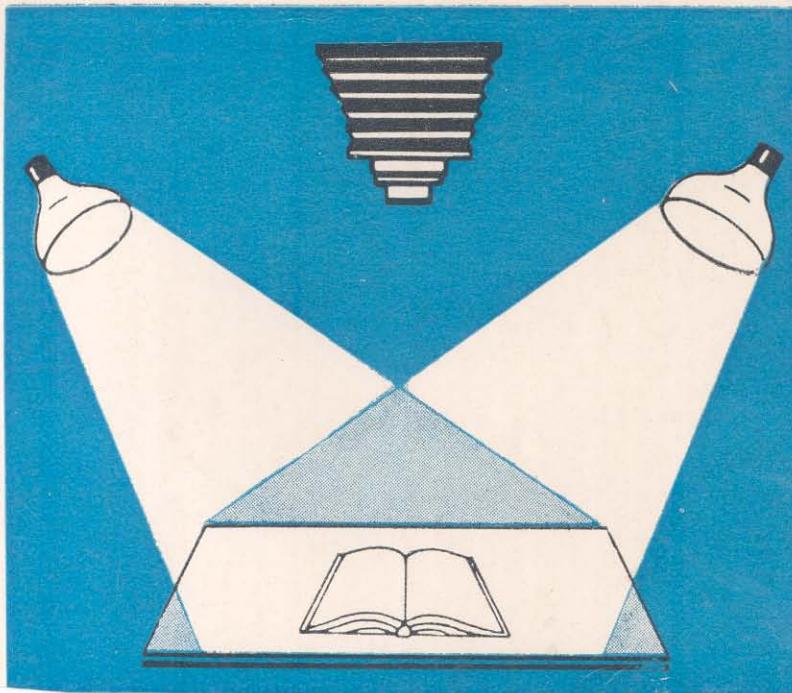


# MICROGRAPHICS FOR ARCHIVES AND LIBRARIES



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*Editor : DR. R. K. PERTI*

# MICROGRAPHICS FOR ARCHIVES AND LIBRARIES

PROCEEDINGS OF THE SEMINAR  
NEW DELHI

November 6-7, 1989

and

November 9-10, 1989

*Editor*

DR. R. K. PERTI

NATIONAL ARCHIVES OF INDIA, NEW DELHI  
AND  
GENEALOGICAL SOCIETY OF UTAH  
1990

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## PREFACE

I am happy that the proceedings of Seminars on Micrographics organised by the National Archives of India in collaboration with Genealogical Society of Utah on 6-7 and 9-10 November, 1989 are being published. The Seminars on "Micrographic Aids and Services" and "Micrographic Standards and Quality Control" were meant for providing effective guidelines to the professionals working in various State Archives, Libraries, Government Departments and allied institutions so that theory and practice connected with Micrographics is well understood for scientific management, storage and dissemination of information. I hope that these proceedings may help the participants to recapitulate what they had learnt in November 1989 and also prove useful to others interested in Micrographics.

I am thankful to Shri Eric Erickson of the Genealogical Society of Utah for his excellent exposition of the Seminar Curricula, and to Shri O. P. Bhugra, Resource Person from this Department for his assistance in discussion and elucidation during the Seminar. To Shri Melvin P. Thatcher of the Genealogical Society of Utah I convey my thanks for showing active interest in these Seminars. I also acknowledge, with thanks, the help and assistance Shri Ranbir Kishore, Senior Fellow and Shri V. V. Talwar, Fellow of the School of the Archival Studies rendered for making the Seminar successful.

R. K. PERTI  
*Director General of Archives,  
Government of India*

NEW DELHI :

August 21, 1990

## SEMINAR ON MICROGRAPHICS

### MICROGRAPHIC AIDS & SERVICES FOR ARCHIVES & LIBRARIES

November 6 and 7, 1989

*Speaker* . . . Shri Eric Erickson,  
Genealogical Society of Utah

*Resource Person* Shri O. P. Bhugra,  
National Archives of India

#### Programme

##### NOVEMBER 6, 1989

10.00 a.m. . . .	Registration of Participants
10.30 a.m.—11.15 a.m. . . .	Inauguration of the Seminar
11.15 a.m.—11.30 a.m. . . .	Tea
11.30 a.m.— 1.00 p.m. . . .	<i>Technical Session I :</i> An Acquaintance with Micrographics
1.00 p.m.— 2.00 p.m. . . .	Lunch Break
2.00 p.m.— 3.30 p.m. . . .	<i>Technical Session II :</i> Micrographic Principles
3.30 p.m.— 3.45 p.m. . . .	Tea
3.45 p.m.— 4.45 p.m. . . .	<i>Technical Session III :</i> Microform Formats

##### NOVEMBER 7, 1989

10.00 a.m.—11.00 a.m. . . .	<i>Technical Session IV :</i> Visit to Reprographic Unit of the National Archives of India
11.00 a.m.—11.15 a.m. . . .	Tea
11.15 a.m.— 1.00 p.m. . . .	<i>Technical Session V :</i> Establishing a Micrographic System— Equipment and Accessories
1.00 p.m.— 2.00 p.m. . . .	Lunch Break.
2.00 p.m.— 3.30 p.m. . . .	<i>Technical Session VI :</i> Microform Storage—Problems and Prospects
3.30 p.m.— 3.45 p.m. . . .	Tea
3.45 p.m.— 4.45 p.m. . . .	New Developments in Informatics— Information Storage and Retrieval Systems
4.45 p.m.— 5.15 p.m. . . .	Discussion and Rounding up of the Seminar

*Chairperson.* . . . Dr. R. K. Perti,  
Director General of Archives,  
Government of India

## MICROGRAPHIC STANDARDS AND QUALITY CONTROL

November 9 and 10, 1989

*Speaker . . .* Shri Eric Erickson,  
Genealogical Society of Utah

*Resource Person* Shri O. P. Bhugra,  
National Archives of India

### Programme

NOVEMBER 9, 1989

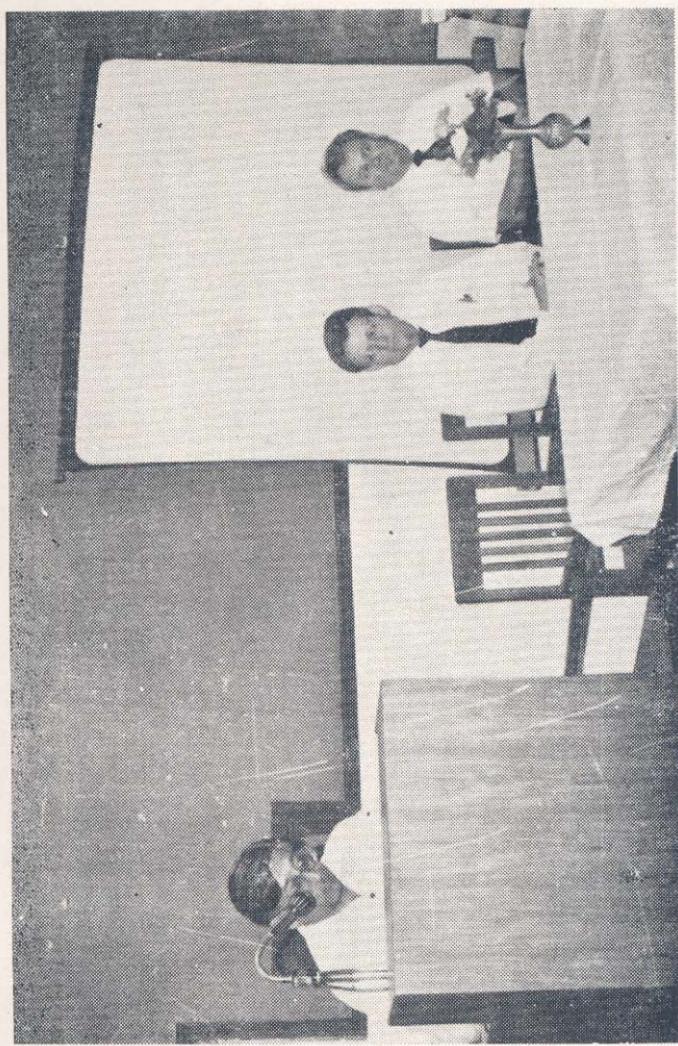
10.00 a.m.—10.30 a.m. . .	Registration of Participants
10.30 a.m.— 1.00 p.m. . .	<i>Technical Session I :</i> Standards : What are the needs of the end-users of the Microfilm ? How many generations between original film and user copy ?  Density Resolution—focus—Quality Index, Image clarity of production work, Missing or covered information
	Document Quality : Size of characters Background colour and texture of documents Document preparation
	Camera operation/performance quality :  Establishing a reference base Filming a step—test to set exposure and check performance of equipment
	Technical targets used to establish references Hand test processed in field versus step test processed in lab
	Keeping a record of : Test results Maintenance New Lamps Emulsion numbers etc. (vi)

1.00 p.m.— 2.00 p.m.	Lunch Break
2.00 p.m.— 3.30 p.m.	<i>Technical Session II :</i> Operator techniques and performance : Review of Sample production roll Simulated production to check for : Placement of documents Hand shadows Use of targets etc.
3.30 p.m.— 3.45 p.m.	Tea
3.45 p.m.— 4.45 p.m.	<i>Technical Session III :</i> Negative Film Processing Quality : Process control strips D-19 hand test Scratch test Test for residual thiosulfate Records Maintenance history
<b>NOVEMBER 10, 1989</b>	
10.00 a.m.—11.30 a.m.	<i>Technical Session IV :</i> Master Film Evaluation : Application of standards Acceptable variations Substandard—Minor Unacceptable variations Retake—Major
11.30 a.m.—11.45 a.m.	Tea
11.45 a.m.— 1.00 p.m.	<i>Technical Session V :</i> Levels of Responsibility Evaluator Evaluation Supervisor Camera Operator Supervisor—Procedure for overriding comments and recom- mendations from evaluator
1.00 p.m.— 2.00 p.m.	Lunch Break
2.00 p.m.— 3.30 p.m.	<i>Technical Session VI :</i> Duplication of Film : Establishing a reference base printer test Creation of printmaster Communication of problems found on original film
Print Inspection :	
	Application of standards
	Acceptable variations
	Substandard—Minor
	Unacceptable variations
	Reprint—Major
	Request retake of original

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3.30 p.m.— 3.45 p.m. . . . .	Tea
3.45 p.m.— 4.45 p.m. . . . .	<i>Technical Session VII:</i> Handling film : Cleanliness of work area Techniques Proper equipment Storage of Master Film : Temperature Humidity Air Quality
4.45 p.m.— 5.15 p.m. . . . .	Discussion and Rounding up of the Seminar

Chairperson. Dr. R. K. Perti,  
Director General of Archives,  
Government of India



Inauguration and Welcome by Dr. R. K. Puri, Director General  
of Archives. On his left are Shri Melvin P. Thatcher and  
Shri Eric Erickson

## INAUGURAL AND WELCOME ADDRESS

DR. R. K. PERTI

*Director General of Archives,  
Government of India*

To my guests from Genealogical Society of Utah, Shri Eric Erickson and Shri Melvin P. Thatcher, and to you all participating delegates, I wish a happy good morning and a warm welcome to this "Seminar on Micrographics" organised by the National Archives of India in collaboration with the Genealogical Society of Utah.

All of us who are present to-day in this august assembly are well aware of the important role being played by micrographics in storage and dissemination of information. Since its first adaptation in reprographics over 5 decades ago, there has been a good deal of sophistication in equipment and accessories now available for preparing copies of documentary materials of the past. From microfilms to the microfiche of yesterday and then to the optical disc of the present has been rather a rapid leap in technology.

Archives, libraries and documentation centres are greatly dependent on micrographics for conservation, storage and dissemination of vast knowledge amassed as documentary heritage of the past as well as that which is under creation. We in India own a very rich collection of manuscripts and valuable records which have been an excellent source of information not only to us but to a great many scholars from the Western World. Existence of oriental faculties in many advanced universities in the U.K., Germany, the U.S.S.R. and the U.S.A., are examples of the rich knowledge that the oriental civilisation has to offer.

The two important parameters of information science or service namely acquisition of knowledge, which has reached to the limit of explosion in to-day's terminology, and its dissemination or retrieval in shortest possible time for effective use, are greatly dependent on modern day technology, which is ever increasing, multiplying rapidly and developing in multi-directions. Thus every now and then we need to review our stand and update our knowledge to face the challenges that our profession has to offer. I am sure that the first seminar which will discuss 'Micrographic Aids and Services for Archives and Libraries' will be useful in its deliberations to meet this objective.

As you might have seen from our programme we have a distinguished expert from the Genealogical Society of Utah, Shri Eric Erickson who would be our chief guest speaker on the subject. I am very happy to introduce Shri Erickson to this assembly. He has over 20 years experience in the field of Micrographics as Manager of Technical Services and as a Consultant in Micrographics with the Genealogical Society, Utah. He has been associated with National Micrographic Association as President of its Intermountain Chapter. He is also a distinguished awardee from the Association of Image and Information Management of the U.S.A. Realising the increasing role being played by an efficient Information Management Service to-day in government, commerce and industry, I am sure, Shri Erickson will focus our attention to the latest developments in equipments, aids, accessories, etc. available for micrographic services as applicable specially to archives, libraries and documentation centres.

You are well aware that in India the National Archives of India was perhaps the first institution which adopted microfilming four decades ago. We have in this Department a well organised and equipped reprographic service. It is a pleasure for me to introduce to you my colleague Shri O. P. Bhugra, who has been with us for over three decades. He combines in himself the professional expertise and technical acumen of long association with this science. He will be working as a Resource Person assisting Shri Erickson, during the course of the two seminars.

Having dilated on the first seminar I may perhaps wind up my address by stressing the important role of the subject to be taken up during the second seminar, viz. Micrographic Standards and Quality Control. I may not be exaggerating if I say that advancing frontiers of science and technology have encompassed the entire field of knowledge to the extent that the world information network has now become a practical necessity and feasibility. This requires an approach of standardisation and quality control for production, servicing and usage of varied software of micrographics. A perusal of the schedule prepared for this seminar manifests that during our four days discussions many topics of vital importance would come up for detailed examination and facilitate initiating and developing micrographic facilities in various archives and libraries.

I am sure all of us will greatly benefit from the deliberations of the Seminars. I once again welcome you all and inaugurate the seminars wishing you a healthy and fruitful participation.

Thank you.

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**PROCEEDINGS OF THE SEMINAR**

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## SEMINAR EXPOSITIONS AND DISCUSSIONS

The curriculum of the seminar was taken up in Two Parts—the first part was devoted to Micrographic Aids and Services, while the second to Micrographic Standards and Quality Control.

The First Part comprising six technical sessions was held on 6th and 7th November, 1989.

### 1ST SESSION : *An Acquaintance with Micrographics*

During this session Shri Eric Erickson, introduced the subject and gave historical background of the development of microfilming as an important adjunct of micrographics. He observed that though the microfilming came into practice with the introduction of flow cameras in 2nd decade of the 20th century, it was adopted in archives and libraries as a tool of duplicating vital records for physical security and preservation by 1930. Having been adopted for V mail during the 2nd World War in 1940, microfilming had become an important vital need for Records Management by 1950, he observed. Introduction of computer technology after 1960 saw rapid development of micrographic aids such as microfilm, COM, CAR, Video Disc and finally Optical Disc, which represented an approach to miniaturisation of documents facilitating storage of approximately 30,000/40,000 pages on a disc of about 8 inches diameter.

### 2ND SESSION : *Micrographic Principles*

During this session, Shri Erickson discussed micrographic principles. He observed that basically photographic science is widely helpful in the art of producing microimages. Describing elements of obtaining a sharp photo copy, he touched upon the properties of sensitized surfaces (films & photographic paper), Camera parts viz. Lens, Aperture and Shutter.

Shri Erickson also discussed salient features of processing films subsequent to their exposure in a Camera, and mentioned how far the development and fixing could be a decisive factor in producing a good or bad or lasting image. He pointed out the major differences in basic photography and microphotography, the latter one needing more rigid resolution, reduction and contrast. Elucidating the points discussed by Shri Erickson, Shri O. P. Bhugra mentioned that variation of light and its control

depending upon the documents which vary widely in their shade and tone was a prime factor in determining the quality of image on a microfilm. The use of proper formulation of a developer and developing time as also temperature maintained during processing help obtaining due image contrast, he observed.

During the discussion by the participants the properties of film bases viz. nitrate, acetate and polyester were discussed. It was mentioned that polyester films were finding wide acceptance for microfilming of archival materials, yet due to variation in temperature under tropical climate there were problems in the use of polyester base microfilms which needed further study.

### 3RD SESSION : *Microform Formats*

During the 3rd session of the seminar, Shri Erickson spoke about the various formats such as microfilm rolls, unitised microfilm like strips, aperture cards and jacket, microfiche and micro opaques etc. Defining their specific use in archives and libraries, he observed that roll microfilm being the least expensive microform to produce and duplicate had proved to be most useful for archives and libraries. An added advantage being that information could be added continuously in sequence, he observed. Mentioning the types of microfilm, viz. silver halide, diazo and vesicular, he said that only silver halide microfilm had been accepted for long term and archival usage. He added that microfiche had an advantage over microfilm in engineering and scientific departments as it was very convenient to update data if desired. The equipments being basically different for these two microforms, merits of each form needed consideration for their adoption.

Clarifying these points further, Shri O. P. Bhugra observed that the National Archives of India, and other State Archives had adopted microfilming for security filming of their collections. He said that plans to procure a microfiche camera, reading equipment for microfiche etc. for the National Archives were under progress. He also mentioned that a reader printer had been added recently in the Reprographic Division under its modernisation plan. During discussions by the participants the merits of a microfilming programme adopting 'Roll format' being more beneficial for the archives were again described by Shri O. P. Bhugra.

### 4TH SESSION : *Observation of Microfilming in National Archives of India*

The fourth session of the Seminar was devoted for a demonstration of a microfilming programme in operation at the National Archives of India. Participants were taken round the



Shri O. P. Bhugra, Resource Person clarifying a point

Reprographic Division of the National Archives of India. Working of microfilming cameras, xerox machines, positive duplicator, enlargement printing equipments and automatic processors etc. were shown and explained.

#### 5TH SESSION : *Establishing a Micrographic System*

Discussing the primary requirement of establishing a micrographic system for an archives and library, Shri Erickson mentioned that these could perhaps be classified as :

- (i) Providing proper physical requirements in the building
- (ii) Selecting equipment best suited for the specific needs
- (iii) Selecting personnel for operative purpose
- (iv) Layout etc. of the space and equipment for flow of materials.

Discussing the requirements of work areas, he observed that Camera Room, Darkroom and storage areas need adequate space to meet the specific needs of each operation. While the work area in the Camera room needed plenty of space around the camera to organise documents and work with targets etc., the Darkroom needed water supply and drainage. Continuing these discussions further Shri O. P. Bhugra mentioned that for archives and libraries, planetary cameras suited to work at varying reduction ratios, were satisfactory. He said that the Reprographic Unit of the National Archives of India had a Fuji Camera, a C. Z. Camera, Kodak MRD II, as also the old Kodak Cameras Model C & D which were in operation since early fifties. He further observed that technical know-how on microfilm equipments and accessories etc. was readily available from the firms dealing in these equipments. Besides the National Archives of India was also supplying information and training on all aspects of microfilm services to Institutions interested in introducing such a system.

During discussions by the participants it was further clarified that the equipments and accessories, and even the essential raw materials i.e. microfilm rolls needed import as there is no indigenous alternative to these materials. Financial input has to match the advantages to be accrued and one of the vital feature to keep in mind while selecting specific wares is the availability of spares and after sales service for maintaining the equipment in operative stage.

## 6TH SESSION : *Microform Storage and Information Retrieval*

Shri Erickson devoted this session for clarifying the requirement of a storage area suited for keeping archival microfilms. He described the salient features of the storage vaults built in the rocks outside Salt Lake city for keeping microfilm collections of the Genealogical Society of Utah. A relative humidity of 30-40% and temperatures of 21°C with air filtration system to eliminate particulate and gaseous contaminants of the environment was required for archival storage of microfilms. While maintaining these conditions, a monitoring system to keep a check for their effective maintenance is very necessary. One of the important factors that needed attention in the storage area is an appropriate fire protection system, he added.

The other aspects which needed consideration for storing microfilm were :

- (i) Microfilm containers.
- (ii) Storage Cabinets.
- (iii) Retrieval system and aids.
- (iv) Regular periodic inspection.

Initiating discussion among participants Shri O. P. Bhugra, mentioned that random selection of the film for inspection and to take immediate action for rectifying the defect or obtaining another copy (duplication) are effective steps which should be taken up as soon as any damage to microfilm is noticed. He said that before the microfilms are finally put in archival storage it is desirable to check their residual hypo content. He observed that National Archives of India keeps a periodic check of processed microfilm by evaluating the same in its Conservation Research Laboratory. Another factor that needed consideration was the quality of the can used for film storage as also the carton containing the can. While the can had to be of a non-staining metal or stabilised plastic, the carton had to be of acid-free paper. He further clarified that Bureau of Indian Standards had issued Indian Standards "Guidelines for storage and handling of microfilms" IS : 3130—1985 which provided useful help for ensuring long term storage of microfilms.

Continuing the discussions further Shri Melvin P. Thatcher from the Genealogical Society further clarified that the type of storage and the conditions to be provided for the environment would largely depend on the objective i.e. whether the microfilms are to be kept for day-to-day use or for permanent retention. Permanent retention of microfilms required more rigorous monitoring of environment and the inspection schedule for them had to be strictly observed.

Shri Erickson in his concluding discussion mentioned that information handling and storage had been much facilitated by a variety of computed softwares such as video discs, compact discs and optical discs. He further observed that help of optical character recognition (OCR) device wherein documents could be automatically scanned and duplicated simultaneously facilitated the work. Computers also facilitate filing and retrieval operations, but their use would greatly depend on the objectives to be achieved.

The sessions for Part I of the Seminar concluded with a vote of thanks to Shri Eric Erickson and Shri Melvin P. Thatcher of the Genealogical Society of Utah by Shri Ranbir Kishore, Technical Co-ordinator of the Seminar for their exposition and discussions during the seminar. He added that for its practical application the science of micrographics needed many considerations such as proper space planning, and selection of equipments which would satisfy the specific needs of the institution, as also taking adequate care in handling and storage of microfilms and other microformats. He observed that the temperature and relative humidity in many parts of India being variable, very widely, their control by airconditioning for optimum storage environment is an important feature of a microfilm repository in an archival institution.

Shri Kishore also thanked Shri O. P. Bhugra, Resource Person for assistance rendered as also the participants for making the discussions meaningful and useful.

## Second Part of the Seminar

The Second Part comprising seven technical sessions was held on 9th and 10th November, 1989. Exposition and discussions on varied aspects of Micrographic Standards and Quality Control were taken up.

### 1ST SESSION : *Standards—Requirements and Controlling Factors*

This session started with introductory remarks by Shri Ranbir Kishore, Technical Co-ordinator, who said that the subject of second seminar viz. micrographic standards and quality control was of immense value for all those who were concerned with management of image for storage and dissemination of information. He observed that copying of documents, which not only vary in their content, but also in form, legibility of the text and tonal value of the written or printed characters needed care and caution. With the increasing use of microforms for acquisition, exchange and transfer of information observance of acceptable quality standards was very necessary.

Initiating his exposition Shri Eric Erickson observed that the main consideration in copying a document was as to how far the copy compares with the original in tone and contrast and also how long a microcopy could be kept and used. Quality of the document to be copied, size of its characters, background colour etc. needed proper evaluation for a good image production. Establishing a reference base for checking exposure, degree of development as also performance of equipment was required by obtaining a test strip. This helped to decide the correct density of image as well as the reductions desirable for copying varying sizes of documents. A quality index for camera negative, print-master as also for second and third generation film was necessary. Supplementing information on the subject Shri O. P. Bhugra said that while copying documents in the National Archives of India test strips were taken to decide the degree of illumination required for the respective series of documents and this was of great assistance in obtaining the correct film density, as also the processing subsequently required for the exposed film.

During discussions by the participants Shri Erickson further brought forward the factors that control sharpness of an image viz. the density and the resolution desirable for obtaining a good copy of the original. He observed that quality of the film, the lens of the camera as also the operational performance were relevant factors in this aspect.

#### 2ND SESSION : *Role of the Operator (Techniques and Performance)*

Shri Erickson devoted the session for describing the operational performance which had a bearing on quality of the microfilm. He mentioned that placement of documents on copy board, obtaining correct degree of lighting, avoiding shades which were likely to blur the image were a few precautions that were desirable. An important aspect of filming was the use of proper technical targets. Bound volumes needed special care for copying the full text. While using clamps for holding the pages in position, heavier clamps were to be avoided if the records were in fragile state. Loose documents in folders were to be kept in the sequence they occur and after filming should find their place in the respective order in the folder.

Continuing the topic further Shri O. P. Bhugra added that keeping a proper length of Leader and Trailer in the film varying from 0.75 m to 1.0 m was required for a roll microfilm. He said that it was desirable for the operator to be equipped with parameters required for filming, viz. density charts, targets to be used etc.



A view of the participants

During discussions by the participants it was clarified that filming of over-sized documents viz. maps, charts or drawings needed determination of a correct reduction ratio as also micro-filming in sections needing manipulation of the original for obtaining correct sequence in the copy.

### 3RD SESSION : *Negative Film Processing*

During this session Shri Erickson clarified the various aspects required for processing the exposed film. He said that high quality of the negative so that it could give good print copies and at the same time could be retained permanently was desirable. Manual as well as automatic processing was in practice, though more and more institutions were depending on automatic processors. The points that needed control were the developer formulation and its strength, the depth of the solution in the developer tank, and time taken for development, temperature of the developer, strength of the fixer etc. Adequate washing of the developed films was very essential for stability of the image, he said. While handling films the operators should invariably use lint-free hand gloves otherwise the films get stained or scratched, he mentioned.

Supplementing the exposition made by Shri Erickson, Shri O.P. Bhugra added that the National Archives of India was using automatic processing adopting requisite standards laid down by Bureau of Indian Standards to obtain archival quality film.

During discussions by the participants, importance of inspection of the negative for likely defects etc. or for sequence of the text were mentioned. It was pointed out that a rigid inspection at that stage helped taking retakes if the film is of substandard quality or if there be any missing sequence. With any of the faults occurring a retake was desirable. Such retakes are often spliced at the end with proper targets indicating the same.

### 4TH SESSION : *Master Film Evaluation*

Shri Erickson devoted this session for considering main quality standards which were : background density and its variation, focus, blurred images, base fog, and missing or covered information : standards set by organisations such as International Standards Organisation, American National Standards Institute and the Association for Image and Information

Management were cited. It was mentioned that because of photographic or document variables, evaluation and quality control judgement was an important factor in determining acceptability of the film (Relevant references cited in Appendix I).

#### 5TH SESSION : *Levels of Responsibility*

Being continuation of the 4th session Shri Erickson devoted his attention to showing and demonstrating a few defects in microfilms, discussing their causes and the remedial measures required to improve upon the quality. He described level of responsibility which could help in evaluation of the quality. Respective role of camera operator, supervisor and film evaluator was discussed.

He demonstrated the proforma sheets maintained by the operators and evaluators during their work in the Genealogical Society.

#### 6TH SESSION : *Duplication of Film and Print Inspection*

Shri Erickson, devoted this session to consideration of an inspection schedule for microfilms, especially of archival quality, as also for duplicate copies which actually represented user copies. He observed that the master film to be used for duplication should invariably be obtained as it would be desirable not to use archival negatives for duplication. He observed that archival negative should not be used for making more than 10 copies, otherwise they were likely to show wear and tear. Preparation of a master print copy helps preserving the archival copy. Printmaster needed a rigid inspection schedule as the quality of subsequently generated films will greatly depend on it, he observed. He said that silver print films being expensive, use of diazo and vesicular films, if available, could be made for preparing duplicate copies. He said that specific films had instructions with their containers, which had to be rigorously observed. He said that diazo films were more suitable for obtaining copies for the reason that these films were capable of retaining the resolution found on the original negative. He mentioned that inspection schedule for the copy should be as thorough as for their original printmaster. The density and resolution of the copy being an important aspect needed to be comparative to the printmaster. Though it was not necessary to inspect a copy as thoroughly as the original printmaster, yet it was desirable to maintain the same standards of inspection and cleanliness. He observed that during copying slipping of the film or its stretching could result in certain problems

and printer or duplicators might need adjustments. Supplementing the discussion further Shri O. P. Bhugra observed that the National Archives of India was observing strict inspection schedule of master negatives as well for positive copies. For the present it had been possible to prepare only one negative as a security copy, and as the requests for duplication were rather few the same was used for preparing positive copies. Due to paucity of resources, and the fact that raw films needed import, it was not practicable to have a separate master negative for printing copies as far as Indian repositories were concerned, he clarified.

A Retake-code chart being used by the Genealogical Society, was circulated with the observation that it would help participants understand the probable defects which could be encountered during inspection of films. The Substandard Microfilm Codes chart and a specimen form of Retake Request and Report, are appended (Appendix II).

#### 7TH SESSION : *Storage and Handling*

Shri Erickson devoted his discussion to problems that needed attention during microform storage. He said that film type and storage conditions were important aspects of film storage. He observed that an important feature of film storage was preparing a film for storage, a factor which needed attention in the first instance. Cleaning of the films to free them from fingerprints, chemicals and stains of processing was the first requirement. An Ultrasonic cleaner was of great help.

Selecting proper type of cans, cartons, envelops etc. was also a requirement, he mentioned. Besides the above the storage cabinets of proper design and specification were also required.

An important requirement for a satisfactory storage cabinet was that it should be fabricated from a non-corrosive, incombustible material. He said that it would be desirable to wait for at least two weeks before placing film in newly painted cabinets or drawers. He pointed out that it was desirable to store films with different media and different emulsion types (silver, diazo or vesicular) in different storage areas or at least in different drawers or cabinets.

Selecting a suitable storage area, where proper storage environment could be observed was an important aspect. Mentioning archival storage requirement he said that a relative

humidity of 30-40% and a temperature not exceeding 21°C was desirable. Adequate filtering of air to remove particulate matter, acidic fumes etc., which were hazardous for the film was necessary. Installation of a fire protection system for the storage area was a vital requirement. Since water or carbon dioxide gas could damage a film, halon was to be adopted. Besides the above precautions fire resistant, insulated cabinets could also be adopted for storing archival microforms. He said that the archival security copy be stored at a safe place other than the original.

Participating in the exposition Shri O. P. Bhugra observed that for the present the security copies of the records of the National Archives of India were kept within the present building of the Department, though a conditioned storage area was provided for these microfilms. Conditions of temperature and relative humidity were being maintained at : temperature  $23 \pm 2^{\circ}\text{C}$  and relative humidity  $50 \pm 5\%$ . He said maintaining lower limits of temperature in tropical climate was rather difficult for reasons of wide fluctuations of both these climatic vectors (temperature rising above  $35^{\circ}\text{C}$  and relative humidity over 65/70%) Shri O. P. Bhugra added that an exclusive repository of security microfilms of the National Archives of India was being made ready in its regional office at Bhopal. A part of the session was devoted to observations from the participants and their experiences in the field of micrographics. Initiating the discussion, Shri V. V. Talwar observed that the curriculum of the seminar which was drafted with a view to provide all the essential elements of micrographics, had been discussed by Shri Erickson and Shri O. P. Bhugra, during the four days of the seminars. Practical demonstration, had further supplemented the desirable important elements which could ensure quality control of microfilms, an important feature of reproduction and copying of documents. The course material which was supplied by the Genealogical Society of Utah consisting of the following two publications :—

(i) Micrographics Principles Seminar.

(ii) A guide to Micrographics.

had since been distributed to the participants, he mentioned.

Shri T. R. Chopra, representing Cabinet Secretariat observed that in Indian climate dust and its elimination from the environment is an essential requirement if microforms have to be kept in good physical state. He observed that keeping information in

microformat does help in retrieval of the same with the aid of computers though an extensive preparatory work for codifying the information for computer output was required.

Shri H. K. Mittal, representing National Thermal Power Corporation stated that an extensive use of microformats was being made by the Corporation for project designs and reports, and feasibility to transfer the data on optical disc was under consideration in their organisation.

### Conclusion

Shri Melvin P. Thatcher, Manager, Asia Pacific of the Genealogical Society in his concluding remarks on the deliberations of the four days seminars observed that the Genealogical Society had been endeavouring to lay due stress on the quality control aspect in its microfilming programme. Though the quality of image in a copy depends on the legibility and contrast of the text with the background, yet selection of proper quality of film, maintaining due standards of acceptable density and careful processing etc. help in ensuring a good microfilm copy not only for securing information, but also for reference and use.

He said that the main aim of the seminar had been to provide adequate feed on all relevant aspects of adopting a micrographic system for reproduction and copying of documents, and said that any further information on the subject would be gladly furnished by the Society either from its headquarters at Utah or from its Regional Offices at Hong Kong or New Delhi. He invited the participants to be in touch with the Society.

Thanking the Genealogical Society, especially Shri Melvin P. Thatcher, and Shri Eric Erickson who had represented the Society in the seminar expositions, Shri Ranbir Kishore, Technical Co-ordinator of the Seminar said that adoption of any micrographic system in a developing country like India needed a cautious approach for selecting equipments which would suit best to the specific requirements of an institution. Microfilming being most suitable for ensuring security of archival documents could be adopted in archives, while other formats viz. microfiche, COM and Optical disc etc. might serve the purpose of storing useful data and other day-to-day information which needed periodic updating. The archival quality of microformats other than microfilm was to be tested with time and their flow to archives could perhaps await such an evaluation. He thanked the participants for their keen interest and expressed gratefulness of the School of Archival Studies and the National Archives of India towards

the Genealogical Society and its representatives Shri Melvin P. Thatcher, for his co-operation in organising the seminar, and Shri Eric Erickson for the brilliant exposition of the varied aspects of micrographics needing and meriting attention while adopting such a programme. He also thanked Shri O. P. Bhugra, the Resource Person from the National Archives of India for his assistance during the expositions in the seminar.

Shri Kishore also expressed his gratitude to the authorities and staff of the school, and also to the Director General of Archives, National Archives of India for organizing the Seminar.

## APPENDIX I

### Cited Standards and References on Micrographics

*American National Standards Institute, New York*

1. Specifications for stability of ammonia-processed diazo photographic film. ANSI PH 1.60—1979.
2. Practice for storage of processed safety photographic film. ANSI PH 1.43—1983.
3. Specifications for photographic film for archival records, silver-gelatin type on cellulose ester base. ANSI PH 1.28—1984.
4. Specifications for photographic film for archival records, silver-gelatin type on polyester base. ANSI PH 1.41—1984.
5. Specifications for safety photographic film. ANSI PH 1.25—1986.

*Association for Image and Information Management, Silver Spring, Maryland 20910, U.S.A.*

6. Basic U.S. Government micrographic standards and specification. RS 1—1983.
7. List of micrographic standards and related items. RR 1—1981.
8. Practice for operational procedures, inspection and quality control of first generation silver-gelatin microfilm of documents. ANSI/NMA MS 23—1983.

*Eastman Kodak Company, Rochester, New York*

9. Storage and preservation of microfilm Publication D-31, 1985.

**APPENDIX II**  
**SUBSTANDARD MICROFILM CODES**

**OPERATOR ERRORS**

1. Other operator errors as described.
2. Pages not filmed.
3. Blurred pages.
4. Out of focus.
5. Hand and other shadows.
6. Fogging.
7. Density variations.
8. Platen errors.
9. Showthrough (when slip sheet is not used).
10. Bleed through (when slip sheet is not used).
11. Volume not filmed.
12. Filmed out of frame.
13. Filmed off end of roll.
14. Covered information.
15. Filmed wrong material.
16. Reflections.
17. No longer in use.
18. High density.
19. Low density.
20. Film mis-threaded.
21. Improper filming.
22. Document misfed (manual).
23. Tests incorrect.
24. Improper corrections.
25. Titleboard errors.
26. Target errors.
27. Extra material in frame.
28. Operator's Report.

**CAMERA & RELATED EQUIPMENT MALFUNCTIONS**

30. Other camera and related equipment errors as described.
31. Shutter.
32. Spacing and transportation errors.
33. Overlapped exposures.
34. Scratched.
35. Nicked film.
36. Fogging (by light leak).
37. Pressure/roller marks.
38. Contraction.
39. Jam.
40. Static marks.
41. Streak.
42. Stretch/Blurs.
43. Out of synchronization.
44. Wash board.
45. Mistracking (filmed off edge).
46. Overexposure.
47. Underexposure.
48. Out of focus.
49. Document misfed (auto feeder).
50. Low target resolution (planetary).
51. Low target resolution (rotary).

**PROCESSING, EVALUATION, AND MANUFACTURER ERRORS**

60. Other errors as described.
61. Overdeveloped.
62. Scratched.
63. Broken film.
64. Stretched.
65. Chemical stains.
66. Water stains.
67. Fogging error.
68. Damaged in inspection.
69. High density.
70. Low density.
71. Wrong information requested.
72. Films lost in shipment.
73. Damaged in field.
74. Defective film.
75. Frilling.
76. Pressure/roller marks.
77. Static marks.

**PURCHASE/EXCHANGE/GIFT ERRORS**

90. Purchase/Exchange errors as described.
91. Density problems.
92. Out of focus.
93. Blurred.
94. Fogging error.
95. Printed off edge.
96. Processing errors.
97. Received damaged.
98. Film handling error.

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## APPENDIX III

### Participants in the Seminar-I

#### A. Representing States Archives

1. Dr. V. V. Krishna Sastry,  
Director,  
Andhra Pradesh State Archives, Hyderabad.
2. Shri Ravindra Singh,  
Photographer,  
Department of Delhi Archives, Delhi.
3. Shri C. B. Pandya,  
Director,  
Gujarat State Archives, Gandhi Nagar.
4. Shri Ravinder Puri,  
Microphotographist,  
Haryana State Archives, Chandigarh.
5. Shri C. R. B. Lalit,  
Director,  
Himachal Pradesh State Archives, Shimla.
6. Shri R. Muniswami,  
Director,  
and
7. Shri Venkata Raju,  
Assistant Technical Officer,  
Karnataka State Archives, Bangalore.
8. Shri P. S. M. Moideen,  
Director,  
Kerala State Archives, Trivandrum.
9. Shri S. D. Guru,  
Director,  
Madhya Pradesh State Archives, Bhopal.
10. Shri N. Indramani Singh,  
Assistant Microphotographist,  
Manipur State Archives, Imphal.

11. Shri S. K. Chattopadhyaya,  
Deputy Director,  
Meghalaya State Archives, Shillong.
12. Shrimati V. Chandrakha,  
Commissioner of Archives,  
Tamil Nadu State Archives,  
Madras.

**B. Representing Libraries and other Allied Institutions**

13. Shri Inder Deo,  
Assistant Director,  
and
14. Shri J. K. Gupta,  
Technical Assistant (Reprography),  
Central Secretariat Library,  
New Delhi.
15. Shri H. S. Bora,  
Photographic Officer,  
and
16. Shri I. M. Tikoo,  
Archaeological Survey of India,  
New Delhi.
17. Shri C. B. Gupta,  
Restorer,  
and
18. Shri Shiv Dutt Bakshi,  
Senior Photographer,  
National Museum, New Delhi.
19. Shri T. R. Chopra,
20. Shri Jawahar Lal,  
and
21. Shri Narendra Chhatwal,  
Technical Laboratories,  
Cabinet Secretariat,  
New Delhi.

22. Shri H. K. Mittal,  
Dy. General Manager,
23. Shri A. K. Sadhu,  
Manager,
24. Shri D. Das,  
Manager,
25. Shri S. K. Biswas,  
Supervisor Gr.-I,  
and
26. Shri R. G. Jaiswal,  
Senior Supervisor,  
National Thermal Power Corporation,  
New Delhi.
27. Shri Y. N. Sharma,  
Keeper,  
and
28. Shri Ramesh Chander,  
Technical Assistant,  
Indira Gandhi National Centre for Arts,  
New Delhi.
29. Shri S. Das Gupta,  
Assistant Librarian,  
Reprography,  
and
30. Shri A. K. Nath,  
Microphotographer,  
National Library, Calcutta.
31. Shri B. R. Sharma,  
Photo-Officer,  
and
32. Shri K. S. Baura,  
Senior Photo-Assistant,  
INSDOC, New Delhi.
33. Shri M. D. Mathur,  
Executive Officer,  
and
34. Shri Shashi Kant,  
Senior Library Assistant,  
Lok Sabha Library, New Delhi.

35. Shri D. N. Wadhwa,  
Library of Congress (U.S.A.),  
New Delhi, H.Q.

**C. Representing School of Archival Studies,  
National Archives of India (including trainees)**

36. Dr. S. Sengupta,  
Officer on Special Duty.

37. Dr. (Smt.) Meena Gautam,  
Assistant Director.

38. Shri Ranbir Kishore,  
Senior Fellow.

39. Shri V. V. Talwar,  
Fellow.

40. Shri A. K. Sharma,  
Microphotographist.

41. Kumari Snehlata Mishra,

42. Shri Pradeep Kumar Singh Yadav,

43. Shri P. K. Ravi,

44. Shri Sadamamd Tjalra,

45. Kumari Pranjana Das,

46. Shri K. Lalruala,

47. Kumari Sucheta Guha Thakurta,

48. Shri Mohd. Abul Kalam,

49. Shri J. L. Varma,

50. Smt. Saenah Bahari,  
and

51. Shri Thomas Simtowe,  
Diploma Course Trainees for the Session 1989-90.

D. Representing Regional Record Centres,  
National Archives of India



52. Dr. Kailash Behari,  
Assistant Director of Archives,  
53. Shri Rajender Singh,  
Microphotographist,  
and  
54. Shri R. C. Tanwar,  
Assistant Microphotographist, Gr.-II,  
National Archives of India, Jaipur.  
55. Shri R. S. Meena,  
Assistant Director of Archives,  
National Archives of India,  
Bhopal.

E. Representing National Archives of India, Janpath

56. Shri O. P. Bhugra, Microphotographist.  
57. Shri A. K. Dey, Microphotographist.  
58. Shri Roop Chand, Microphotographist.  
59. Shri K. K. Sahni, Assistant Microphotographist, Gr.-I.  
60. Shri B. C. Majumdar, Assistant Microphotographist, Gr.-I.  
61. Shri N. S. Mani, Assistant Microphotographist, Gr.-I.  
62. Shri P. K. Moulik, Assistant Microphotographist, Gr.-II.  
63. Shri Jagmohan Singh, Assistant Microphotographist, Gr.-II.  
64. Shri Satwant Singh, Assistant Microphotographist, Gr.-II.  
65. Shri K. K. Sinha, Assistant Microphotographist, Gr.-II.  
66. Shri Hari Ram, Assistant Microphotographist, Gr.-II.  
67. Shri R. N. Rajput, Assistant Microphotographist, Gr.-II.  
68. Kumari Madhu Rajpal, Assistant Microphotographist, Gr.-II.  
69. Shri A. K. Jain, Assistant Microphotographist, Gr.-II.  
70. Shri Rakesh Bisht, Assistant Microphotographist, Gr.-II.

F. Rapporteurs for the Seminar

71. Shri B. C. Sen, Archivist.  
72. Shri A. K. Mathur, Assistant Chemist, Gr.-I, School  
of Archival Studies, National Archives of India.