Preservation of Cinematographic Film in the National Film Archive

A REPRINT

By ERNEST H. LINDGREN

Previous treatments of the film preservation problem have tended to concentrate on special aspects in isolation. This paper stresses the importance of a total procedural pattern involving selection, acquisition, storage, testing, cataloging and the safeguarding of preservation masters and describes the work of the British National Film Archive in putting such a pattern into practice.

WE HAVE A responsibility to preserve historically important motion pictures, as a new form of historical record of contemporary life, and as a new form of art which deserves to be studied and developed. Experience has shown that if preservation is left to chance, significant films are lost or survive only in a mutilated form.

The work of preservation must be undertaken deliberately, and since it requires adequate finance, staff and facilities, as well as the confidence and cooperation of the film and television industries, it is a task best undertaken by a national organization with the financial support of its national government. For such an organization film preservation is not an insuperably difficult or complex problem, nor is its cost out of proportion to that of preserving other works of art or forms of record. Basically it demands the faithful observance of certain simple disciplines.

This paper, by Ernest H. Lindgren, Curator of the National Film Archive, 81 Dean St., London W.1, England, and Deputy Director of the British Film Institute, is reprinted from the October 1968 issue of *British Kinematography Sound and Television* by permission of the British Kinematograph Sound and Television Society.

N. B.: Four Figures have been added and more recent data substituted.

Experience gained in the National Film Archive in London during the last thirty years, as well as in film archives elsewhere, suggests that these are:

(1) Films to be preserved must be carefully selected.

(2) A national film archive should be certain of being able to acquire a copy of at least any publicly-exhibited film it requires.

(3) The copies acquired by an archive should be new, and of a kind to ensure preservation in the most perfect form.

(4) Preservation copies must be stored in the best conditions.

(5) Preservation copies must be examined and tested, and recopied if necessary.

(6) Preservation copies, even if positives, should never be projected.

(7) Archival films should be fully catalogued and documented.

(8) The making of copies from preservation masters must be controlled and limited.

Most previous considerations of this problem have tended to concentrate on one or several of these elements in isolation. The purpose of the present paper is to stress the importance of a *total procedural pattern*, composed of all the elements in combination. The efforts of the British National Film Archive to put such a pattern into practice will now be described.

History

The National Film Archive began with modest resources as a department of the British Film Institute in May 1935. Today, thanks to growing support from the British Government, it is the largest single division of the British Film Institute, with a staff of 40, seven departments, nearly 10,000 films and as many newreels, 15,000 books, 650,000 film stills, a unique film information service, and separate storage centres for its nitrate films and its acetate films. It receives a direct annual grant of some £77,000 ($184,000), and additional indirect subsidies amounting perhaps to a further £25,000 ($60,000), both given by the British Government through the Department of Education and Science.

Selection

All selection is by its nature imperfect, but since it is in practice impossible to preserve everything selection is inevitable, and one can only try to reduce its imperfections to the minimum.

The National Film Archive has always avoided constructing any elaborate theory of selection, because theories can quickly become outdated. Fundamentally what we require our selectors to do is to ask of any particular film: "Is there anything in this film in form, content or attendant circumstances the loss of which is likely to be regretted in fifty or five hundred years' time if the film does not survive?" If this question can be an-

Fig. 1. The new acetate store (in background) is built onto Kingshill House (foreground) which is projected as a work and study centre.

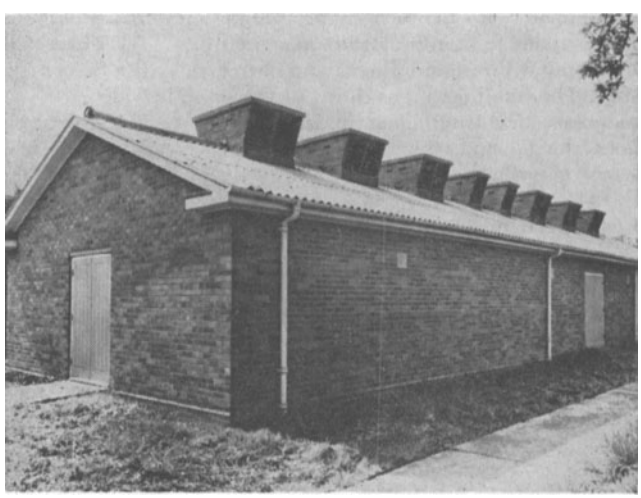

Fig. 2. Nitrate film storage block (Aston Clinton, Hertfordshire) containing 24 temperature-controlled vaults, each 500 reels capacity, and each with its own pressure vent protruding through the roof.

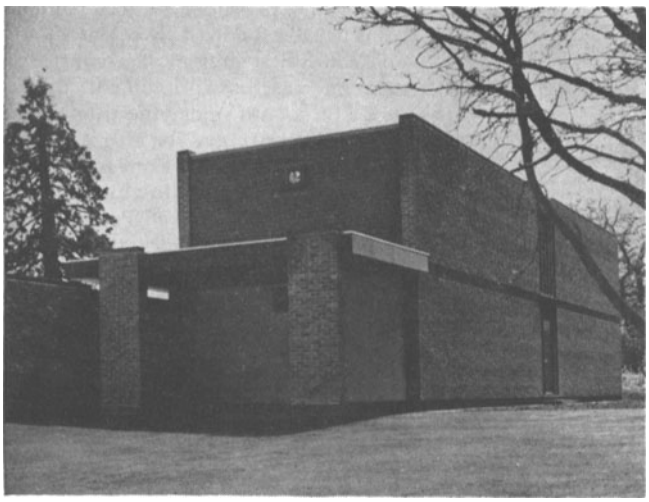

Fig. 3. New acetate store at Berkhamsted, Hertfordshire.

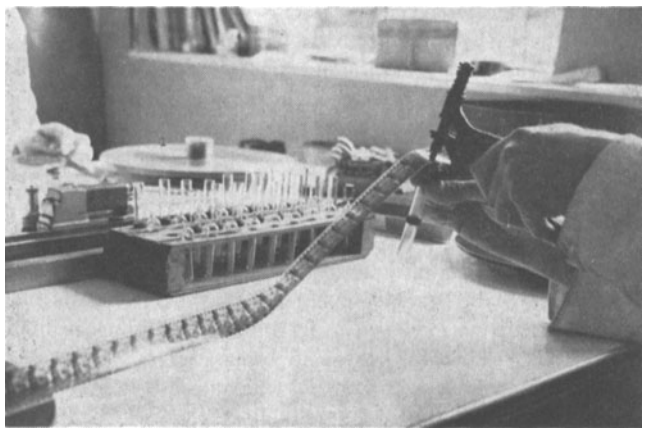

Fig. 4. Taking a punching for the stability test. The sample falls directly into the test tube which is then put into a numbered place in the tube-rack, ready to be taken to the heating oven.

swered positively, whatever the reason, there is a case for preserving the film.

Selection is controlled by three Acquisition Officers relying on the advice of four voluntary committees of outside experts (for feature films, historical records, scientific films and television respectively) which each meet six times a year.

Lists of current productions, to some extent pre-selected, are submitted to these committees within their respective fields, and one important discipline imposed on the committees is that they are required to give a specific reason for each film they recommend, to ensure that the committee arrives at a single clear decision, and understands what that decision is. Although we are not entirely happy with the present system and are continually trying to improve it, the Archive is, so far as we are aware, the only one in the world to operate a systematic selection procedure of this kind over the whole field of films as art and as historical records.

Acquisition

Hitherto the National Film Archive has always had to rely upon voluntary donation of films, subject to an undertaking that any films deposited will be used only for preservation and private study on the Archive premises, and for no other purpose without the written permission of those controlling the copyright. Although the Archive has always been grateful to those companies cooperating in this voluntary deposit system, and has itself always observed faithfully its undertakings, it has to be said that the Archive has never received more than a comparatively small number of the films it selects.

Taking feature films alone, for example, its General Selection Committee has recommended over the ten years 1957–66 some 20% of the total number in distribution in Great Britain. An analysis of the films received within this selection of 20% shows that out of 208 British films selected, only 111 were received; out of 340 American films selected, 96 were received; and out of 343 other films (mainly those made on the European Continent) only 34 were received.

With such a low rate of acquisition it is clear that the Archive cannot do its job effectively, and that the careful balance which the selection committees are trying to ensure is not being achieved in practice. For this reason we are being reluctantly forced to the conclusion, after trying to make the voluntary system work for more than 30 years, and drawing up model agreements with the British and American film industries for this purpose, that the only solution to the acquisition problem is some form of statutory deposit.

Quality of Preservation Material

A further defect of voluntary deposit is that the Archive is often given nothing better than a "good used print"; for serious preservation this is clearly unsatisfactory, and will be creditable neither to the Archive nor to the industry. No reputable film distributor would today present to the public films duped from worn projection copies, and there is no reason why we should force these onto posterity. The National Film Archive would like in all cases to acquire negative or duplicating material in perfect condition as soon as possible after the production of a film, and once again the only way of ensuring this in all cases would seem to be by some form of statutory deposit, even if it were one under which the Archive had to pay the laboratory costs of what it required where this had to be specially produced.

Storage

The first storage vaults of the National Film Archive, now 118 in number and situated in a village forty miles from London (Aston Clinton), were started in 1940, and were designed for nitrate film. It was the advice of the Archive's permanent Technical Advisory Committee that since nitrate film was inherently unstable, and would eventually have to be copied, effort should be concentrated on a testing and copying programme, rather than on full air-conditioning to extract the maximum life out of the nitrate copies. The Archive has therefore contented itself with keeping its nitrate store at a constant temperature of 55°–60°F, not difficult in the temperate British climate, by thermostatically controlled electric heating, and insulation against summer warmth (by air gaps and white-painted exteriors). Pressure vents also lead from each vault to the roof, to guard against the spread of fire by explosion.

Since the film industry adopted acetate film in 1951, the Archive has been under increasing pressure to build acetate stores, and for this purpose 5½ acres of ground were purchased near Berkhamsted, Hertfordshire (8 miles from Aston Clinton and 32 miles from London) in 1966, and the first stage of a new acetate store was completed there in May 1968. This consists of four large rooms, all fully air-conditioned. Three of them, each with a capacity of 3712 double reels, are designed to operate at 55°F (13°C) and 55% relative humidity, for the storage of black-and-white-material (negatives, positives, or separation masters). The fourth, of slightly smaller size, has been specially insulated to operate at a temperature of −18°C and 15% relative humidity, for the storage of colour-dye material, and is provided with a conditioning chamber for films entering or leaving this low temperature.

Examination and Testing

All film copies deposited in the Archive, whether new or old, are carefully examined, and detailed notes of their condition are entered on a technical record card.

New master material is tested for residual hypo, by applying a drop of a solution of mercuric chloride and potassium bromide to a quarter-inch film punching, and watching for any clouding of the solution. Film which reacts positively to the test is returned to the processing laboratory for rewashing.

The Archive also subjects all its nitrate films to a stability test.*

A double-walled copper oven with a small quantity of xylene in its outer chamber is electrically heated to bring the xylene to boiling point (138°C) which produces a temperature of approximately 134°C within the inner chamber. A quarter-inch punching of film (selected from an expendable frame) is then placed into a test-tube fitted with a loose stopper, around which is wrapped a piece of moistened filter paper impregnated with alizarin red dye, and the lower half of the test-tube is inserted through a hole in the lid of the oven, so that the punching is fully in its inner chamber, and the indicator paper is left visible (in practice, twelve test-tubes are inserted into the oven at a time). The action of the heat on the disc of film is to drive off the acid gases of decomposition, which bleach the alizarin red indicator. If this bleaching occurs within 25 min., we know the film is approaching the end of its life, and to continue its preservation it must be copied onto acetate before the film begins to deteriorate physically, the original unstable film being then destroyed. A film which shows a positive test reaction after 25 min. but within 60 min. is put back for retesting in one year's time. All other nitrate films are retested after three years.

By testing all its nitrate films systematically in this way, the Archive gains two benefits. First, it has sufficient warning to copy films before physical deterioration would make them uncopiable, and a complete loss. Secondly, it reduces its fire risk by eliminating potentially dangerous unstable film, susceptible to spontaneous combustion.

Protecting Preservation Masters

In 1934 the British Film Institute, anticipating the creation of the Archive, asked the British Kinematograph Society for advice on the best methods of preserving film, and its recommendations were in due course published.† One of these was as follows: "It is important that films deposited for storage should never be used for projection. They should be used only for providing prints for this purpose." This principle has always been rigorously observed by the National Film Archive, although at the cost of some misunderstanding. The film industry makes a clear distinction between its master material (negatives, duping prints, protective separations, etc.) and its show-copies, but this distinction is not so obvious within film archives, whose collections include many show prints partly because they are forced, under the voluntary deposit system, to accept used prints, and partly because films of the distant past have survived in no other form.

It may seem pedantic for an archive to insist that a projection print, which has already suffered the wear and tear of past use, cannot be used for "just one more projection," under the assurance that "every care will be taken." Yet if this projection print is the best or sole form in which the film exists, the archive must absolutely prohibit all further projection. Whatever the condition in which a film entered the archive, that condition must be maintained without further risk or loss. On no other basis is preservation possible.

The National Film Archive makes only one concession. Where a research student wishes to study viewable master preservation material, and can be satisfied by a single viewing, this is permitted on a table-viewer (not a projector) under Archive staff supervision. This is a temporary compromise allowing a limited access until such time as the Archive has money to make duplicate viewing copies.

Cataloguing

The National Film Archive's large collection is useless unless it is catalogued. When a film is first received, whatever information is known about it, incomplete and inaccurate though it may be, is typed onto a loose-leaf Kalamazoo form in the Acquisition Department, and is passed to the Cataloguing Department which immediately inserts it in alphabetic order of title, into one of a series of visible-index Kalamazoo binders which form our Provisional Catalogue; to this extent every film is catalogued immediately on acquisition.

In the Cataloguing Department qualified librarians are employed to view the Archive's films on a table viewer, in order to record the information contained in credit titles and to make a summary of the principal subject content. This is usually followed by research, and when the fullest and most accurate information has been obtained, this is entered on a card under the title, which forms the main entry for the Archive's Permanent Catalogue. Entries are also made in the Subject Index, the Production Index, the Index of Personalities, etc. For the Subject Index the Archive employs the Universal Decimal Classification, which is an extension of the Dewey System.

Broad areas of the Archive's collection are being catalogued systematically in order, and as each area is completed (for the time being at least) a volume of the Archive's Printed Catalogue is published. This is the third and final stage of the Archive's cataloguing operation. Three such volumes have already appeared.‡

The chief value of the Permanent Catalogue is to enable the Archive to answer such questions as: Does it have a particular title or titles? (given by the main entry). Does it have a film of a particular director, or with a particular actor? (given by the index to production personnel). Does it have a film showing London horsebuses or the building of an Eskimo igloo? (given by the subject index). Does it have any film of Theodore Roosevelt? (given by the index to persons). And so on.

The Catalogue also brings at least two other benefits. First it is an essential tool of the Archive's Acquisitions Officers and Selection Committees, enabling them to avoid duplication by ascertaining in relation to any new film being considered, what already exists in the Archive of a similar kind. Secondly, by being sufficiently detailed to lead enquirers as directly as possible to the precise films they are interested in, it saves unnecessary handling and viewing of preservation copies. In fact, those services which cataloguing performs for acquisition and preservation illustrate well the interrelationship of all the elements of the total preservation pattern which this paper is concerned to justify.

Protection of Printing Material

Preservation is not an end in itself, but a means to an end; a film archive exists to be made use of. This means that copies must be made for viewing, and from certain films copies may be required frequently. Just as preservation masters which are in the form of show prints must be withheld from projection, so preservation masters which are in the form of negatives must not be run continually through film printers. The

* This was originally suggested by C. Smith, of the Kodak Research Department, and further developed by S. A. Ashmore of the Government Laboratory, who is also a member of the Archive's Technical Committee. The relevant publications are: (1) Smith, C. H., Testing Procedure for Assessment of Deterioration of Record Films, Kodak Research Laboratory Report, October, 1942; and (2) Hutchinson, G. L., Ellis, L., Ashmore, S. A., Surveillance of Cinematograph Record Film, Research Development Establishment, Ministry of Supply, February, 1948.

† Report of a Special Committee set up by the British Kinematograph Society to consider means that should be adopted to preserve Cinematograph Films for an indefinite period. British Film Institute Leaflet No. 4, August, 1934.

‡ National Film Archive Catalogue: *Part I:* Silent News Films, 1895–1933; 2d ed., 1965. (25/ plus postage). *Part II:* Silent Non-Fiction Films, 1895–1934, pub. 1960. (15/ plus postage). *Part III:* Silent Fiction Films 1895–1930, pub. 1966. (25/ plus postage).

Archive imposes a limit of three printings; if more are required, a working negative has to be made separately from the preservation negative. The fact that this may result in show copies arrived at through several stages of duping emphasizes once more the extreme importance of obtaining the best quality originals to begin with.

Conclusion

It is impossible to cover all the problems facing the National Film Archive and other similar archives in this short paper. The most acute is the financial one, since few countries have yet shown sufficient realism to recognise that the preservation of historically significant films costs as much as the preservation of other works of art and forms of record; it cannot be done on the cheap.

In proportion to the total Government grant for national museums and art galleries, the grant for the National Film Archive is only 1.5%, and until this is considerably increased, our practical success must be severely limited. Nevertheless, I and my colleagues in the Archive believe that our approach to film preservation on a national scale is the right one, and that it depends, as I have tried to make clear, on the total effect of applying a number of techniques and disciplines, distinguishable as separate activities, but nevertheless so closely interlocked and mutually dependent as to form a single concerted attack, from which no element can be omitted without endangering the whole.

standards and recommended practices

Approved USA Standards

On July 21, 1969, the United States of America Standards Institute approved three new USA Standards and the revision of an existing USA Standard which are published here for your information.

Dimensions for Projection Reels for 8mm Motion-Picture Film, PH22.23-1969, is a substantial revision of the 1958 issue and should be examined carefully by all concerned. It should be noted that the standard has been expanded to include 1200-ft capacity reels.

The other three standards also prepared by the 16 and 8mm Committee are: Dimensions for Double 8mm Motion-Picture Camera Spools (100-Ft Capacity), PH22.173-1969; Dimensions for 16mm Daylight-Loading Motion-Picture Camera Spools (50-to-400-Ft Capacity), PH22.174-1969 and Dimensions for Projection Lamps, Four-Pin Prefocus Base-Down Type, PH22.175-1969.

USA Standards Reaffirmed

In July, 1969, the United States of America Standards Institute, upon the recommendation of the SMPTE Engineering Committees and USASI Standards Committees PH22 and C98, reaffirmed without change the following standards:

Dimensions of Magnetic Striping of 16mm Prints Having Magnetic-Photographic Sound Records, PH22.127-1962 (published in the November 1962 *Journal*); Specifications of Monochrome Video Magnetic Tape Leader, C98.2-1963 (published in the December 1963 *Journal*).

Inasmuch as compliance with USA Standards is purely voluntary, these standards will become truly effective only when broad publicity is given to their existence. USASI and the SMPTE would appreciate any personal influence to promote the use of these standards where such action is appropriate and proper. Copies of the Standards may be obtained for a nominal fee from the United States of America Standards Institute, 10 E. 40th St., New York, NY 10016.—*Alex E. Alden*, SMPTE Staff Engineer