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THE CONSERVATION AND DOCUMENTATION OF VIDEO ART *

At the Tate Gallery, London, we have developed a special approach to the conservation of video art works (some general guidelines are given in Appendix I). Most of the conservation literature relating to video has been written for archives and those responsible for vast collections of material. Although information about the structure of tape, its storage and its deterioration is applicable to any video collection, there are important differences between the care of art works and the care of archive material. The focus of this article is the conservation of video as art.

The Tate's collection of video is small and recent. Although we own three videos from 1972 by Gilbert and George, the majority of art works in this medium were made and acquired in the last six years from living artists. In most cases the artist can therefore be involved in the conservation process. There are three categories in which video is represented at the Tate:

1. As part of an installation that incorporates many different materials of which video is just one element. For example Matthew Barney's *Ottoshaft* is an installation combining a variety of materials including vinyl, tapioca and plastics alongside video.
2. As the primary medium where the equipment and display specifications are essential to the impact and meaning of the sculpture. For example Gary Hill's *Between Cinema and a Hard Place*, which includes twenty-three monitors of various sizes, modified by the artist and laid out in a particular way, displaying a series of images.
3. As the primary medium where the display details are loosely specified. These videos are usually displayed on a monitor or as a simple projection. Here the relationship between the display and the meaning of the art work is peripheral. Examples of this type include Gary Hill's *Remarks on Colour* or Gilbert and George's *Gordon's Makes Us Drunk*.

When the Tate Gallery buys or is given an art work for the collection, it acquires the rights for display and loan. For video art works, preserving these rights is only possible if the Gallery has an archival master tape and if the installation is fully documented. The archival master tape enables display format material (discs, tapes, etc.) to be produced when required, and the documentation provides the information needed for correct installation. Both the preservation of the video signals and the documentation of the display details are therefore central to the conservation of video art.

Preservation of video signals

The term 'video' covers an array of rapidly changing technologies both in terms of the formats on which an art work might be made, archived and displayed and the equipment used in its presentation. Video signals are commonly stored on magnetic tape, although this is probably something which will change in the next few years.

Modern magnetic tape is made from three different layers.¹ The video signal is encoded into the top layer of the tape, which is a binder layer made from polyester polyurethane in which the magnetic particles (which carry the video signal) are embedded. It is susceptible to chemical deterioration by oxidation and hydrolysis and it is vulnerable to wear and tear. When videotape is played, the tape heads of the playback machine make direct contact with this upper layer in order to decode the signals. Abrasion to the surface of the tape results in loss of these magnetic particles. The effect is loss of information, most commonly visible as white streaks across the picture known as 'drop out'.

Good storage and management will slow the chemical and physical deterioration of magnetic tapes (see Guidelines in Appendix I). However, good storage and management are not sufficient to ensure the preservation of the video. In addition to the risks posed by deterioration, there is also the problem that video formats change and become obsolete.

Video is a coded system. This means a particular tape can only be played on a machine designed to decode that format. It is pointless to preserve encoded information if the machine to

decode the signals back into picture and sound is no longer available. One strategy would be to preserve the playback equipment alongside the tapes. However, this approach has not been adopted at the Tate Gallery because it would be very difficult, if not impossible, to maintain these machines to function at their optimum and to employ the skilled personnel to operate them once obsolete. Instead an ongoing preservation program ensures that the videos in the collection are always stored on a current format.

The broadcast industry drives developments in video technology. Although choosing a format that is used in industry helps to ensure that it will be in use for a fairly long period of time, any format will eventually become obsolete.² A regular transfer of the video signals onto new stock, to overcome the problem of material deterioration, and onto new formats to overcome the problem of obsolescence, is therefore essential for the conservation of these art works. The Tate Gallery plans to do this every five or six years. Copying video signals without the loss of information or picture quality is therefore essential and can be achieved using digital technology.

Assessing the art work

When the Tate Gallery considers an art work for the collection, the conservation department prepares a report. This is an invaluable opportunity to assess the condition of the art work and identify any problems. This is particularly useful for video works, as it provides a chance to make contact with the artist or dealer and explain the procedure for conservation, and to discuss the details of the installation and the importance of obtaining the master tape.

Video signals are recorded as analogue signals or as digital signals. At present, most video art works coming into the collection have been made as analogue video. Even if an artist has edited the material using digital technology on a computer, the output is still largely on analogue formats. Common analogue formats include VHS, low and high band U-Matic and Beta SP. Even Optical VideoDisc, which the Tate Gallery uses as a display format, is an analogue format.³ Every time an analogue signal is copied, information and therefore picture quality is lost. With digital technology, information can be copied repeatedly without the loss of picture quality. For this reason the Tate makes a digital copy whenever a video art work enters its collection. This tape then becomes the Gallery's archival master.

The term 'master tape' usually refers to the edit master, i.e. the first tape that was made from the original footage after it has been edited into its final form. The artist or the dealer usually retains this. When dealing with analogue video, it is essential to archive from the first generation master because of the deterioration in quality each time an analogue signal is copied. Traditionally the concept of a master tape therefore relates to analogue technology. The first generation master tape of an analogue video should have the best quality picture and sound. However, sometimes this is not the case. Tapes become damaged or lost, or technical errors may have occurred in the first generation master. With digital video, as long as the specification of the formats has remained equally high and the tapes have been well looked after, there should be no loss in quality between different generations. It is important to ensure that the archival master tape is produced from the best quality source material available.

The master tape is viewed before the art work is acquired to ensure that it is in good condition and that a good archival master can be made for the Gallery. The following aspects of a master tape are checked:

- Whether it has colour bars and tone as references at the beginning of the tape.
- Whether any drop out or tape damage has occurred.
- Whether there are any faults or technical problems with the audio.
- Whether the combined chrominance and luminance levels are below 110% (this information is significant to the choice of display format).
- Whether the artist feels the colour levels are correct when the video is viewed on a correctly calibrated monitor (this helps to establish objective criteria for installation).

The pre-acquisition report will comprise:

- A brief description of the art work, including whether it is part of an edition.

- The estimated cost of archiving the video material.
- The estimated cost of displaying the art work, including equipment costs, the cost of making an exhibition copy of the video, construction costs (for example, corridors to keep the light out of the Gallery space or a frame to hold a screen).
- An estimate of conservation time required.
- Any other details with cost implications, for example copyright clearance for music or images used by the artist.
- Any practical details which might affect the suitability of the art work for the collection, for example potential health and safety problems.

When the video is acquired by the Gallery, the archival master is made at an outside facility house. The formats used for the Tate Gallery's archival masters are professional non-compressed digital formats. Although these are high-quality formats, the conversion from an analogue to a digital signal still means that there is a risk of changes occurring in the visual appearance of the video material. The Tate's relationship with a wide range of professional bodies both in and outside the industry, such as The British Film Archive, The National Sound Archive and commercial sound and video facilities houses, is essential to the conservation of video. Commercial facilities houses are able to maintain equipment and have staff with a level of expertise that would not be financially viable for the Gallery to provide in-house. However, commercial video engineers work within the requirements of broadcast standard material rather than with art works. Therefore it is important to work closely with these professional engineers, to ensure that they understand what it is we are trying to achieve and that the unique characteristics of an art work are preserved. Whenever possible, this is done in conjunction with the artist. Once the archival master has been made, the artist is asked to view it against the original. This is done in a viewing room with two monitors that have been calibrated to match.

Intervention

The considerations of conservation ethics, in particular intervention, are applicable to new media such as video. As discussed, the conservation approach is to transfer the video material onto a digital format from the best available master tape, preserving the unique character of the original. Although in many cases preservation involves converting analogue signals into digital signals, the visual appearance of the video remains unchanged. The character of a particular video art work will be affected by a number of factors. These might include the technology used to make it; the budget restrictions under which the artist worked; the skill of the artist; and the intervention by the artist to manipulate or use the technology in a particular way. It is important that these aspects are preserved and the material is not indiscriminately 'improved' or altered. This requires vigilance on the part of the conservator.

However, there are cases where some intervention is necessary, for example when the artist's master tape has been damaged. These decisions are made in consultation with the artist and the curator, and any treatment is documented.

Installation and display

The conservation of video art works includes documenting the installation and details that the artist considers essential. The artist is therefore interviewed about the history of the work, the equipment for the installation and the relationship between the equipment and the meaning of the art work (see Appendix II). The installation might involve considering equipment, lighting, architectural space, and acoustics. Few artists are accustomed to handing over the responsibility for installation to an institution. However, in my experience artists are interested in the conservation of their work and willing to give their time to answer questions.

The four main areas of display requiring documentation are sound, pictures, environment and equipment. Installations where the equipment is integral to the work will require particular care in documentation because of the obsolescence of display equipment. Although it is possible to docu-

ment how an art work is installed with existing equipment, it is impossible to predict how technology will change the way video will look in the future.

The installation *Between Cinema and a Hard Place* by Gary Hill provides a good example of a complex installation where the equipment is integral to the work. This installation includes a series of images that feed into twenty-three monitors of different sizes. Gary Hill has taken the cathode ray tubes out of their casing, effectively disembowelling the monitors. The circuit boards and cathode ray tube technology become a sculptural element. It is clear that cathode ray tube technology will be superseded in the next few years by liquid crystal display panels.⁴ The Gallery has acquired an extra set of monitors, which will provide spare parts for some time. However, this will only be a temporary solution, and the problem of how to replace this equipment when it is no longer widely available remains.

Bill Viola's *Nantes Triptych* presents another example where the display technology is essential to the meaning of the art work. This installation is made up of three large screens; the two side panels are 2946 mm high and 2210 mm wide. The central section is the same height, but 3931 mm wide. The two side images of the birth of a child and the death of a woman are back-projected. The central image is a front projection of a man floating. The projected image passes through a gauze material into a white rectangular space. The atmospheric mood of this work is created by the way it is installed, including the use of cathode ray tube projectors. Recognising that cathode ray tube projectors are likely to become obsolete, the artist has said that the projectors used to create the two side images could in the future be replaced by large liquid crystal display panels. However, the artist feels it is essential that the central image is created using projected light.

Video is now firmly established as a mainstream medium in contemporary art and is present in every contemporary collection. The first step in preserving these works is to accurately document them. As the vocabulary develops to describe their nuances, so too will the sophistication of our approach to their conservation.

Appendix I

TATE GALLERY GUIDELINES FOR THE CARE OF VIDEO ART WORKS⁵

Management of video material

All video material should be labelled with:

- the accession number and/or artist's name and title of the work, and
- the status of the material (i.e. archival master, exhibition format et cetera).

For each art work one would expect to hold material falling into the following categories:

- Archival format, which at the Tate will be a digital tape format.
- Exhibition format, which at the Tate is usually a disc format.
- Curator's viewing copy, which is usually a VHS, sometimes with time code in picture.

In addition, other material held might include the original tapes deposited with the Gallery by the artist, pre-edit rushes, et cetera. All should be clearly labelled.

The status of the material affects who has access to the tape or disc and how it is managed. For example, master tapes would never be played unless as part of a monitoring process or in order to make copies (or 'clones') for archiving or display. Master tapes are always accompanied by a member of staff if they have to leave the storeroom in order to go to a facilities house for copying or checking. Master tapes are never lent.

Only exhibition format material is sent if a loan is agreed. In most cases this is an optical laser disc which is condition-checked before and after it goes on loan. If the work is shown on tape, exhibition tapes are destroyed at the end of the loan, and enough tapes are made to ensure that the

work can be shown for the duration of the loan without the picture quality being seriously compromised.

Curator's viewing copies may be viewed by curators or researchers in the library or in their office. They are usually VHS tapes and sometimes have time code recorded in picture, which is a useful tool and is also an added security device.

All of the material mentioned above is stored together and its location is recorded on a database.

Storage

Very little research has been published about the storage of video. Although different tape manufacturers make recommendations, they do not provide the background information on how these were arrived at (see note 1, Mary Baker, p.108). However, all agree that video tape should be stored at temperatures below 20 degrees centigrade, and that the humidity should be controlled at somewhere between 30 and 50% RH. Low humidity and low temperatures will slow down the deterioration of tape.

However, cool storage is not always available. At the Tate Gallery, until a cool storage facility is set up, we store our tapes in glazed cabinets with metal shelves, in a controlled environment of 55% +/- 3%, with seasonal temperature fluctuations between 17 and 23 degrees centigrade. The tapes are stored vertically, away from dust and pollutants. This is the way they should be stored.

Choosing archival formats

Choose a professional digital format to ensure the highest possible quality and reliability of tape stock. The standards by which digital tape formats are compared are the sampling rate, the bit depth and the bandwidth.

- Choose a format that is likely to be in wide use in the industry for a reasonable period. This will mean that commercial facilities houses will continue to invest in equipment and personnel to support this format.
- Consider its compatibility with new formats. It is usually possible to predict where technology is developing in general terms.

Choosing display formats

When choosing a display format, the following criteria should be considered:

- Reliability, i.e. its ability to run repeatedly eight hours a day, seven days a week with minimal maintenance and wear and tear.
- Ease of operation: the ideal is a system that can be operated simply by switching the power on in the morning and off at night or even perhaps computer controlled. However, anything on a timer should allow the possibility to be easily over-ridden for openings and out-of-hours private views.
- Capacity to be controlled externally and synched up to other video, images and sound if necessary.
- The quality of the sound and picture.
- The cost.

In a large museum, the reliability of a display is very important; for this reason the Tate shows most of the video art works in the collection on Optical VideoDisc. There are two ways in which discs are made, by moulding and by cutting. The moulded discs are more than twice as expensive as the cut discs but their quality is better. Discs can be made in plastic and in glass; although the plastic discs are cheaper, they are less reliable than the glass discs.

Advantages of Optical VideoDisc as a display format:

- Highly reliable display format.
- No wear and tear whilst playing.
- Simple to switch on.

- Can be externally controlled to a high level of accuracy by an external source; therefore can be synchronised with other equipment.

Disadvantages of Optical VideoDisc as a display format:

- The format will be superseded in the next five years by higher quality digital disc formats.
- The quality of VideoDisc is not as high as professional tape formats.
- Technical problems can arise in the making of the disc. Often a compromise occurs between the sound and the picture quality in the manufacture of the discs. Art works with high chrominance and luminance levels are not suitable for laser disc, as these cause moiré patterning. VideoDisc is therefore not suitable for all artists' art work.
- There are two types of Optical VideoDisc: CAV (Constant angular velocity) and CLV (Constant linear velocity). The CAV discs can hold thirty minutes (54,000 frames) and have the capacity for freezing on a particular frame. CLV discs can hold sixty minutes of video. However CLV are not widely available, nor is the picture quality as good as on CAV discs and there is no freeze frame function.

The choice of Optical VideoDisc as a display format is a compromise between reliability and quality, however it is still the best display format readily available at present. The new digital systems, which are now being introduced either on disc (DVD) or playing direct from a computer hard disc, promise better quality and greater flexibility and control. However, the high level of compression employed and the novelty of the technology make it difficult to judge their potential usefulness. When choosing an exhibition format it is important to discuss the advantages and disadvantages of any system with the artist and if possible ask him/her to view the display material once it is made.

Compression

Recent advances in digital video have seen the development and introduction of new compression systems. The most significant of these are the system employed by Sony for the Digital Betacam tape format and the Motion Picture Experts' Group's MPEG II which is the basis for the Digital Versatile Disc (DVD). Compression enables more video to be encoded onto a smaller area of tape, computer hard disc or onto a CD type disc, by eliminating redundant information. Presently there is a debate about the effects of the different compression systems on video material. Although MPEG II uses a very high level of compression, some argue that the much milder compression used for Digital Betacam (sometimes described as 'no loss') is acceptable for archival use.

Until more is known about these systems we should be cautious about transferring video which was not made using a compression system onto a compressed format. Not only do we require great accuracy in copying tapes from the original but also artists' videos sometimes incorporate non-standard video signals. Problems might therefore occur when working with artists' videos which are not encountered by others using broadcast standard video material.

The conservation record

The conservation record for a complex installation will include:

- A precise description of the art work.
- A condition report with a history of the tapes.
- Equipment details identifying which parts of the equipment are key to the meaning of the art work and why they are important.
- An installation manual which records the light levels of the room, the sound levels and details of how to calibrate the equipment, as well as wiring diagrams, plans of the space (showing entrances and exits) and lighting and seating arrangements.
- Documentation of any control systems used for the art work.

Some installations are less defined than others. This might be the artist's conscious intention. However, it is important to establish the parameters of possible change, for example the largest and smallest acceptable sizes of monitors.

Appendix II

QUESTIONS

To follow is a collection of questions which are written as a prompt when interviewing artists and should not simply be sent to them. They are not exhaustive.

I The video material

- a. When was it made in terms of the artist's career?
- b. What format was it shot on?
- c. Where was it made, who was involved?
- d. Was there any source material, either in images or in sound, which was not live video (this relates to copyright questions as well as identifying any graphics systems used, et cetera)?
- e. Is the video in parts or in one continuous piece?
- f. Are there any technical problems that the artist is unhappy with?
- g. Are there any credits for actors or crew? When should these appear (wall text, catalogue)?

II Copyright and editions

- a. Was the art work commissioned? Who funded it?
- b. Has the art work ever been shown on television?
- c. Is the footage used in any other art work?
- d. Is the art work an edition? If so, what is the nature of the edition?
- e. Is there any material that the artist used either as images or as audio that might require copyright clearance? (If so, did they clear it?)
- f. Who holds copyright?

III Display

General Questions

- a. Is the way in which the work is to be displayed tightly defined by the artist?
- b. Where has the art work been shown before, and how? How does the artist feel about the way the work has been shown in the past? Has it ever been shown in a way that the artist was not happy with?
- c. What display formats have been used in the past? Is the artist happy with the use of laser disc?
- d. Are there any synchronising requirements?
- e. What equipment is required to show the art work?
- f. What are the light levels needed?
- g. Is there anything about a particular piece of equipment now being used to show the art work that may become obsolete while the artist believes it is essential to the art work?
- h. If the art work has sound, what are the specifications of the speakers?
- i. How loud should the audio be?

Questions specific to single-channel works

- a. If the work is a single-channel piece, can it be shown in the auditorium?

Questions specific to installations

- a. Is there an installation plan?
- b. How should the public gain access to the art work (door plans)?
- c. Discuss health and safety requirements in terms of entrances and exits, fire exit signs, barriers, emergency switches.
- d. Warding requirements?

Questions for works which are acquired with equipment

- a. Has the art work ever been shown for eight hours a day, seven days a week? What is the most likely technical problem to arise? (This question is only relevant if the equipment is acquired with the work.)

Questions for video art works shown on monitors

- a. If monitors are used, what size constraints are there on the monitors? Max/min what height should they be?

Questions for projected video art works

- a. If the art work is projected, what projector is used?
- b. What type of screen is required? Are there any types of screens which have not been suitable and if so, why?

IV Access

- a. How does the artist feel about serious researchers having access to the art work, either in the form of excerpts or the complete video viewed on a monitor?
- b. Can the Gallery show excerpts in the auditorium to illustrate a lecture, or in education material supporting a display (e.g. CDROM, etc.)?
- c. Can the Gallery show excerpts of the video on the internet as part of the Gallery's Website? (If the answer is 'no', document the reasons.)

A N N O T A T E D B I B L I O G R A P H Y

Useful books and articles; most do not discuss conservation issues directly but are technical books on video and related technologies.

1. Mary Baker, 'Lifetime Predictions for Polyurethane-based Recording Media Binders: Determination of the "Shelf-life of Videotape Collections"'. in: *Resins Ancient and Modern, Conference Proceedings*, Aberdeen, 13-14 September 1995, pp. 106 –110.

This article describes the physical and chemical structure of videotape and its deterioration, and also a project using FTIR (Fourier Transform Infrared Spectroscopy) to monitor the condition of videotape.

2. Bay Area Video Coalition, conference entitled *Playback 1996*, March 1996.

Although unpublished, a number of useful notes and resources were made available to conference participants and follow-up conferences are planned. BAVC also have a good web site with a link to a useful glossary of terms – <http://www.bavc.org/>. Their address is Bay Area Video Coalition, 111 17th Street, San Francisco, CA 94104.

3. Deirdre Boyle and Media Alliance, *Video Preservation: Securing the Future of the Past*, 1993.

This publication arose out of a symposium held in New York on 14 June 1991. This useful source book is available from Media Alliance, c/o Thirteen/WNET, 356 West 58th Street, New York, NY 10019. Media Alliance is currently producing a New York State source book on Magnetic Media Preservation to be edited by Mona Jimenez.

4. Richard Kallenberger and George Cvjetnicinanin, *Film into Video: A Guide to Merging the Technologies*, Focal Press, 1994. ISBN 0240 80215 2.

Provides a useful introduction to video and film technology and formats.

5. Robert Simpson, *Videowalls: The book of the big electronic image*, Focal Press, 1997. Different display technologies, including clear technical information relating to electronic images. ISBN 0240 51505 6.

6. Eugene Trundle, *Newnes Guide to TV and Video Technology*, Newnes, 1996. Dense technical book aimed at engineers. ISBN 07506 23748.

7. John Watkinson, *Compression in Video and Audio*, Focal Press, 1995. A readable introduction to compression technology. ISBN 0240 513940.

1 Mary Baker, 'Lifetime Predictions for Polyurethane-based Recording Media Binders: Determination of the "Shelf-life of Videotape Collections"', in: Resins Ancient and Modern, Conference Proceedings, Aberdeen, 13-14 September 1995, pp. 106–110.

2 A good example of this is that the half-inch format CV-2000 produced by Sony in 1965 was only in production for three years before it was superseded by CV-2100. Although the huge investment made in particular formats by television stations and support facilities helps to slow down the rate of change, obsolescence still remains a problem. For example, the popularity of compressed digital formats with the broadcast industry will, perhaps as soon as in the next three years, result in the obsolescence of non-compressed digital video formats such as D1 and D5.

3 Analogue formats are not suitable as archival formats. It may be that digital disc formats in the future will prove a better archival format than digital tape (although the compression employed may not be acceptable), but these should not be confused with analogue VideoDiscs. Also, as computers become more and more powerful it may be possible to store non-compressed digital video on computer hard discs.

4 The first flat liquid-crystal display panel television was launched by Sony in 1997.

5 Bill Viola and his partner the photographer Kira Perov are leading the field in developing ways of insuring the preservation and documentation of Bill Viola's video installations. I am indebted to them for their guidance and expertise.

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*The article has been published in: Hummelen, J., Sillé, D., *Modern Art: Who Cares?*, Amsterdam: Foundation for the Conservation of Modern Art/ Netherlands Institute for Cultural Heritage, 1999, p. 263-271.