density and film base
- | make a visual check of completed microforms to determine completeness, image legibility and compliance with specifications
- | record quality control inspection details
- | arrange for the return of originals after filming and checking
- | record details of completed microforms for lists.

In competency-based training models, the **learning outcomes** closely relate to the term **elements of competency**.

Recognition of current competencies (RCC)

You may already have knowledge, experience and skills which are relevant to this module. This means that if you wish to complete a formal Preservation Microfilming course, you may not have to study all of it.

Please discuss this with your course coordinator, or lecturer. Evidence of your microfilming competence and/or an assessment, such as a practical test, will be required.

Assessment

If you are formally studying the Preservation Microfilming course, you must meet certain **performance criteria** in order to demonstrate your competency in each unit or module. These criteria form the basis of your assessment. They are listed at the beginning and end of each topic.

As you work your way through the training materials, you will need to keep a record of the **performance criteria** and other learning **activities** that you have completed.

Conditions

You will also need access to the following, either in your own workplace, or by arrangement with another organisation:

- | a densitometer (for measuring density) of test film
- | a microscope for checking the resolution of test film
- | a 35mm microfilm reader for checking test film.

The following are provided with this module:

- | a polarising filter for checking the film base
- | a test film which contains some problems and a section for density readings.

Cotton gloves for handling the film were supplied with the module, **Processing and Duplicating Microforms**.

Contact your lecturer or mentor immediately if you have any difficulty in accessing the equipment or other supplies, so that an alternative can be arranged.

Activities

There are two types of learning activities in this module which are indicated by the icons below:

■ Activity

Responses to these activities are written in this book. They are usually short tasks which keep you involved with the issues you are considering and may also require you to apply what you are learning.

Some of the activities in these training materials require you to perform tasks such as loading a camera or operating a processor. A lecturer or assessor will observe you performing the tasks and then examine the results or the product (e.g. the newly processed microfilm) to check that it meets requirements. Major activities are marked with the symbol .

● Reflect

Here you will be asked to think about key issues, usually in consultation with workplace colleagues, and come to some conclusions. The purpose of these activities is to allow you to share your understanding with others, and benefit from wider experience than your own.

You will need to be prepared to discuss your findings or conclusions with your assessor or lecturer who will be signing off the relevant **performance criteria**.

▲ Submit

When this icon appears, you are ready to record in the **Log book** that you:

- | can meet the **performance criteria**
- | have satisfactorily completed the **activities** for a topic.

You can record these in the Log book simply by marking the boxes in the shaded columns with a **yes** or **no**.

You can then ask your lecturer or assessor to verify that you can meet the **performance criteria** and that you have satisfactorily completed the **activities**.

If you work through the various activities along the way, you will find the assessment activities relatively easy to complete.

Resources

 **There are a number of resources available on preservation and preservation microfilming. A librarian can help you find out where these resources are available.**

Below are a few:

Printed materials

Adcock, Edward P. (ed. & comp.) 1998, *Principles for the Care and Handling of Library Material*, International Preservation Issues, number 1, IFLA-PAC, Paris.

Address: IFLA Core Programme for Preservation and Access (PAC) Bibliotheque Nationale de France, 2, rue Vivienne, 75084 Paris Cedex 02, France.

(Available online at IFLA website as *Principles for the care and handling of library material*, <http://www.ifla.org/VII/4/news/pchlm.pdf>, accessed 4 May 2003.)

Arfanis, Peter 2000, 'Meeting International Standards Effectively with Local Budgets and Resources', Proceedings of the International Meeting on Microform Preservation and Conservation Practices in Southeast Asia: Assessing current needs and evaluating past projects, February 21–24, 2000, Chiang Mai University, Chiang Mai, pp.41–43. (Available from the SEACAP website, <http://www.seacap.chiangmai.ac.th>, accessed 14 May 2003).

Canadian Cooperative Preservation Project 1993, *Guidelines for Preservation Microfilming in Canadian Libraries*, Prepared by the National Library of Canada for the Canadian Cooperative Preservation Project, Ottawa.

Cybulski, Walter 1999, 'You Say You Want a Resolution? Technical inspection and the evaluation of quality in preservation microfilming', *Microform and Imaging Review*, vol. 28, no. 2, Spring, pp. 56 – 67.

Elkington, Nancy E. (ed.) 1992, *RLG Preservation Microfilming Handbook*, Research Libraries Group, Mountain View, California.

Elkington, Nancy E. (ed.) 1994, *RLG Archives Microfilming Manual*, Research Libraries Group, Mountain View, California.

Fox, Lisa L. (ed.) 1996, *Preservation Microfilming: A Guide for Librarians and Archivists*, 2nd edn, ALA, Chicago.

Gunn, Michael J. 1985, *Manual of Document Microphotography*, Focal Press, London

Meyer, Lars & Gertz, Janet 1993, *RLG Guidelines for microfilming to support digitization*, Research Libraries Group, Mountain View, California. Available online at <http://www.rlg.org/preserv/microsuppl.pdf>, accessed 12 May 2003.

Microform and Imaging Review 1972– , (journal), quarterly, K. G. Saur, Munich, Germany.

Micrographics Year Book 1981– 2001 (annual), G. G. Baker, Windlesham, Surrey, UK. (Last edition 2001).

National Library of Australia 1995, *Preservation Microfilming: Does It Have a Future?* Proceedings of the First National Conference of the National Preservation Office, at the State Library of South Australia, 4–6 May, 1994, National Library, Canberra.

National Library of Australia 1998, *Guidelines for Preservation Microfilming in Australia and New Zealand*, National Library, Canberra.

National Preservation Office 2000, *Guide to Preservation Microfilming*, The Office, London.

Saffady, William 1990, *Micrographic Systems*, 3rd edn, Association for Information and Image Management, Silver Spring, MD.

Saffady, William 2000, *Micrographics: Technology for the 21st Century*, Association of Records Managers and Administrators, Prairie Village, Kansas.

SEACAP (Southeast Asian Consortium for Access and Preservation) 2000, Proceedings of the International Meeting on Microform Preservation and Conservation Practices in Southeast Asia: Assessing Current Needs and Evaluating Past Projects, February 21–24, 2000, Chiang Mai University, Chiang Mai. (Available from the SEACAP website, <http://www.seacap.chiangmai.ac.th>, accessed 4 May 2003.)

Standards (relevant):

ANSI/AIIM MS23-1998 Standard for Information and Image Management – Standard recommended practice for production, inspection and quality assurance of first-generation silver microfilm of documents.

ISO 18917 1999 Photography – determination of residual thiosulfate and other related chemicals in processed photographic materials – methods using iodine-amylase methylene blue and silver sulfide.

MP 25 – 2002 Basic Guide to microfilming – Miscellaneous Standard. Standards Australia.

See also the list of international standards in the [Learning Guide](#).

Internet sites

(As internet sites change frequently, you may need to use a search engine to identify the latest location)

AICCM (Australian Institute for the Conservation of Cultural Material Inc.), <http://www.aiccm.org.au>, accessed 15 May 2003.
Address: GPO Box 1638, Canberra ACT 2601, Australia.

AIIM (Association for Information and Image Management), <http://www.aiim.org>, accessed 4 May 2003, and its sub group the Film-based Imaging Association, <http://www.fbi.aiim.wegov2.com>, accessed 14 May 2003. The film-based imaging association has a buyers guide of U.S. manufacturers and distributors of micrographic equipment and supplies.
Address: 1100 Wayne Avenue, Suite 1100, Silver Spring MD 20910 USA

ANSI (American National Standards Institute) <http://www.ansi.org> accessed 15 May 2003.
ANSI administers and coordinates the U.S. standardisation system. Address: Customer Service, American National Standards Institute, 25 West 43rd Street, New York, NY 10036.

BSI Group (British Standards Institution), <http://www.bsi-global.com>, accessed 13 May 2003.
The source of information and supply of British microfilming standards.
BSI Group 389 Chiswick High Road, London, W4 4AL, UK.

CLIR (Council on Library and Information Resources), <http://www.clir.org>, accessed 3 May 2003.
Address: 1755 Massachusetts Avenue, NW, Suite 500 Washington DC 20036, USA

G.G. Baker and Associates, <http://www.ggbaker.com>, accessed 15 May 2003.

This organisation provides detailed advice about micrographic systems. The web site includes links to suppliers and also provides background information about areas of microfilming from jacketing to linking with electronic document management systems.

Address: Saffron Hill, Chedworth, Glos. GL54 4AL UK.

IFLA (International Federation of Library Associations and Institutions) Preservation and Conservation (PAC) Core Programme, <http://www.ifla.org/VII/4/admin/general.htm#1>, accessed 15 May 2003.

IFLA-PAC Bibliotheque Nationale de France,

Address: 2, rue Vivienne, 75084 Paris Cedex 02, France.

- See also *Principles for the care and handling of library material*, <http://www.ifla.org/VII/4/news/pchlm.pdf>, accessed 15 May 2003.
- A number of back issues of *International Preservation News* are available direct from the IFLA website, <http://www.ifla.org/VII/4/pac.htm#4>, accessed 15 May 2003.
- The IFLA-PAC Centre at the National Library of Australia maintains a *Documentary Heritage Preservation Register*. This provides information about preservation projects in the Southeast Asian and Pacific regions such as microfilming, training, basic conservation and collection surveys, <http://www.nla.gov.au/dhpr> accessed 15 May 2003.

IPI (Image Permanence Institute)

<http://www.rit.edu/~661www1/>, accessed 15 May 2003.

The IPI is a university-based research laboratory devoted to image preservation.

Address: Rochester Institute of Technology, 70 Lomb Memorial Drive Rochester NY 14623-5064, USA.

ISO (International Organisation for Standardisation), <http://www.iso.ch>, accessed 15 May 2003 .

Address: ISO Central Secretariat PO Box 56 CH-1211 GENF Switzerland.

Library Preservation and Conservation Tutorial – Southeast Asia. Designed for librarians and conservators in Southeast Asia, it has a range of information on preservation, including microfilming, <http://www.librarypreservation.org>, accessed 15 May 2003.

The Microfilm Shop, <http://www.microfilm.com>, accessed 15 May 2003.

Provides product information, news and views with a focus on business applications.

MICROLINK-L is an email discussion list on preservation microfilming jointly owned by the National Library of Australia and the State Library of South Australia, http://www.nla.gov.au/nla/listserv/microlink_l.html, accessed 15 May 2003.

Introduction

Museums Australia, <<http://amol.org.au/>>, accessed 15 May 2003.
Address: PO Box K36 Haymarket NSW 1238.
(The resource *ReCollections* is also available online from the Museums Australia website, <<http://amol.org.au/recollections/>>, accessed 15 May 2003.)

National Library of Australia <<http://www.nla.gov.au/>>, accessed 15 May 2003.
Address: Canberra, ACT 2600, Australia
National Library of Australia. Policy on Preservation Copying of Collection Materials, <<http://www.nla.gov.au/policy/micro.html>>, accessed 15 May 2003.
National Library of Australia. Anica – Australian Network for Information on Cellulose Acetate, <<http://www.nla.gov.au/anica/index.html>>, accessed 15 May 2003.
See also MICROLINK-L <http://www.nla.gov.au/nla/listserv/microlink_l.html>, accessed 15 May 2003, and IFLA-PAC Documentary Heritage Preservation Register <<http://www.nla.gov.au/dhpr/>> accessed 15 May 2003.

The National Preservation Office (UK).
Address: British Library, 96 Euston Road London, NW1 2DB, UK <<http://www.bl.uk/services/preservation/>>, accessed 15 May 2003.

NSSN: a National Resource for Global Standards, <<http://www.nssn.org>>, accessed 15 May 2003.
Provides a fee-based information service which includes international standards and technical data. Address: Customer Service, American National Standards Institute, 25 West 43rd Street, New York, NY 10036.

PAMBU (Pacific Manuscripts Bureau), <<http://rspas.anu.edu.au/pambu/>>, accessed 15 May 2003. Based in the Research School of Pacific and Asian Studies, Australian National University, the aim of the Pacific Manuscripts Bureau is to locate and preserve archives, manuscripts and other unpublished or semi-published material through microfilm.
Address: PAMBU, Research School of Pacific and Asian Studies, Australian National University, Canberra, ACT, 0200, Australia.

Preservation Resources is a division of OCLC. (Online Computer Library Center Inc.), <<http://www.oclc.org/oclc/presres/microfilm.htm>>, accessed 15 May 2003.
It offers services such as preservation microfilming to libraries, including duplicating, scanning and polysulfide treatment.

RLG DigiNews is a newsletter conceived by the members of the Research Libraries Group's PRESERV community. Funded in part by the Council on Library and Information Resources (CLIR) from 1998-2000, it is available internationally via the RLG PRESERV web site, <<http://www.rlg.org/preserv/>>, accessed 15 May 2003.
Address: Research Libraries Group 1200 Villa Street Mountain View, CA 94041-1100 USA.

SEACAP (Southeast Asian Consortium for Access and Preservation), <<http://www.seacap.chiangmai.ac.th>>, accessed 14 May 2003.

The aim of SEACAP is to encourage and support collaboration amongst libraries, archives and other institutions and interested individuals in order to preserve and provide access to the published and documentary heritage of the region.

Spring Singapore, <<http://www.psb.gov.sg>>, accessed 15 May 2003.
The source for information and supply of Singapore Codes of Practice relating to microfilming.
PSB Building, 2 Bukit Merah Central, Singapore 159835.

Standards Australia, <<http://www.standards.com.au>>, accessed 14 May 2003. Address: GPO Box 5420 Sydney NSW 2001, Australia.

State Library of New South Wales. *Microforms for Sale*, <<http://www.sl.nsw.gov.au/ml/microform/>>, accessed 23 May 2003.

State Library of Queensland. *Commercial Microfilming Services Catalogue*, <<http://www.slq.qld.gov.au/bsd/cms/mcatalogue.htm>>, accessed 23 May 2003.

UNESCO *Memory of the World Programme*, <<http://whc.unesco.org/nwhc/pages/home/pages/homepage.htm>>, accessed 15 May 2003.

Topic 1

General inspection of microforms, packaging and winding

Performance criteria

You will have achieved the performance criteria for this topic when you can:

- | check the condition and completeness of the microforms and originals
- | check that packaging meets preservation standards
- | check that the roll film is wound according to specifications.

Always check the final product

This sound piece of advice is especially important in preservation microfilming—where the aim is to preserve knowledge and cultural heritage for the benefit of future generations. Any errors or omissions will limit the usefulness and authenticity of the microfilm copy, and if the original material has deteriorated badly, it may be impossible to copy it again in the future.

Apart from the preservation issues, quality control makes sense from an economic point of view in checking that there is ‘value for money’. After investing all the time, knowledge, skills and work in preparing, filming, processing and duplicating microforms, it makes sense to check that the final product meets the required standards.

Lisa Fox strongly supports full quality inspection:

The quality of the work performed and the completed microfilm are only as good as the inspection measures you and the filer take... Good quality control procedures will ensure that the institution's high expectations are met, and only full inspection can provide that assurance. (Fox 1996, p. 212)

In essence, a quality inspection program is the test of an organisation's commitment to preservation microfilming. So, whether the microforms are produced by a separate microfilming organisation, or in-house, a regular quality control inspection program should be established. Inspection should be carried out in a logical, structured manner, with specific levels and criteria that are established *before* starting the inspection process.

There are three levels of quality control inspection:

- | general
- | technical
- | visual

All three levels of inspections are discussed in this module.

( See Cybulski, Walter 1999.)

Who should check?

Checking is the responsibility of both the ordering organisation and the filming organisation.

The ordering organisation

Ultimately, the commissioning organisation has the responsibility for ensuring that the microforms meet the preservation standards. This means that the organisation which has ordered the microfilming will need to carry out a range of quality checks that are described in this module.

The filming organisation

In addition, most Agreements with microfilming organisations will also require those organisations to make certain quality inspections. Organisations should provide a record certifying that that inspections have been done and also report any problems. (See also **Preservation Microfilming—Basics** for information on **Agreements** in Topics 4 and 5.)

Another independent organisation

In some cases, technical or other levels of inspection may be done by another independent organisation where the specialised equipment is more readily available. (See Arfanis, Peter 2000). Again, the organisation should provide a record certifying that inspections have been done and also report any problems.

Even in cases where inspections are done by other organisations, it is important for microfilming staff to be aware of the steps involved, as this will help in independently assessing the quality of the final product.

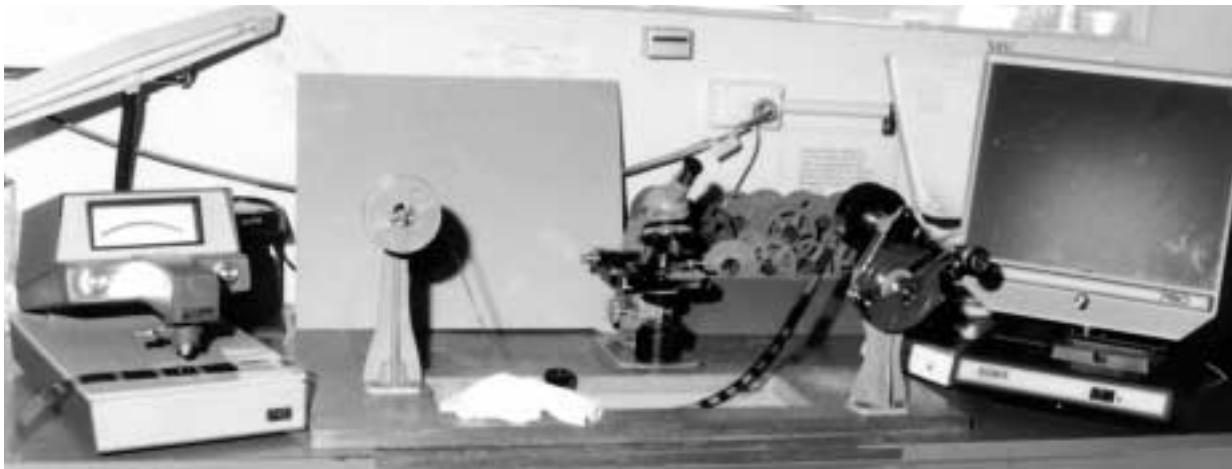
Staff

As with all areas of microfilming, all staff who carry out quality inspection should be properly trained. If microfilming is done in-house, the operators can check quality as part of their regular duties. This gives the operators the opportunity to check the results of their work and to learn from any problems.

Work area and equipment

It is useful to have a separate area set aside for quality checking. Enough space is needed around the area for staff to look at the microforms as well as the original documents. Appropriate equipment for quality checking can include:

- | clean white cotton gloves
- | a pair of film rewinds mounted on a level working surface (approximately 1 metre apart)
- | a light box placed or built-in between the rewinds
- | an eye loupe
- | a microscope with at least 40x, and preferably 100x magnification
- | a densitometer
- | a microfilm reader
- | a microfiche reader.



Quality control equipment: cotton gloves, film rewinds and light box, eye loupe, microscope, densitometer, microfiche reader

© Photograph courtesy of State Library of South Australia

General inspection: checking the condition

The first stage in general inspection is checking the condition and completeness of the microforms and the originals.



Checking physical condition

© Photograph courtesy of National Library of Australia

A general inspection means checking for the following features:

Feature	Comments
condition of originals—damage	<ul style="list-style-type: none">check that original materials have not been damaged during filming and transport (if sent to a microfilming bureau)check that the condition of the returned originals matches the description in any Condition Reports which were prepared during the preparation process—see Preparation for Microfilming, Topic 2)
completeness of originals	<ul style="list-style-type: none">check that all of the original materials have been returned, or can be located
condition of microforms and packaging—damage	<ul style="list-style-type: none">check that the microforms and their packaging are in good condition (e.g. not damaged by water, heat, or crushed during transport)
completeness of filming	<ul style="list-style-type: none">check that all of the items on the list for filming have been filmed
all generations present	<ul style="list-style-type: none">check that all three generations of film/fiche have been supplied
correct polarity of each generation	<ul style="list-style-type: none">check that the polarity of each generation matches the specifications
correct film type	<ul style="list-style-type: none">check that the film type of each generation (silver halide, diazo, vesicular) matches the specifications

When problems arise

If there are problems, you will need to discuss these with your colleagues and your supervisor, especially if the problem is complex or serious. If the microfilming is done in-house, it may be a quick process to sort out problems, such as a missing film. If the microfilming is done by an external organisation, that organisation will need to be contacted.

Most organisations will have procedures in place for dealing with problems arising from filming done by an external organisation, including identifying who is authorised to contact them.

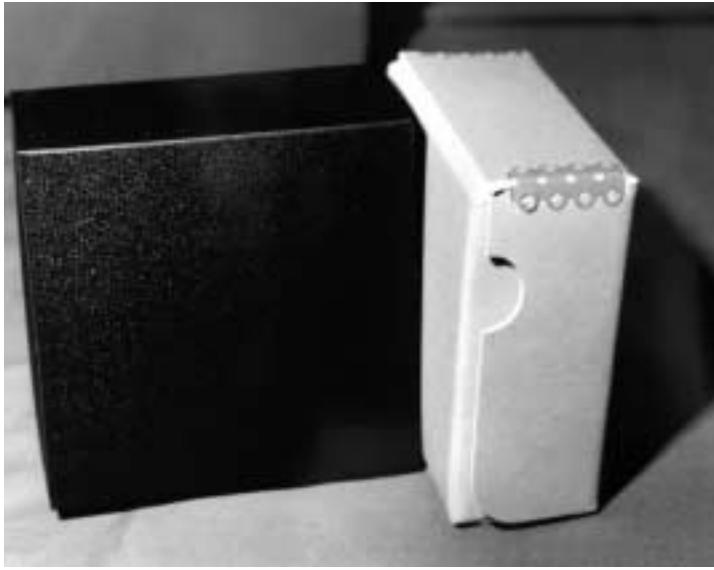
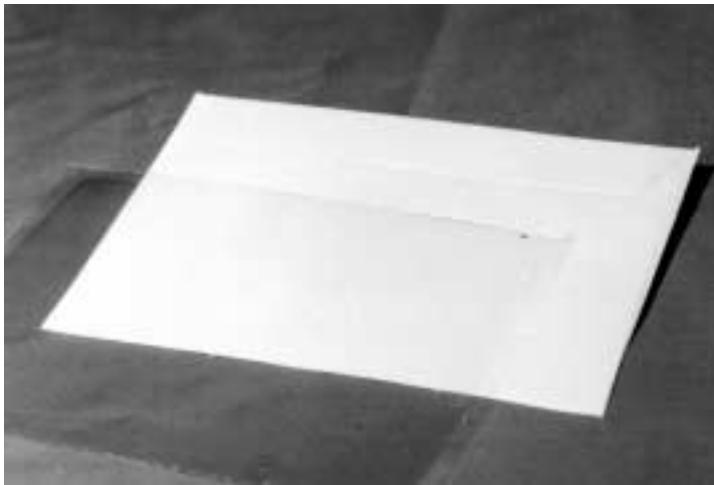
General inspection: checking the packaging

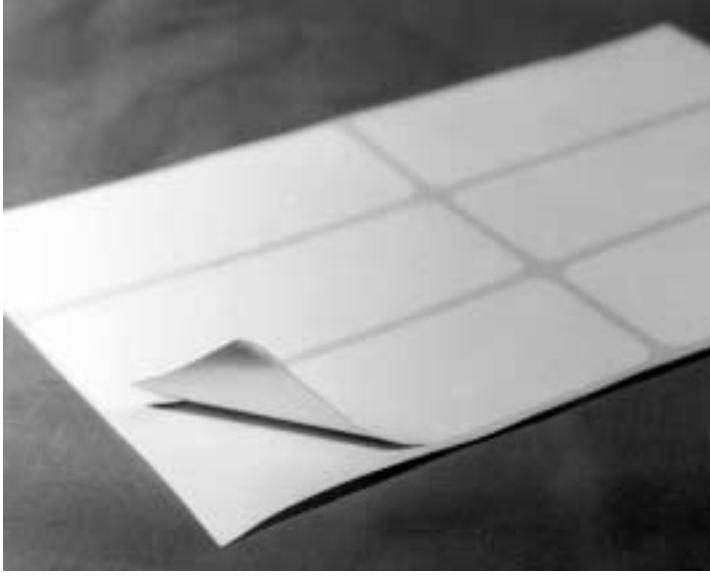
All packaging used for storing the film and fiche must be checked to see that it complies with preservation standards. The following are some typical points to check. These features are also discussed in the module, **Physical Management and Storage of Microforms**, Topics 1 and 2.

Packaging feature	Points to check
spools	<ul style="list-style-type: none">only preservation-standard, inert plastic spools should be used



Topic 1

Packaging feature	Points to check
boxes and enclosures	<ul style="list-style-type: none">the core of the spools should fit the organisation's microfilm readers
	<ul style="list-style-type: none">should be acid-free and lignin-freeplastic materials must be polyester, polypropylene or polyethyleneenclosures made of metals, cellulose acetate, or papers with waxes or other ingredients that may transfer to the microfilm are unacceptable
envelopes/sleeves (for fiche)	<ul style="list-style-type: none">should be acid-free and lignin-free
	

Packaging feature	Points to check
restrainers (fasteners used to control or prevent roll film from unwinding)	<ul style="list-style-type: none">• should be acid-free and lignin-free• rubber bands and paper clips should <i>not</i> be used as these will damage the microfilm
	
labels	<ul style="list-style-type: none">• should follow the specifications of the organisation that has ordered the microfilming, e.g. listing reel titles, dates• labels with unstable adhesives and inks known to bleed must not be used on masters or printing masters• foil-backed labels can help to overcome these problems
	

General inspection: checking the winding

Check the amount of film on the reel to ensure that it is filled to no more than 5mm from the edge of the spool.

Check the leaders and trailers to ensure that there is an adequate length—at least 500mm in the service copies.

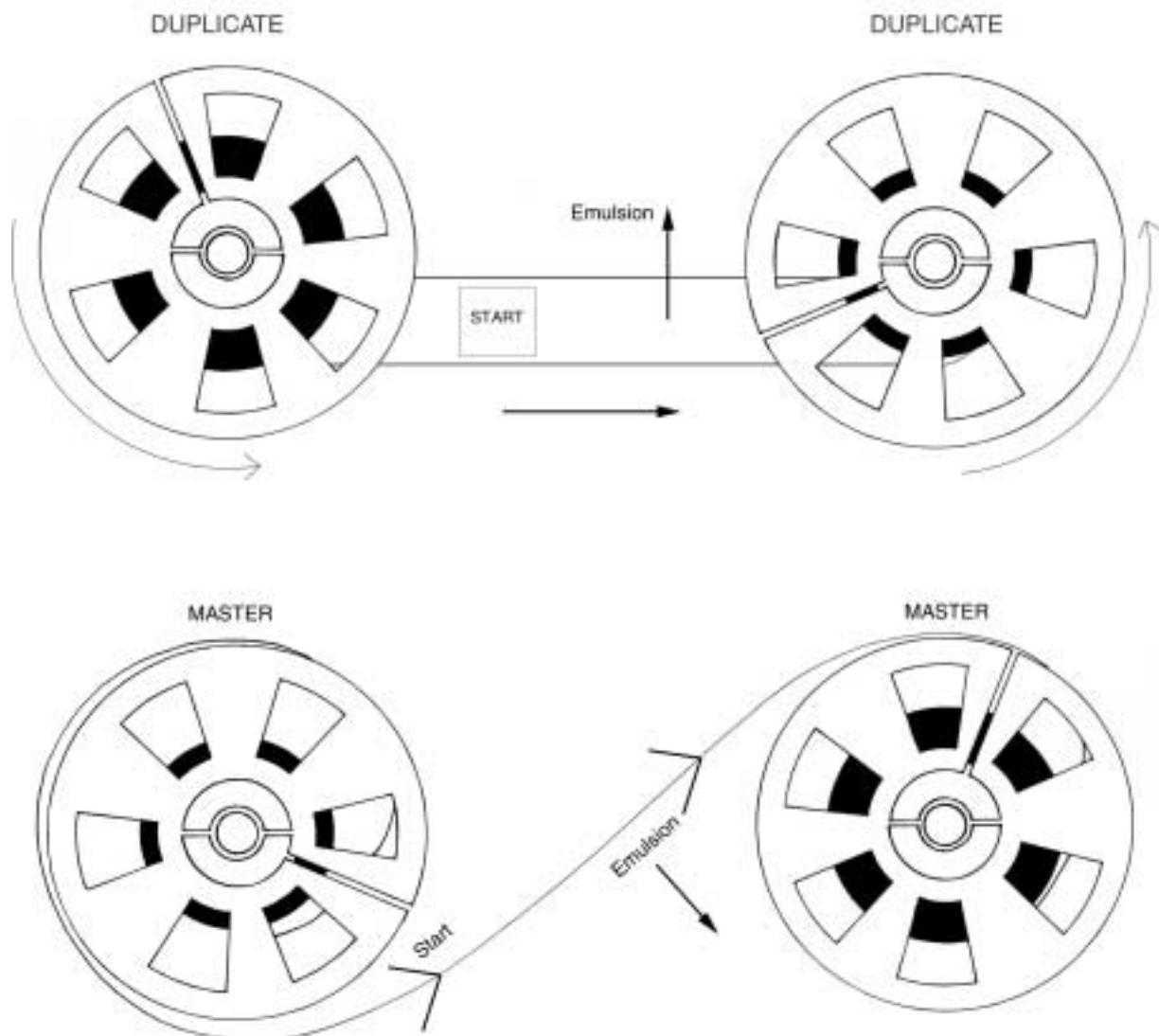
Winding

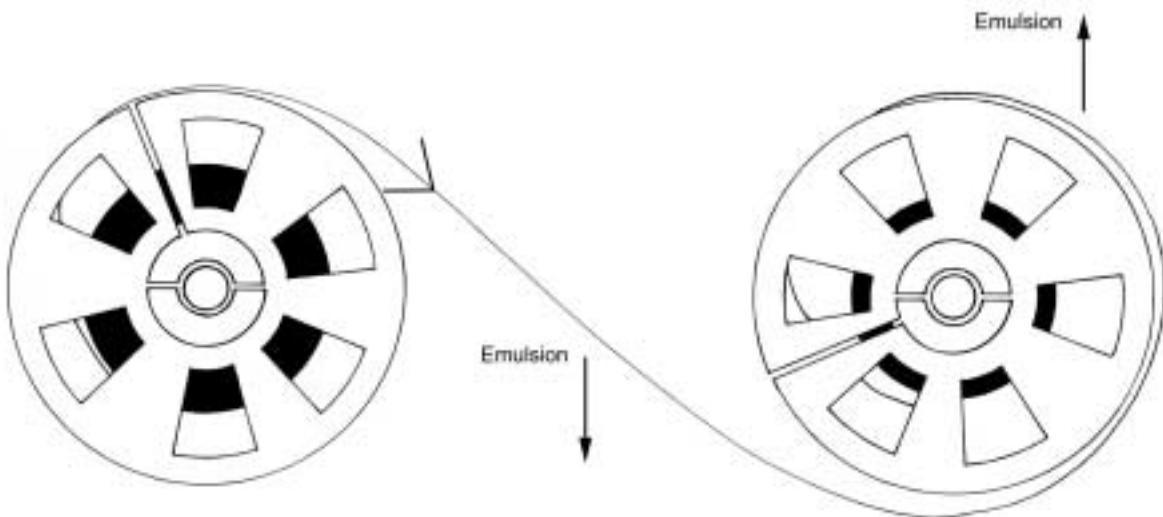
Any special winding requirements should be specified in the Agreement with the microfilm organisation.

It is common for organisations to request that reels should be wound in the following way.
(See, for example, the standard ANSI/AIIM MS 23 1998.)

Generation of film	Common specifications for winding
first generation master	<ul style="list-style-type: none">wind with emulsion out, away from centre of reel, with start target at the outer end (same as third generation)
second generation printing master	<ul style="list-style-type: none">wind with emulsion side facing in toward centre of the reel, with start target at the outer end
third generation service or use copy	<ul style="list-style-type: none">wind with emulsion out, away from centre of reel, with start target at the outer end (same as first generation)

Any incorrectly wound film should be returned for rewinding.





Winding diagrams

● Reflect 8A

General inspection problems

- | What kind of problems have you observed in microforms and the original materials at the general inspection stage?
- | Have your colleagues experienced any similar problems?
- | Check out the examples below and add others from your own experiences.

The following are examples of problems that have been observed by a number of microfilming staff from around Australia:

- | the original materials were crushed during transport
- | the microfilm boxes were badly crushed
- | the wrong type of film was supplied for service copies (e.g. vesicular instead of silver halide)
- | the wrong films were placed in the microfilm boxes (dates and titles mixed up)
- | microfilm boxes were incorrectly labelled
- | printing master copies were not supplied for some films
- | films were not wound according to the specifications
- | the original materials were damaged by mice.

Other problems

■ Activity 8.1

A case study in general inspection

A container of microfilm reels and original materials has just been returned by a local microfilming organisation. You have been asked to do a general inspection.

Briefly list the points which you would look for in checking the condition, packaging and winding of the films, and the original materials.

Condition

Packaging

Topic 1

Winding

Summary

- | A rigorous quality inspection program is critical to ensure that the microfilm copy is accurate and complete.
 - | The first stage of quality inspection involves checking the condition and completeness of the films and the originals.

Checklist

In order to test your understanding of this material, work through the checklist below.

If you can answer 'yes' to each question, and you have completed the activities for this topic, you are now ready for your lecturer or assessor to verify that you:

- I can meet the **performance criteria**
- I have satisfactorily completed the **activities**.

If you are in any doubt about any of the content, you should read through the material again, consult some of the references mentioned in the section entitled **Resources**, talk to your work colleagues or contact your lecturer or mentor.

I can:

- I check the condition and completeness of the microforms and originals
- I check that packaging meets preservation standards
- I check that the roll film is wound according to specifications.

▲ Submit

You are now ready to record in your **Log book** that you:

- I can meet the **performance criteria**
- I have satisfactorily completed the **activities** for this topic.

You can record these by marking off the boxes in the shaded columns with a **✓ yes** or **✗ no**.

You can then ask your lecturer or assessor to verify this information.

Topic 2

Technical inspections of microforms

Performance criteria

You will have achieved the performance criteria for this topic when you can:

- | use a densitometer to check that film density is within specifications
- | check the resolution test chart to confirm that a specified level of resolution has been achieved
- | calculate the Quality Index level and determine whether this is acceptable
- | check that a polyester film base has been used
- | interpret the results of a methylene blue test to determine whether this is within recommended levels
- | identify the appropriate actions if the methylene blue test results are outside recommended levels.

A number of technical inspections **must** be carried out to make sure that the microform meets preservation standards. These are testing for:

- | density
- | resolution and that the required Quality Index has been achieved
- | film base
- | chemical levels (usually a methylene blue test).

Density

In the module **Preservation Microfilming—Basics**, density is described as the degree of darkening of the film emulsion.

Density is influenced by the type of film, the exposure levels and how the film is processed.

Many preservation microfilming projects specify minimum density ranges according to the contrast and type of materials.

Level of contrast

Density tests measure the level of contrast achieved between the dark and light areas on the film.

On negative films the background density or maximum density (**Dmax**) is the **dark** part of the image and the minimum density (**Dmin**) is the **light** part.

This is **reversed** in positive films.

The *Guidelines for Preservation Microfilming in Australia and New Zealand* specify that the following readings should be taken on every roll of film.

Generation	Maximum (Dmax) density	Minimum (Dmin) density
master negative	✓	✓
printing master	✓	✓
service copy	✗	✓

Taking a density reading

Taking a density reading of a master negative involves the following steps.

Step	Comments
1. use a densitometer (calibrated)	<ul style="list-style-type: none">use a densitometer which has been properly calibrated
2. identify points for background density readings	<ul style="list-style-type: none">select the background density readings (Dmax) from a part of the page without text or illustrations (the black part of the image area)avoid taking readings from inner or outer margins as pages may be discoloured around the edges
3. take at least 3 maximum density readings	<ul style="list-style-type: none">take a minimum of 3 Dmax readings throughout the roll or 1 per fiche(the <i>RLG Preservation Microfilming Handbook</i> requires at least 8 readings per roll)
4. average the readings	<ul style="list-style-type: none">average the result of the readings
5. take at least 1 minimum density reading	<ul style="list-style-type: none">also take at least 1 minimum density reading (Dmin) per roll, or per ficheselect the test area from the blank areas of film before and after the exposed frame



Taking a density reading using a densitometer

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Density levels

The *RLG Preservation Microfilming Handbook* specifies certain background density levels for different types of materials (Elkington 1992). These are reproduced with permission in the table below.

HIGH CONTRAST	1.00-1.30
Bold printed or bold handwritten text on crisp white paper.	
MEDIUM CONTRAST	0.90-1.10
Bold printed or bold handwritten text on moderately darkened paper. Bold printed or bold handwritten text on lightly colored paper. Black opaque pencil on white paper. Small high contrast printed text on white to moderately darkened paper.	
LOW CONTRAST	0.80-1.00
Faint printed or faint handwritten text on moderately to badly darkened paper. Pencil on moderately to badly darkened paper. Faint pencil on white paper. Faint printed or faint handwritten text on tissue or onion skin. Faint printed or faint handwritten text on lightly colored paper. Printed or handwritten text on dark colored paper. Faint pencil and ink drawings.	

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Additional recommendations

The following table shows suggested background density ranges for different types of documents.

Generation	Maximum (Dmax) density	Minimum (Dmin) density	Other recommendations
master negative		Dmin—not higher than 0.10	
printing master	Dmax 1.25	Dmin between 0.10 and 0.20 —depending upon manufacturers' specifications for type of film used	
service copy		Dmin—less than 0.15	within any one frame, the maximum variation should be 0.15
within any one reel			the average densities should vary by no more than 0.20

Levels are only a guide

In practice, the recommended density levels serve as a guide only. Many original materials are far from ideal, with poor contrast and fine lines. Simply specifying higher background density may produce a dark background, but the image may not be legible. This is one reason why preservation microfilming has been described as 'an art, as well as a science'.

Other types of problem materials have a number of contrast levels on the one page (e.g. text and photographs) and these may require multiple exposures at different settings. (see, **Operating Microfilming Equipment—Cameras**, Topic 5)

When filming, it is good practice to carry out step tests to determine the camera settings that best suit the materials that are being filmed. Step tests are discussed in the module, **Operating Equipment—Cameras**, Topic 5.

The following diagram shows the effects of underexposure and overexposure on density levels and overall image quality.



Density levels and effects of underexposure and overexposure

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Uniform density target

The uniform density target is another of the technical targets that are quality-checked. This target is used to check how well the camera lamps are balanced. The target is nothing more than a uniform white sheet of card stock or heavy paper. This target is filmed twice at the same exposure level—immediately before the start and before the end targets.

After processing, the density values of both the uniform density targets are compared for any significant variations that may indicate lighting, camera or processing problems.

The *RLG Preservation Microfilming Handbook* also specifies the following (Elkington 1992, pp. 36–37):

Feature of uniform density target	Details
areas to be tested	<ul style="list-style-type: none">• all four corners plus the centre
generation to be tested	<ul style="list-style-type: none">• master negative
levels	<ul style="list-style-type: none">• density of all areas tested should lie between 0.90 and 1.30

Feature of uniform density target	Details
differences	<ul style="list-style-type: none">density of any two areas should not differ more than 0.10 density units
area to be tested	<ul style="list-style-type: none">any 1mm diameter site accessible to a densitometer that is wholly within the filmed uniform density targettest point should not contain any printed information

■ Activity 8.2★

❖ These are major activities which require the lecturer/assessor to observe and/or sign off performance details.

Taking a density reading



For this activity you will need access to a densitometer.

A test film is supplied with this module with a section marked *density reading* and cotton gloves were supplied with the module, **Processing and Duplicating Microforms**.

You will also need to make advance arrangements so that your lecturer or assessor can be present to observe you taking the density reading, and sign off your performance in the table below.

(Your lecturer or assessor will also need to be present for **Activity 8.4**.)

Using a densitometer, take the background (Dmax) density of the sample negative film supplied.

Follow the steps listed below.

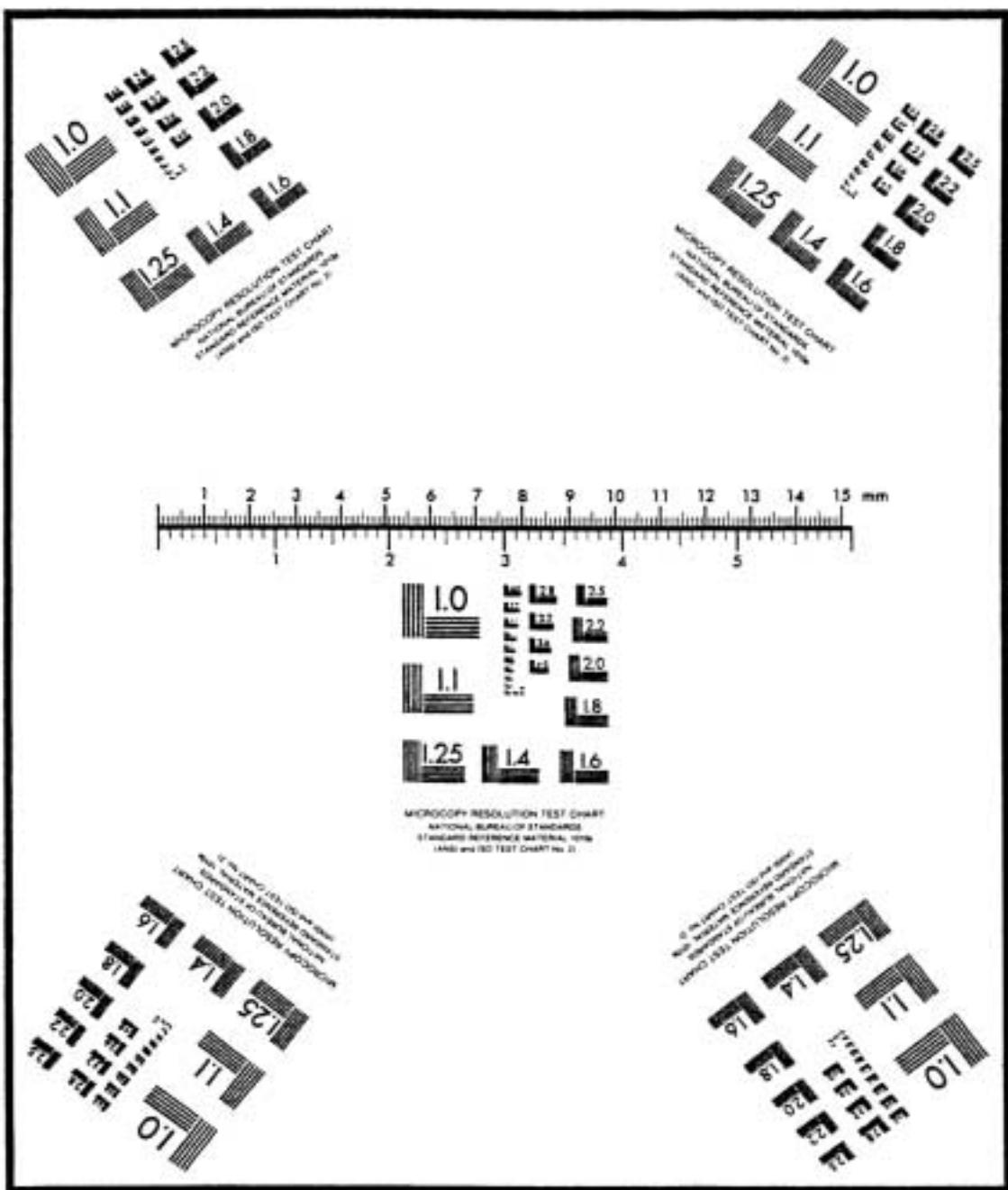
1. First calibrate (check the readings of) the densitometer according the manufacturer's instructions.
2. Handle the film very carefully with cotton gloves, to avoid scratching it.
3. Find the sections in the test film which are marked *density reading* then select test areas from the black part of the image area (without text or illustrations).
4. Take the test readings from a minimum of three different parts of the *density reading* section.
5. Average the readings.
6. Record your result on the dotted line below.
7. Dmax =
8. Using the RLG chart in the section, **Taking a density reading**, is this reading within acceptable levels, if the original is high contrast? yes or no

Steps	Lecturer/assessor to verify that each step has been performed correctly		
	Correct ✓ yes ✗ no	Assessor signature	Date
operator first calibrates the densitometer according the manufacturer's instructions	<input type="checkbox"/>		
operator handles the film carefully with cotton gloves to avoid scratching it	<input type="checkbox"/>		
operator selects test areas from the black part of the image area (without text or illustrations)	<input type="checkbox"/>		
operator takes the test readings from a minimum of three different parts of the film	<input type="checkbox"/>		
operator averages the readings	<input type="checkbox"/>		
operator records the results	<input type="checkbox"/>		
operator determines whether reading is within acceptable levels using the RLG chart	<input type="checkbox"/>		

Resolution

Resolution is introduced in, **Preservation Microfilming—Basics** as the degree to which fine details can be distinguished. The higher the resolution, the finer the detail that will be reproduced. The resolution test chart appears in the targets. (See examples in, **Preservation Microfilming—Basics**, Topics 4 and 5, and the test film supplied.)

The resolution target has five charts. One is in the centre and four are placed in the corners so that they correspond to the corners of the largest documents being photographed. Each pattern on the resolution chart has a rating.



Resolution test chart (This example is for illustration only and should not be used for test purposes.)
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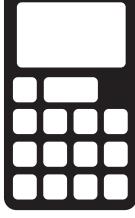
Calculating the resolution

To find the resolution, follow the steps below. The first stage is checking the resolution test chart, which should appear in the microfilm targets.

Topic 2

Summary

To calculate the resolution you will need to check the resolution target to identify the *smallest image size* in which you can clearly distinguish the *finest pattern of lines*.

steps	comments and examples
1. inspect under a microscope 	<ul style="list-style-type: none">• inspect the filmed image of the resolution chart under a microscope• handle film carefully with cotton gloves
2. examine pairs of line patterns and move from larger to smaller	<ul style="list-style-type: none">• make sure that both horizontal = and vertical II lines can be clearly distinguished• keep on moving down to the smallest pairs of line patterns, until it is no longer possible to clearly distinguish separate line pairs
3. select the smallest pair of line patterns that can be resolved	<ul style="list-style-type: none">• the fine lines should be visually separated
4. calculate resolution 	<ul style="list-style-type: none">• calculate the resolution, in line pairs per millimetre• the resolution is the number linked with the smallest pattern size in which the lines are just visually separated—multiplied by the reduction ratio
example	<p>For example:</p> <ul style="list-style-type: none">• smallest pattern size is identified = 8• reduction ratio = 1: 18• resolution = $8 \times 18 = 144$ line pairs per millimetre
5. check all 5 charts	<ul style="list-style-type: none">• this provides information on the resolution value out in the corners where the lenses begin to get a little fuzzy

Resolution levels

In preservation microfilming, a **minimum** level of resolution is often specified. The project manager or supervisor should discuss with the curator or owner of the records what quality level is required. The following are levels that are commonly recommended.

Generation	Recommended resolution levels
master negative	<ul style="list-style-type: none"> • between 120 to 150 line pairs per millimetre
2nd generation printing master	<ul style="list-style-type: none"> • should not fall more than one level below the first generation master
3rd generation service copy	<ul style="list-style-type: none"> • should not fall more than one level below the second generation printing master

Quality Index

The Quality Index (QI) system takes account of the level of detail in the original, which is added to the resolution measurement. This is a measurement of *type size* in millimetres (or point size) of the lower case letter 'e' in the original document.

This measurement is then multiplied by the smallest resolution pattern that is resolved on the film. The number is then used as the Quality Index.

Quality index levels

The Australian *Guidelines* recommend that, ideally, QI levels should be as follows:

Generation	Minimum QI level
1st	10.0
2nd	9.0
3rd	8.0

A Quality Index table can be used to determine the resolution required to reach a particular QI level

Type size small 'e' in original	Resolution rating required in:		
	1st generation (QI 10)	2nd generation (QI 9)	3rd generation (QI 8)
4pt = 0.04" = 1.0 mm	resolution = 10.0	9.0	8.0
6pt = 0.06" = 1.5 mm	resolution = 6.3-7.1	5.6-6.3	5.0-5.6
8pt = 0.08" = 2.0 mm	resolution = 5.0	4.5	4.0
10pt= 0.10" = 2.5 mm	resolution = 4.0	3.6	3.2
12pt= 0.12" = 3.0 mm	resolution = 3.2-3.6	2.8-3.2	2.5-2.8
14pt= 0.14" = 3.5 mm	resolution = 2.8-3.2	2.5-2.8	2.2-2.5
16pt= 0.16" = 4.0 mm	resolution = 2.5	2.2-2.5	2.0
18pt= 0.18" = 4.5 mm	resolution = 2.2	2.0	1.6-1.8
20pt= 0.20" = 5.0 mm	resolution = 2.0	1.8	1.6
22pt= 0.22" = 5.5 mm	resolution = 1.8	1.6-1.8	1.4-1.6
24pt= 0.24" = 6.0 mm	resolution = 1.6-1.8	1.4-1.6	1.25-1.4

Quality index table

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■ Activity 8.3

Resolution and Quality Index

Resolution

Calculate the following resolutions, and comment on whether you see the resolution as average, poor or high in comparison to the information provided in **Resolution levels** above.

Smallest recognisable pattern	Reduction	Resolution ratio	Comment (average, poor or high)
8	1:16		
7.1	1:15		
6.3	1:17		
8	1:20		

Quality index

Calculate the following Quality Index (QI) levels for a first generation microfilm. Does the QI level fall within the minimum acceptable levels for first, second and third generations of microforms?

Indicate ✓ Yes or ✗ No.

(pt = point size, which refers to the size of the type or font)

Type size small 'e' in original	Resolution	Generation	QI	Acceptable minimum QI level achieved?
4 pt = 1.0mm	10.0	1st		<input type="checkbox"/>
14 pt = 3.5mm	2.0	2nd		<input type="checkbox"/>
8 pt = 2.0mm	5.6	3rd		<input type="checkbox"/>

■ Activity 8.4★

★ These are major activities which require the lecturer/assessor to observe and/or sign off performance details.

Calculating resolution



For this activity you will need access to a microscope.

A sample film with resolution targets is supplied with this module, and cotton gloves were supplied with the module, **Processing and Duplicating Microforms**.

You will also need to make advance arrangements so that your lecturer or assessor can be present to observe you taking the density reading, and sign off your skills in the table below.

Calculate the resolution in the sample film supplied, using a microscope.

- | Follow the steps listed above under, **Calculating the resolution**.
- | For this activity, use the centre pattern of the 5 patterns on the resolution target.
- | The reduction ratio is 1:16.

Give details of your calculations in the spaces provided below.

Calculation

- | Smallest pattern size identified =
- | Reduction ratio = 1: 16
- | Resolution = X = line pairs per millimetre.

Steps	Lecturer/assessor to verify that each step has been performed correctly		
	Correct ✓ yes ✗ no	Assessor signature	Date
operator inspects the filmed image of the resolution chart under a microscope	<input type="checkbox"/>		
operator handles the film carefully with cotton gloves to avoid scratching it	<input type="checkbox"/>		
operator examines pairs of line patterns and moves from largest to the smallest, until it is no longer possible to clearly distinguish separate line pairs	<input type="checkbox"/>		
operator selects the smallest pair of line patterns that can be resolved (the fine lines should be visually separated)	<input type="checkbox"/>		
operator calculates the resolution as the number linked with the smallest pattern size in which the lines are just visually separated—multiplied by the reduction ratio	<input type="checkbox"/>		
operator records the results	<input type="checkbox"/>		

Film base

Microfilm is available in both polyester and acetate base.

Only polyester basefilms are suitable for preservation microfilming. Cellulose acetate and triacetate bases have a much shorter lifespan and generally deteriorate as a result of the 'vinegar syndrome'.

As part of quality inspection, it is important to make sure that only polyester-base film has been used on all generations of film.

Testing film base of a master negative

A number of tests can be carried out to determine the base of a microform master negative. Two simple ones are described below.

Tear test

Acetate film tears more easily than polyester film.

- I Tear a small piece from the leader of the acetate base film supplied with this module.
- I Repeat this with the polyester base film—also supplied.

As tear tests damage the film, the polarising test below is widely used.

Polarising test

Step	Comments
take test card	<ul style="list-style-type: none">use the polarising test card
hold master negative film and card to light	<ul style="list-style-type: none">hold negative to the light and view it against the window in the card
check for rainbow effect	<ul style="list-style-type: none">check for a rainbow effect in the windowwhere there is a rainbow effect, polyester film has been usedwhere there is no rainbow, the film is likely to be acetate
	<input checked="" type="checkbox"/> rainbow = polyester <input type="checkbox"/> no rainbow = acetate



Using a polarising test card to test the film base

© Photograph courtesy of State Library of South Australia

When checking film base it is always a good idea to unwind the roll film and test a point in the main film sequence, past the leader. This is because the leader may have been spliced on, and may be a different film base from the main film.

Further information about cellulose acetate is available from a number of organisations, such as the Image Permanence Institute (IPI) and the National Library of Australia.

If you have access to the internet you can check for information from the Image Permanence Institute (IPI) and the National Library of Australia's website under its *cellulose acetate project*.

■ Activity 8.5

Film base

A polarising filter for checking the film base has been supplied with this module.

Test the film samples supplied to find out which are on polyester base and which are on acetate base.

- | use the polarising test card
- | follow the steps listed above under **Polarising test**
- | record your answer by ticking the correct box below for each sample.

Sample A Polyester Acetate

Sample B Polyester Acetate

Sample C Polyester Acetate

Why is acetate base film unsuitable for preservation microfilming?

Testing chemical levels

The processed silver halide microfilm must be tested to make sure that the chemicals used in developing and fixing the images have been removed from the film by proper washing. If these chemicals remain on the film, they will cause the images to fade and discolour in the longer term.

Methylene blue test

One of the most common methods of testing for residual (left over) chemicals is the methylene blue test.

- | This test measures the levels of residual thiosulfate in the processed film.
- | The test is done on a portion of the processed film taken from the trailer.
- | The operator must handle the test film carefully at all times with clean white cotton gloves to prevent contamination.
- | The operator must individually identify test samples (eg title/date). This will assist in following up any problems.

Frequency of testing

As methylene blue tests are expensive, testing every single film or fiche is not practical.

Identifying batches for testing can also be difficult, in organisations where automatic processors are used. These commonly-used processors run continuously with programmed levels of chemical replenishment, so here it is difficult to isolate discrete batches.

The following suggestions are adapted from the Australian and New Zealand *Guidelines* (National Library of Australia 1998) and the *RLG Handbook* (Elkington 1992).

- | For small microfilming operations, test a small number of samples selected randomly from daily samples collected, (e.g. over a week). *Australian Guidelines*
- | For large microfilming operations, test one sample of master film every day that master film is processed. *RLG Handbook*



Performing a methylene blue test

© Photograph supplied by State Library of South Australia

Requirements of testing

Requirement	Comments
specified level	<ul style="list-style-type: none"> the maximum permissible concentration of thiosulfate is 1.4 micrograms per square centimetre this is often written as $1.4 \mu\text{g}/\text{cm}^2$ (where μg = micrograms)
certification of testing	<ul style="list-style-type: none"> the testing organisation must give a written report confirming the test results an example of a certification report is given in Activity 8.6 below
problem (requiring rewash)	<ul style="list-style-type: none"> if one sample fails the test, then all other films which were processed at the time (for example, on that day) must be rewashed this is another reason why accurate processing records need to be kept (see, Processing and Duplicating Microforms)
time frame (within 2 weeks)	<ul style="list-style-type: none"> it is a common requirement for methylene blue tests to be carried out within a maximum time frame of 2 weeks after the film has been processed accurate details of when films were processed will help to identify samples for testing well within this time frame the module, Processing and Duplicating Microforms described the need for accurate processing records to make sure that methylene blue tests are carried out promptly
who performs the test?	<ul style="list-style-type: none"> some organisations have the equipment and chemicals necessary to do their own testing it is also common to find that organisations arrange to have their methylene blue testing carried out independently by another organisation ideally, the testing should be done by an independent accredited laboratory to the standard ISO 18917

Who can do the methylene blue tests?

It can be difficult to find organisations which will conduct methylene blue tests. If you need to find an organisation that will do the test, ask your colleagues and contacts within the microfilming industry, especially film suppliers.

You can also contact a major library or archives in your country, or other microfilming organisations, national libraries or archives in the region, for suggestions.

■ Activity 8.6

Methylene blue test

MBT (Methylene Blue Testing) Services Pty. Ltd.

Analysis of microfilm for residual thiosulfate

METHOD: ISO 18917 Methylene blue test

RESULTS:

Test on batch received 7/4/2001

Sample no.	Number/title	Date processed	Result
1	PRG 30/2 Lien family records	3/04/2001	<0.1 µg/cm ²
2	GRG 43 Cambodian historical records	2/04/2001	<0.1 µg/cm ²
3	Mount Fuji Courier 1932	5/04/2001	<0.1 µg/cm ²

The above methylene blue test result has been returned from MBT testing laboratory. Use the earlier information under, **Testing chemical levels**, to answer the following:

a) What is the maximum level of thiosulfate allowed on preservation master microfilm?

b) What does this mean?

1.2µg/cm²

c) Are all tested samples within the maximum specified level? Yes No

d) Were all samples tested within a two week period of being processed? Yes No

e) Why is it important to do methylene blue tests on master film?

f) What happens if a sample fails the test?

Summary

A number of technical inspections must be carried out to ensure that the microfilm meets preservation standards.

Technical inspections include the following:

- | testing for density using a densitometer—this is a check that density levels fall within the specified levels
- | testing resolution using a resolution chart—this tests the resolution and Quality Index levels
- | testing for film base, for example, using a polarising filter—this is to check that the film base is polyester
- | testing for residual chemicals—using the methylene blue test.

Checklist

In order to test your understanding of this material, work through the checklist below.

If you can answer ‘yes’ to each question, and you have completed the activities for this topic, you are now ready for your lecturer or assessor to verify that you:

- | can meet the **performance criteria**
- | have satisfactorily completed the **activities**.

If you are in any doubt about any of the content, you should read through the material again, consult some of the references mentioned in the section entitled **Resources**, talk to your work colleagues or contact your lecturer or mentor.

I can:

- | use a densitometer to check that film density is within specifications
- | check the resolution test chart to confirm that a specified level of resolution has been achieved
- | calculate the Quality Index level and determine whether this is acceptable
- | check that a polyester film base has been used
- | interpret the results of a methylene blue test to determine whether this is within recommended levels
- | identify the appropriate actions if the methylene blue test results are outside recommended levels.

▲ Submit

You are now ready to record in your **Log book** that you:

- can meet the **performance criteria**
- have satisfactorily completed the **activities** for this topic.

You can record these by marking off the boxes in the shaded columns with a **✓ yes** or **✗ no**.

You can then ask your lecturer or assessor to verify this information.

Topics 3 & 4

Visual inspections of microforms and records

Performance criteria

You will have achieved the performance criteria for this topic when you can:

- I check a third generation service copy visually for defects affecting:
 - completeness
 - legibility
 - compliance with project specifications
 - suitability for future digitisation
 - physical condition
- I maintain records of quality control inspections.

Unless the microform is a complete, accurate and legible copy of the original material, it fails to meet preservation requirements, even if its technical quality is excellent.

Guidelines for Preservation Microfilming in Australia and New Zealand, p.64.

If the microfilm meets all the technical standards, it should be visually checked for defects. This involves placing the film on a reader and inspecting it, frame-by-frame. The film should be compared with the original text.



Visual inspection

Which generation to inspect?

Microfilmers around the world have differing views about which generation of film should be inspected frame-by-frame. A summary of the arguments for and against inspecting the master (first generation) or a copy (second or third generation) is provided below.

The example is taken from information posted to *MICROLINK-L*, an international preservation microfilming discussion list. See **Resources** list at the front of this module. It is reproduced with permission of MICROLINK-L and the writer.

Ultimately, the decision about which generation(s) to check must be made by the project manager or supervisor.

Brown, Heather (SLSA)

From: Julie Dees [jbullock@mdah.state.ms.us]
Sent: Friday, 11 May 2001 23:48
To: Microforms Discussion List; Microlink Discussion List
Subject: frame-by-frame inspection

Microlink - <http://www.slsa.sa.gov.au/microlink>

Thank all of you for your helpful responses. Per several individuals' requests, I am summarizing the information I received for the entire list. The vote was split evenly between inspection of the camera negative and inspection of the second-generation negative (or print master or copy negative, depending on the terminology used at the different agencies).

Proponents for inspection of the camera negative argued that errors were caught immediately, without further waste of duplicates, and many cited the NPO Guide to Preservation Microfilming (updated Mellon guide) as their source. They advised the use of light boxes or glassless microfilm readers for the inspection to avoid damage to the preservation copy. Most advocates for first-generation inspection were companies who process and duplicate microfilm, though there were also archive supporters.

Those who advocated the inspection of second-generation negatives cited the need to protect the camera negative from unnecessary handling. Some said their service provider automatically created a copy negative for every camera negative processed, so they lose nothing by inspecting the second-generation negative, rather than the camera negative.

There were a couple of institutions who inspect third-generation, positive prints frame-by-frame. Their argument was that the camera negative and second-generation negative should be handled as little as possible, and positive prints are easier to read and can be placed on a reader without concern over scratches. They said that inspection of the positives would take less time, thereby reducing labor costs and more than making up for the occasional rejected roll(s).

Julie Dees
Archival Reformatting Unit
Mississippi Department of Archives and History

How many and how much should be checked?

Do you really have to do 100 percent inspection on every completed film?

Lisa Fox answers, 'Yes you should'.

(Fox 1996, p. 212)

The Australian and New Zealand *Guidelines* add that:

Experience suggests that the only reliable method of confirming that the microfilm is a complete and accurate record is to carry out a frame-by-frame inspection of the third generation service copy against the original material.

(National Library of Australia 1998, p.64)

As many organisations do not have the resources to do frame-by-frame checking, the question of how many should be checked becomes a risk management issue. The following table gives suggestions on levels of checking. It has been adapted from the Australian and New Zealand *Guidelines* (National Library of Australia 1998) and the *RLG Handbook* (Elkington 1992).

Level of checking	Category	Source
lower level (spot checks)		
1 in 10 reels (10%)	100 reels or fiche have been fully checked, with few quality problems	<i>RLG Handbook</i>
higher level (detailed checks)		
check all reels frame-by-frame (100%)	if collation has not been detailed	<i>RLG Handbook</i>
	if originals are in another alphabet/script	<i>RLG Handbook</i>
	if film is to be used as evidence	<i>Australian & NZ Guidelines</i>
	if the film includes a declaration that it is a complete and accurate copy	<i>Australian & NZ Guidelines</i>
	if film is to be supplied commercially and purchasers believe they are paying for a complete/accurate copy	<i>Australian & NZ Guidelines</i>
	if the film will take the place of an original of national significance	<i>Australian & NZ Guidelines</i>
	if there is no chance of redoing the work (e.g. original is in fragile condition)	<i>Australian & NZ Guidelines</i>

Checking for completeness and compliance

The film should be checked for completeness, legibility, physical condition and compliance with the Agreement. It should be a complete, accurate and legible copy. It should also meet the specifications of any Agreements. (See, **Preservation Microfilming—Basics**, Topics 4 and 5.)

Checklist

The following is a typical list of features to check in a detailed visual inspection. It has been adapted from *Guidelines for Preservation Microfilming in Australia and New Zealand* (National Library of Australia 1998, pp. 66-67). Adapt the list to your own needs. Add to the list in the spaces below.

completeness	<ul style="list-style-type: none">the complete list of the original material has been filmedthere are no missing pagesinformation has not been lost due to gutter shadow
targets	<ul style="list-style-type: none">all of the technical and bibliographic detail targets have been filmedall of the targets appear correctly and in the correct orientationall of the targets are in the right order
alignment	<ul style="list-style-type: none">the image is aligned correctly within the frame, with no more than 10% skew from the vertical
orientation	<ul style="list-style-type: none">image orientation is according to specifications e.g. single or double frame, comic or cine
reduction ratio	<ul style="list-style-type: none">the reduction ratio used nearly fills the frame, with all the edges of the document visible
legibility	<ul style="list-style-type: none">all of the information is easy to read (regardless of resolution and density levels)
density	<ul style="list-style-type: none">there are no major variations in densityphotographs or other features are neither too light nor too darkmultiple exposures are used to film originals with variations in density
focus	<ul style="list-style-type: none">there are no blurred images—especially near splicespages have been filmed flat—the original has not been distorted
foreign objects	<ul style="list-style-type: none">there are no additional objects in the images e.g. operator's hands, tape, pencils
fogging	<ul style="list-style-type: none">there is no fogging or extra light which may cloud the image
splicing	<ul style="list-style-type: none">only the master has been splicedsplices have been made using an ultrasonic spliceradjacent frames are not badly scratched or blurredthere are no more than 6 splicesthere are no splices between the technical target and the first ten frames of the textdefective frames have been removedat least two pages before and after the page being refilmed are included in the retake
scratching (physical condition)	<ul style="list-style-type: none">the film is free from scratching (see below for what is acceptable and unacceptable)
marks (physical condition)	<ul style="list-style-type: none">the film is free from blemishes, dust, fingerprints, water spots and other defects

Suitability for digitisation

If the microfilm is to be digitised, this information should already appear in the Agreement, as digitising requirements will have an impact on the filming arrangements and image quality.

When checking suitability for digitising a number of additional factors should be checked. These are listed as **Factors which impact on the quality, rate and cost of digital image** in the module, **Preservation Microfilming—Basics**, Topic 6.

Another way of checking on suitability for digitising is to ask the filming organisation to supply test scans from selected images for checking.

Quality inspection records

Any quality problems that have been identified should be recorded systematically. Clear and accurate records of problems will help in the next stage of deciding on the actions to take. Most organisations create their own quality inspection record sheets.

Two examples are provided below.

The example from Library and Information Services of Western Australia is a *birth certificate* which is kept with the records for each film.

Many organisations use a job record which follows a microfilming job from all stages from preparation and filming through to quality checking. The quality inspection records then become part of the overall job records.

QUALITY CONTROL REPORT

Date: _____ Job No: _____
Client: _____
Job Name: _____
Period Covered: _____
Density (black area): _____ Density (clear area): _____
No. of Splices: _____ Reduction: _____ Resolution: _____

Blip:
Target Order Correct:
All documents/pages present:
Index>Title:
All duplicates present:

Condition of Items/Defects – Comments:

METHYLENE BLUE TESTING

M.B.T. No: _____
Allen Processor: _____ Cordell Processor: _____

(<) 0.7 micrograms/cm² indicates Kodak Archival quality
(>) 0.7 micrograms/cm² indicates Kodak NON-Archival quality

Signed: _____

Preservation Services																																									
Quality Certificate																																									
Edit Print Save Exit																																									
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Problems: causes and actions

Once problems have been identified, the next stage is identifying the causes. This will help in determining what to do next. The original text should always be checked in this process. For example, what may appear to be a problem of a large mark on an image may turn out to be simply caused by a stain on the original. No further action can be taken in this case.

In other cases where the cause is likely to be a problem with the equipment or the operator, further action needs to be taken to prevent the problem recurring.

Acceptable or unacceptable?

A decision also needs to be made as to whether the problem is acceptable or unacceptable, and any actions required.

Type of problem	Acceptable/unacceptable	Actions
minor	error accepted	none
major	unacceptable	a complete refilm, or a retake of sections
combination of minor problems	unacceptable	a complete refilm, or a retake of sections

Ultimately, the decision to accept or reject a problem, and on any actions such as refilming, will need to be made by the supervisor or project manager.

A number of the microfilm handbooks and guidelines can assist in decision-making. For example, the Australian *Guidelines* suggests the following actions for scratches.

accept scratches if	correct scratches if
<ul style="list-style-type: none">the scratches are outside of the frame	<ul style="list-style-type: none">there is major scratching e.g. deep scratching in which the emulsion is scratched
<ul style="list-style-type: none">the scratches do not damage the film	<ul style="list-style-type: none">scratching is across the frame or textthere is a significant number of out-of-frame scratches

Another useful source for decision-making is the ANSI/AIIM MS23 - 1998 standard. This has a table of *defects classification and source guide* which classifies defects as major or minor and identifies the possible source. (Table 7).

A comprehensive table which is a guide to problems, causes and actions has been compiled by Robert Mottice in the RLG *Preservation Microfilming Handbook* (Elkington 1992).

The **Guide to defects on first-generation camera negatives—and appropriate corrective actions** is reproduced below, with permission.

The right-hand side column advises when corrective action is required. This column is titled **If found on inspection**.

Guide to Defects on First Generation Camera Negatives

Compiled by Robert Motrice

DEFECT/DESCRIPTION	POSSIBLE CAUSES	CORRECTIVE ACTION	IF FOUND ON INSPECTION
Excessive bleed-through; ink showing through from succeeding pages	Thin paper and/or over-inking combined with possible under exposure	More exposure until text starts gaining density	Retake if bleed-through causes severe loss of contrast between text and paper
Images grossly out of focus	Film not threaded properly in camera; film platen not seating properly; vacuum hold-down system not functioning properly	Troubleshoot and repair or correct	Retake affected section
Portion of image out of focus	Page movement during exposure	Hold page motionless during exposure. Use a glass platen to hold pages motionless if needed	Retake affected section
Pages appear on film from right to left	Camera head turned wrong	Rotate camera head 180°	Retake affected section
Occasional skewed page	Camera operator error	Instruct camera operator	Retake if skew guidelines exceeded
All pages skewed	Camera head misaligned; internal finder device out of adjustment	Align camera head; calibrate finder device	Retake if skew guidelines exceeded
Shadows (low density areas) in image	Head, hands, shoulders or other object interfering with camera lights	Instruct camera operator	Retake if shadow causes severe loss of contrast between text and paper
Shadows (low density areas) in gutters	Camera lamp angle too low	Reposition lamps at a higher angle	Retake if there is text in shaded areas
Shadows (low density areas) due to and adjacent to wrinkles and creases	Uneven paper surface casting shadows	Hold page flat under glass. <i>Ironing may help but can be done ONLY if permission has been received from the owning institution</i>	Retake if shadow causes severe loss of contrast between text and paper
Reflection (high density areas) in image	Shiny hard copy not held flat on camera bed. Lamps not at proper angle	Flatten hardcopy under glass. If appropriate AND permission has been received from owning institution, raise gutter with dowel rods	Retake if reflections cover text
Nonuniform density throughout image area that is <i>not</i> related to variations in paper reflectivity	Lamps out of balance; obstruction within lens	Balance camera lighting; inspect and clean lens; review ANSI uniform illumination standard (<i>ANSI/AIIM MS26-1990</i>)	Retake if density exceeds guidelines
Foreign objects on camera bed: pencils, string, tape, scissors, paper, dust, etc.	Camera operator oversight	Instruct camera operator to keep camera bed clean	Retake if aesthetics are a concern and/or this defect occurs in combination with other, less serious defects
Small nontext areas of high density	Bits or scraps of paper covering text	Instruct camera operator to watch for debris	Retake

Guide to defects on first generation camera negatives—and appropriate corrective actions

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Topics 3 & 4

Small areas of low density	Ink blotch on hardcopy	No correction possible	Review with filming agent. Retake if replacement (unmarked) page is available
Image of a hand	Camera operator's hand in view of camera lens	Instruct camera operator	Retake if hand image passes through text and diminishes contrast
Folded pages	Pages folded over	Unfold and rephotograph	Retake
Creased pages with text obscured	Paper is creased	Uncrease and rephotograph. <i>Ironing may help but can be done ONLY if permission has been received from the owning institution</i>	Retake
Torn portions of a page not matched	Two possibilities: 1) camera operator broke embrittled pages while filming and did not realign properly; 2) library did not repair the item prior to submitting for filming	Repair if legibility is hindered (<i>ONLY if owning institution has given permission to do so; otherwise, return to owning institution</i>)	Repair (see note at left) and retake if legibility is hindered
Overlapping frames	Camera film advance not adequate	Adjust camera advance mechanism	Retake if any portion of the images overlaps
Static discharge marks (high density marks shaped like tree branches)	Relative humidity too low, film wound too rapidly in camera or processor	Raise relative humidity to 50-60%; instruct camera operator to slow winding process	Retake if static marks raise text density
Fog marks (areas of unwanted nonimage density.)	Light leak in camera head. Door opened accidentally. Light leak in darkroom. Not advancing the film far enough after loading or before unloading	Advance film in camera by adequate amount to prevent fog; check camera and darkroom for light leaks	Retake if fog increases text density
Water spots, small crystalline deposits	Final processor squeegee not working properly; water contains excessive amount of solids	Adjust or repair squeegee; install photo-flo rinse	Rewash and check for scratches
Light scratches	Dirty or stuck camera, processor or reader rollers; dirt caught in processor squeegee; foreign object in processor; improper camera or processor threading; footage counter with burnished counter roller, etc.	Check all potential sources	Retake if scratches show up objectionably or if they interfere with legibility of subsequent generations
Deep scratches	(see above)	(see above)	Retake if gouges penetrate image layer
Fingerprints	Touching film with bare fingers	Instruct inspectors to wear clean, lint-free gloves	Retake; some body chemistries cause film deterioration and silver tarnishing
Pressure marks (small, randomly occurring areas of high density)	Film kinked or buckled before or during development (rough)	Instruct camera operator	Retake if marks occur in text areas

Guide to defects on first generation camera negatives—and appropriate corrective actions

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Topics 3 & 4

	(handling)		
Torn or nicked film edge	Rough handling, coming in contact with sharp edge in camera or processor	Instruct camera operator; check film path for signs of scraping, etc.	Retake, since emulsion layer may separate from base upon aging
Repeating marks (surface damage)	Burrs, nicks, scratches, dirt, or grit on camera rollers or processor rollers	Polish or replace metal rollers; clean or replace rubber rollers	Retake if marks occur in image area
Foreign material on film	Slime or gelatine from processor wash tanks; oil, or grease from roller bearings and chains, etc.		

Guide to defects on first generation camera negatives—and appropriate corrective actions

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■ Activity 8.7

Visual inspection



For this activity you will need access to a 35mm film reader.

A test film, which contains some problems, is supplied.

- a) Carry out a visual inspection on the film sample supplied to identify any problems. You will need to check the film using a reader.
- b) Note any problems and record them in the **Visual inspection** section of the Quality Report Form provided. Also, comment on the **Targets** and **Other problems**. Do not fill in the technical section.
- c) Briefly make suggestions for corrective actions in the space provided. (Use the information from the **Guide to defects** table to help in making your suggestions.)

Note that **Activity 8.8** also uses the information from this Activity.

Quality Report Form

Title:	Dates:		
Quality checked by:	Date:		
Technical inspection:	Requirements	Results	
reduction ratio			
resolution pattern			
lines (ratio x resolution)			
background density (clear)	Dmin – less than 0.15		
film base	polyester		
residual thiosulfate test	less than 1.4 mg/cm ²		
Visual inspection		Present	
		Yes	No
Targets	start		
	uniform density		
	resolution		
	reduction ratio		
	title/bibliographic detail target		
	filmed by		
	copyright		
	list of irregularities		
	end		

Topics 3 & 4

Visual inspection		Present	
		Yes	No
Targets	resolution		
	other (specify):		
	Are all targets present?		
Other problems	Page/frame reference	Corrective actions	
alignment problems (skew)			
orientation			
does image fill total area?			
missing pages (list)			
focus defects			
images too light			
images too dark			
obstruction in frame			
finger prints			
water spots			
scratches			
more than 6 splices			

Other comments:

■ Activity 8.8

Actions to correct defects

- Use the information from the Quality Report Form in **Activity 8.7** above for this activity.
- Complete the **Summary of actions required to correct defects** in the table below.
- List the details of which pages need retakes. (Remember to take into account the recommended limit on the maximum number of splices.)

Summary of actions required to correct defects

Refilm whole title: Yes No

Retake of pages (list):

Other comments:

Summary

- Unless the microform is a complete, accurate and legible copy of the original material, it fails to meet preservation requirements, even if its technical quality is excellent.
- If the microfilm meets all the technical standards, the film should be visually checked for defects. This involves placing the film on a reader and inspecting it, frame-by-frame. The decision as to which generation(s) should be checked should be made by the project manager or supervisor. The film should be compared with the original text.
- The question of how much to check is a risk management issue. The project manager or supervisor needs to decide on the level of visual inspection that is needed—according to the nature of the material and the level of risk.
- Checklists of typical features and problems to look for are a key to systematic visual inspection. They include factors such as completeness and legibility.
- Quality inspection records give a summary of the problems and the corrective actions required.
- A sound knowledge of
 - microfilming specifications
 - the causes of problems and corrective actionsis essential when making decisions about whether or not to refilm all or part of a reel.

Checklist

In order to test your understanding of this material, work through the checklist below.

If you can answer ‘yes’ to each question, and you have completed the activities for this topic, you are now ready for your lecturer or assessor to verify that you:

- I can meet the **performance criteria**
- I have satisfactorily completed the **activities**.

If you are in any doubt about any of the content, you should read through the material again, consult some of the references mentioned in the section entitled **Resources**, talk to your work colleagues or contact your lecturer or mentor.

I can:

- I check a third generation service copy visually for defects affecting:
 - completeness
 - legibility
 - compliance with project specifications
 - suitability for future digitisation
 - physical condition
- I maintain record of quality control inspections.

<input type="checkbox"/>

▲ Submit

You are now ready to record in your **Log book** that you:

- can meet the **performance criteria**
- have satisfactorily completed the **activities** for this topic.

You can record these by marking off the boxes in the shaded columns with a **✓ yes** or **✗ no**.

You can then ask your lecturer or assessor to verify this information.

Topics 5 & 6

Post-inspection steps and microform lists

Performance criteria

You will have achieved the performance criteria for this topic when you can:

- | identify steps which need to be followed after quality checking has been completed
- | record titles/details of completed microforms for stock lists, sales catalogues etc.

After quality inspection

After filming and quality inspection of films and originals has been completed a number of final steps need to be carried out. These steps include:

- | the physical removing of flags and other information from the originals
- | updating records
- | arranging for the originals to be returned to their correct location.

Good communication skills, good record keeping and attention to detail are all needed in this process.

Physical removal of items

This may include:

- | removing flags, targets and other markers in the originals
- | replacing original fasteners etc. in archival items, as required.

Updating records

Typically, this can involve updating or deleting notes in catalogue records, finding aids and location files, or asking other staff to make the changes.

Arranging the next stage

There are a number of options for the next stage which include arranging to:

- | return the originals to their original owners
- | send them for further conservation treatment
- | withdraw them from use, and/or house them in preservation level enclosures (e.g. wrapping, boxes).



Returning original after filming—original is being wrapped in a protective enclosure

© Photograph courtesy of State Library of South Australia

Decisions about where to send the originals should have already been made at the stage when the item was selected for microfilming. This information should have been recorded by the supervisor or project manager and kept with the records of the microfilming job.

In cases where a 'best microfilm copy' has been created from a number of individual copies, staff will need to arrange for all the individual copies to be returned to their correct owners.

*To avoid future misunderstandings, many organisations keep records of when items have been returned to their original owners, as in the following example of **Filming instructions and record of items sent and returned**, reproduced by permission of Artlab Australia.*

FILMING INSTRUCTIONS AND RECORD OF ITEMS SENT AND RETURNED

Item	Instructions	Target
Book 10	<ul style="list-style-type: none"> • Film whole book in sequence. Except film 4 pages of additional materials after p. 90 and before p. 91. • Do not film blank pages. • Film the 5 pages at the end of the book. 	Field Diary 13 February to 31 December 1953.
Book 11	<ul style="list-style-type: none"> • Film title page • Film whole book in sequence. • Do not film blank pages. • Film 2 pages of expenses at the back of the book. • Film label on envelope at back of the book. 	Field Diary 2 January 1954 - 29 October 1974
Book 12	<ul style="list-style-type: none"> • Film title page • Film whole book in sequence - except final 3 pages of additional material after p31 and before p32. • Do not film blank pages. 	Field Diary 31 October 1974 - 31 December 1976

Delivered to SLSA: 21/01/01

Received by: Ines Mill

Returned to Artlab: 21/02/01

Received by: Vicki Humphrey

■ Activity 8.9

Post inspection checklist

- a) Prepare a checklist of tasks which need to be done in your organisation after the microforms have been quality-checked. Use the spaces below.
 - b) Your checklist should include the physical removal of items from the originals, updating records and arranging for the originals to be returned to their owners or their correct location.

Post inspection checklist

Topics 5 & 6

-
-
-
-

Microform lists

Lists of what microforms have been produced help to keep track of issues such as:

- | what has been filmed, and what is yet to be filmed
- | how many reels or fiche cover a particular title
- | what titles may be available for sale.

Individual microfilming organisations will have their own methods for listing their products, depending on needs. In some organisations, these lists are integrated into library catalogues. Other organisations keep brief records that are enough to identify titles and prevent duplication (refilming of the same originals).

Some lists are kept on computers, some are on web sites and others are simple hand-written or typed lists. Whatever the format, in order to be useful the list needs to be continually updated as new microforms are produced.

Microform numbers

To assist in keeping track of microforms it is common for organisations to give them identifying numbers. There may be unique numbers for a series such as a newspaper title (e.g. **Micronesian Times MF 108**) and individual reels or fiche within a series may be numbered as **Reel 1, Fiche 1**.

The number also assists in filing the microforms on the shelves. This is discussed further in the module, **Physical Management and Storage of Microforms**, Topics 1 and 2.



*Microfilms with unique identifying numbers
© Photograph courtesy of State Library of South Australia*

Stock lists

Stock lists or holdings lists are complete and detailed records, reel-by-reel, of microform stock—the reels and fiche produced.

For example:

Banyan Library—Stock list

Title: Asian Pacific Records

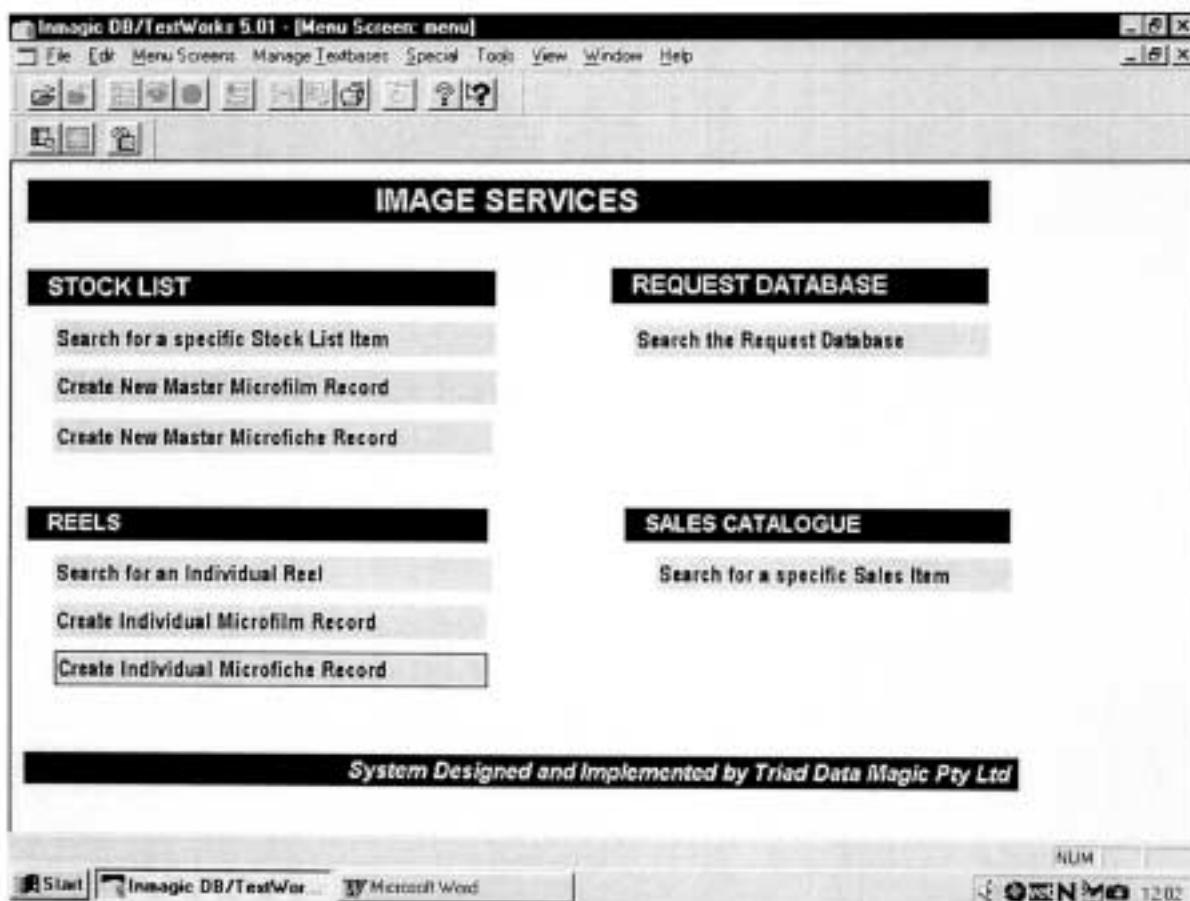
1836-1840 reel 1

1841-1844 reel 2

1845-1850 reel 3

1851-1854 reel 4

1855-1860 reel 5



Example of stock list details

© Photograph courtesy of State Library of South Australia

Sales catalogues

These are lists of microform products for sale. Usually, sales catalogues are not as detailed as stock lists. They give summaries of the total number of reels or fiche covered by a particular title (as compared with a reel-by-reel breakdown).

For example:

Banyan Library—Sales catalogue

Title: Asian Pacific Records

1836–1860 5 reels

Price per reel = W\$ 50 (world dollars) Total for set = W\$ 250

Income from the sale of microforms can be used to support further microfilming projects.



A sales catalogue

© Reproduced by permission, Pacific Manuscripts Bureau, Australian National University.

Sales catalogues can be found at the web sites of major libraries, archives and microfilming organisations, for example:

State Library of New South Wales. *Microforms for Sale*,
<http://www.sl.nsw.gov.au/ml/microform/>, accessed 23 May 2003.

State Library of Queensland. *Commercial Microfilming Services Catalogue*,
<http://www.slq.qld.gov.au/bsd/cms/mcatalogue.htm>, accessed 23 May 2003.

Pacific Manuscripts Bureau. *Catalogue of Films*,
<http://rspas.anu.edu.au/pambu/>, accessed 15 May 2003.

■ Activity 8.10

Microform lists

- Find an example of a microform list that is produced by your own organisation, or another microfilming organisation of your choice, and answer the questions below. (Some lists are available on the internet—see the examples above.)

Topics 5 & 6

Name of organisation

- a) Details about items included in the list (e.g. title, number of reels, dates covered by reel etc).

- b) What is the list used for?

- c) How frequently is the list updated?

- d) Suggested improvements

■ Activity 8.11

Recording details

Series Number: 0129	Series Number: 0129	Series Number: 0129	Series Number: 0129
Sentosa News	Sentosa News	Sentosa News	Sentosa News
Produced in Singapore	Produced in Singapore	Produced in Singapore	Produced in Singapore
Reel 1 1985-1986	Reel 2 1987-1988	Reel 3 1989-1990	Reel 4 1991-1992

Add the details of the above titles to the stock list below.

Stock list

Series number: _____

Title: _____

Place: _____

Reel details: _____

Reel number	Dates
_____	_____
_____	_____
_____	_____
_____	_____

Summary

Lists of what microforms have been produced help to keep track of issues such as:

- | what has been filmed, and what is yet to be filmed
- | how many reels or fiche cover a particular title
- | what titles may be available for sale.

Checklist

In order to test your understanding of this material, work through the checklist below.

If you can answer 'yes' to each question, and you have completed the activities for this topic, you are now ready for your lecturer or assessor to verify that you:

- | can meet the **performance criteria**
- | have satisfactorily completed the **activities**.

If you are in any doubt about any of the content, you should read through the material again, consult some of the references mentioned in the section entitled **Resources**, talk to your work colleagues or contact your lecturer or mentor.

I can:

- identify steps which need to be followed after quality checking has been completed
- record titles/details of completed microforms for stock lists, sales catalogues etc.

▲ Submit

You are now ready to record in your **Log book** that you:

- can meet the **performance criteria**
- have satisfactorily completed the **activities** for this topic.

You can record these by marking off the boxes in the shaded columns with a **✓ yes** or **✗ no**.

You can then ask your lecturer or assessor to verify this information.

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Background

The training materials have been developed by the National Library of Australia, in collaboration with the State Library of South Australia and under the auspices of IFLA PAC, and will be provided to people within the Asia and Pacific regions as a training resource. The materials will also be used within Australia as part of an accredited TAFE training course.

The training materials consist of 10 modules, 6 wall charts, a Log Book, a Learning Guide and a Glossary/Index. We expect that users will both read a printed version of the materials and download them as PDF files from the National Library of Australia's website – www.nla.gov.au

