Fig. 6. System for superimposing titles.

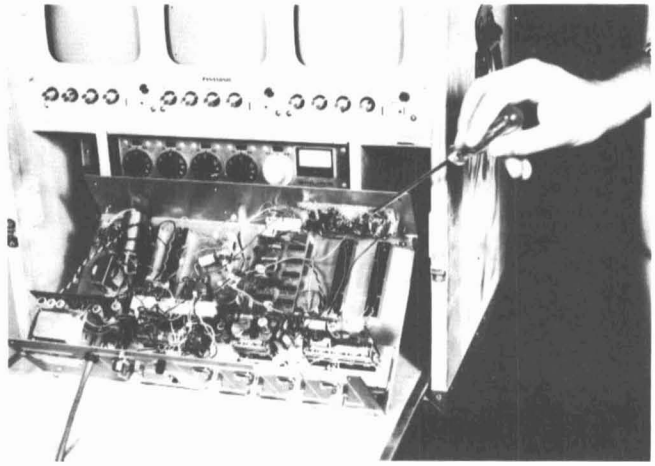


Fig. 7. Sync separator circuit board in special-effects generator.

cost editing of videotape and produce a new master tape of a quality quite close to the quality obtainable with professional equipment. So far, every series of modifications that we have made has suggested a new series of improvements that could be made. Thus, where Phase I involved only three real changes (starting and stopping both machines by a common switch, providing a reverse mode, allowing for double recording of sound at the edit point), Phase II went much further and used relays extensively to automate the operation. And we must note — in a kind of "note added in proof" — that while the report on all this work was in preparation, Phase III was implemented: it consists of replacing most of the time-delay relays of Phase II with electronic switching circuits. And Phase III leads naturally to Phase IV, and. . . .

For the benefit of anyone who might wish to duplicate this work or attempt his own modifications of VTR equipment, more detailed information (specifics regarding the needed resistors, transistors, mounting brackets, etc.) will be made available by the authors on request. Also, a bulletin describing all the Phase III modifications is to be published shortly.

Acknowledgments: We gratefully acknowledge the contributions of Robert Forget, Youssef Hasrouni, Lester Dupuis and Anthony Zsiros in the development of this system.

Errata

May 1973 *Journal*

Studio Lighting Equipment

Page 348, 1st col., 3d paragraph:

For:

"Mole-Richardson Co. (Hollywood, U.S.A.) introduced the new 2,000-W Type 8021 Mole-quartz Molelipso ellipsoidal pattern light (Fig. 2), using a new Q2000/4CL/BP 750-h long-life 3200-K globe developed especially for the unit. Flow-through ventilation provides adequate cooling with a fan . . ."

Read: (for the last sentence)

"Flow-through ventilation provides adequate cooling without a fan."

Pages 405–406 (photos to be interchanged for Figs. 109 and 110).

For: "Fig. 109. Production control suite of London Weekend Television's new South Bank center" see photo on p. 406.

For: "Fig. 110. South Bank Television Center as it looks from the north bank of the Thames" see photo on p. 405.

Progress Committee Report for 1972

standards and recommended practices

Draft American National Standards

Four Draft American National Standards are published here for a trial period and public review.

PH22.108, Dimensions for Four 150-Mil Magnetic Sound Records on 35mm Motion-Picture Film (Revision of PH22.108–1958), and PH22.137, Dimensions for Four-Track Magnetic Sound Records on 35mm Motion-Picture Release Prints (Revision of PH122.137–1963), are in fact editorial revisions and do not reflect technical or dimensional changes. The modifications were made to improve clarity and adjust the format to be in accord with similar standards.

PH122.185, Dimensions for Six-Track Magnetic Sound Records on 70mm Motion-Picture Release Prints, and PH22.186, Dimensions for Six 100-Mil Magnetic Sound Records on 35mm Motion-Picture Film, are new standards reflecting established engineering practices.

Comments should be addressed to Alex E. Alden, Staff Engineer, at Society Headquarters before 1 September 1973. The proposals have been submitted to American National Standards Committee PH22. Consequently, all comments received through *Journal* publication will be reviewed prior to conclusion of action by that committee. Alex E. Alden, *Staff Engineer*

Draft American National Standard

Dimensions for Four 150-Mil Magnetic Sound Records on 35 mm Motion-Picture Film

PH22.108

Revision of PH22.108-1958

1. Scope

1.1 This standard specifies the lateral location and dimensions of the four 0.152-in (3.86 mm) magnetic sound records and their reproducing speed on 35 mm motion-picture film.

1.2 The standard also specifies the width dimension for the recording heads.

2. Sound Records

2.1 The lateral location and dimensions of the four magnetic sound records shall be as shown in the figure and table.

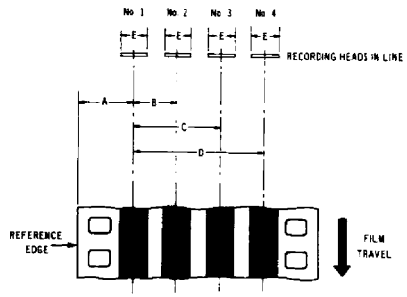
2.1.1 The records shall be referred to by number as shown in the figure with record No. 1 nearest the reference edge.

2.2 The gaps in the recording and reproducing head assemblies shall be physically in line and at an angle of 90° ± 5′ to the direction of the film travel.

2.3 With the direction of travel as shown in the figure, the magnetic coating is on the upper surface of the film.

3. Reproducing Speed

The recording shall be made so that the sound records will reproduce properly at 96 perforations per second (approximately 90 feet [27 meters] per minute or 18 inches [46 centimeters] per second) which is 24 frames per second.



Dimensions	Inches	Millimeters
A	0.314 ± 0.002	7.98 + 0.05
B	0.250 ± 0.002	6.35 ± 0.05
C	0.500 ± 0.002	12.70 = 0.05
D	0.750 ± 0.002	19.05 + 0.05
E	0.152 = 0.002	3.86 ± 0.05

NOTE 1: The film is used for sound records only. Any accompanying picture is on a separate photographic film.

NOTE 2: The dimensions of the magnetic coating are not specified, but it is assumed to be wide enough to permit the placement of the sound records in accordance with this standard.

NOTE 3: The film base used for the sound records conforming to this standard is usually made in accordance with American National Standard Dimensions for 35 mm Motion-Picture Film, KS-1866, PH22.139-1969 (R-1964).

NOTE 4: When sound records are intended to be used in synchronization with pictorial material found on a separate film, the picture-sound relationship should be in accordance with SMPTE Recommended Practice RP 25-1968, Sound and Picture Synchronization on Motion-Picture Film Relative to the Universal Leader for Magnetic and Photographic Tracks.

Draft American National Standard

Dimensions for Six 100-Mil Magnetic Sound Records on 35 mm Motion-Picture Film

PH22.186

1. Scope

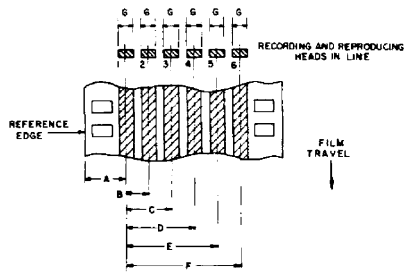
1.1 This standard specifies the lateral location and dimensions of the six 0.100-in (2.54 mm) magnetic sound records and their reproducing speed on 35 mm motion-picture film.

1.2 The standard also specifies the width dimension for the recording heads.

2. Sound Records

2.1 The lateral location and dimensions of the six magnetic sound records shall be as shown in the figure and table.

2.1.1 The records shall be referred to by number as shown in the figure with record No. 1 nearest the reference edge.



Dimensions	Inches	Millimeters
A	0.289 ± 0.002	7.34 ± 0.05
B	0.160 ± 0.002	4.06 ± 0.05
C	0.320 ± 0.002	8.13 ± 0.05
D	0.480 ± 0.002	12.19 ± 0.05
E	0.640 ± 0.002	16.26 ± 0.05
F	0.800 ± 0.002	20.32 ± 0.05
G	0.100 ± 0.002	2.54 ± 0.05

2.2 The gaps in the recording and reproducing head assemblies shall be physically in line and at an angle of 90° ± 5′ to the direction of the film travel.

2.3 With the direction of travel as shown in the figure, the magnetic coating is on the upper surface of the film.

3. Reproducing Speed

The recording shall be made so that the sound records will reproduce properly at 96 perforations per second (approximately 90 feet [27 meters] per minute or 18 inches [46 centimeters] per second) which is 24 frames per second.

NOTE 1: The film is used for sound records only. Any accompanying picture is on a separate photographic film.

NOTE 2: The dimensions of the magnetic coating are not specified, but it is assumed to be wide enough to permit placement of the sound records in accordance with this standard.

NOTE 3: The film base used for the sound records conforming to this standard is usually made in accordance with American National Standard Dimensions for 35 mm Motion-Picture Film, KS-1866, PH22.139-1969 (R-1964).

NOTE 4: When sound records are intended to be used in synchronization with pictorial material found on a separate film, the picture-sound relationship should be in accordance with SMPTE Recommended Practice RP 25-1968, Sound and Picture Synchronization on Motion-Picture Film Relative to the Universal Leader for Magnetic and Photographic Tracks.

Draft American National Standard

Dimensions for Four-Track Magnetic Sound Records on 35 mm Motion-Picture Release Prints

PH22.137

Revision of PH22.137-1963

1. Scope

1.1 This standard specifies the lateral location, dimensions, identity and use of the four magnetic sound records and their reproducing speed for 35 mm motion-picture release prints.

1.2 The standard also specifies the longitudinal picture-sound separation.

1.3 This standard further specifies the width dimension for the recording and reproducing heads.

2. Sound Records

2.1 The lateral location and dimensions of the magnetic sound records shall be as shown in the figure and table.

2.1.1 The records shall be referred to by number as shown in the figure with record No. 1 nearest the reference edge. The left and right channel apply to a listener facing the screen. Record No. 1 shall be used for the left loudspeaker channel. Record No. 2 shall be used for the center loudspeaker channel. Record No. 3 shall be used for the right loudspeaker channel. Record No. 4 shall be used for the surround or auditorium loudspeakers or control signals or both.

2.2 The gaps in the recording and reproducing head assemblies shall be physically in line and at an angle of 90° ± 5′ to the direction of film travel.

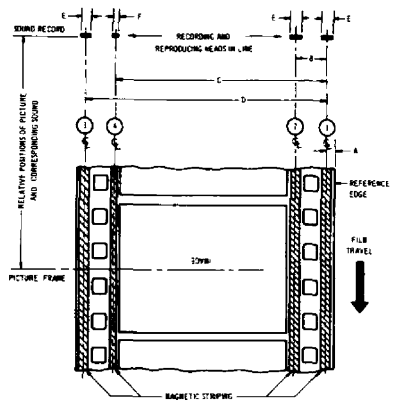
2.3 With the direction of film travel as shown in the figure, the magnetic striping shall be on the side of the film toward the projector lens.

3. Reproducing Speed

The recordings shall be made so that the sound records will reproduce properly at 96 perforations per second (approximately 90 feet [27 meters] per minute or 18 inches [46 centimeters] per second) which is 24 frames per second.

4. Picture-Sound Separation

The magnetic sound records on the film shall lag behind the center of the corresponding picture by a distance of 28 frames ± ½ frame (See Appendix).



FILM AS SEEN FROM THE LIGHT SOURCE IN THE PROJECTOR LOOKING TOWARD THE LENS

Dimensions	Inches	Millimeters
A	0.040 ± 0.002	1.02 ± 0.05
B	0.171 ± 0.002	4.34 ± 0.05
C	1.148 ± 0.002	29.16 ± 0.05
D	1.298 ± 0.002	32.97 ± 0.05
E	0.059 min	1.50 min
F	0.036 ± 0.002	0.91 ± 0.05

NOTE 1: The dimensions which locate the reproducing heads are based on the assumption that the film has shrunk 0.2 percent in width. Since the shrinkage of the film will normally increase between the time of recording and the time of reproducing, it would be logical that different shrinkage values should be taken to determine the dimensions which locate the recording and reproducing heads, but the same value of 0.2 percent (which corresponds to low shrinkage safety-type film) is adopted for practical reasons. This value has been chosen to represent rather more than the shrinkage likely to have occurred at the time of recording and rather less than the shrinkage likely to have occurred at the time of reproducing.

NOTE 2: Motion-picture prints conforming to this standard are usually made on film made in accordance with American National Standard Dimensions for 35 mm Motion-Picture Film, CS-1870, PH22.102-1969 (R-1964), with magnetic striping done in accordance with American National Standard Dimensions of Magnetic Striping of 35 mm Motion-Picture Film for Four-Track Magnetic Sound Release Prints, PH22.177-1970, and projected in accordance with American National Standard Specifications for Projector Usage of 35 mm Release Prints with Four-Track Magnetic Sound Records, PH22.103-1971 (R-1966).

Appendix

(The Appendix is not a part of this American National Standard, but is included for information purposes only.)

As a working procedure, the accuracy of picture-sound separation in a projection print is frequently judged by screening in a review room. It is important that the standard thread-path in this review room projector be set accurately to the value specified in this standard minus 1 frame for every 50 feet (15 meters) separating the loudspeaker from the observer. Otherwise, nonstandard prints may be produced.

Draft American National Standard

Dimensions for Six-Track Magnetic Sound Records on 70 mm Motion-Picture Release Prints

PH22.185

1. Scope

1.1 This standard specifies the lateral location, dimensions, identity and use of the six magnetic sound records and their reproducing speed for 70 mm motion-picture release prints.

1.2 The standard also specifies the longitudinal picture-sound separation.

1.3 The standard further specifies the width dimension for the recording and reproducing heads.

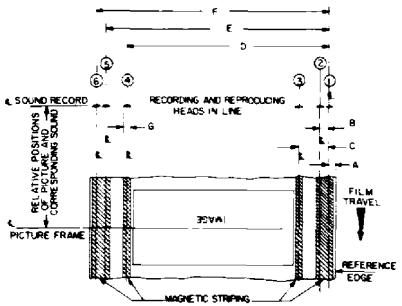
2. Sound Records

2.1 The lateral location and dimensions of the six magnetic sound records shall be as shown in the figure and table.

2.1.1 The records shall be referred to by number as shown in the figure with record No. 1 nearest the reference edge. The left and right channel apply to a listener facing the screen. Record No. 1 shall be used for the left loudspeaker channel. Record No. 2 shall be used for the left center loudspeaker channel. Record No. 3 shall be used for the center loudspeaker channel. Record No. 4 shall be used for the right center loudspeaker channel. Record No. 5 shall be used for the right loudspeaker channel. Record No. 6 shall be used for the surround or auditorium loudspeakers.

2.2 The gaps in the recording and reproducing head assemblies shall be physically in line and at an angle of 90° ± 5′ to the direction of film travel.

2.3 With the direction of film travel as shown in the figure, the magnetic striping shall be on the side of the film toward the projector lens.



FILM AS SEEN FROM THE LIGHT SOURCE IN THE PROJECTOR LOOKING TOWARD THE LENS

TABLE 1

Dimensions for Recording Head Placement
(0.2% Lateral Film Shrinkage Assumed)

Dimensions	Inches	Millimeters
A_1	0.052 ± 0.002	1.32 ± 0.05
B_1	0.110 ± 0.002	2.79 ± 0.05
C_1	0.316 ± 0.002	8.03 ± 0.05
D_1	2.328 ± 0.002	59.13 ± 0.05
E_1	2.534 ± 0.002	64.36 ± 0.05
F_1	2.644 ± 0.002	67.16 ± 0.05
G_1	$0.060^{+0.004}_{-0.000}$	$1.52^{+0.10}_{-0.00}$

TABLE 2

Dimensions for Reproducing Head Placement
(Optimized for 0.2 to 0.4% Film Shrinkage)

Dimensions	Inches	Millimeters
A_2	0.052 ± 0.002	1.32 ± 0.05
B_2	0.110 ± 0.002	2.79 ± 0.05
C_2	0.315 ± 0.002	8.00 ± 0.05
D_2	2.324 ± 0.002	59.03 ± 0.05
E_2	2.529 ± 0.002	64.24 ± 0.05
F_2	2.639 ± 0.002	67.03 ± 0.05
G_2	$0.050^{+0.000}_{-0.004}$	$1.27^{+0.00}_{-0.10}$

THIS PROPOSAL IS PUBLISHED FOR COMMENT ONLY

3. Reproducing Speed

The recording shall be made so that the sound records will reproduce properly at 120 perforations per second (approximately 112.2 feet [34 meters] per minute or 22.4 inches [57 centimeters] per second) which is 24 frames (5 perforations each) per second.

4. Picture-Sound Separation

The magnetic sound records on the film shall lag behind the center of the corresponding picture by a distance of 23 frames ± ½ frame (See Appendix).

NOTE: Motion-Picture prints conforming to this standard are usually made on film made in accordance with American National Standard Dimensions for 70 mm Motion-Picture Film, Perforated 65 mm, KS-1870, PH22.119-1967.

Appendix

(The Appendix is not a part of this American National Standard, but is included for information purposes only.)

A1. As a working procedure, the accuracy of picture-sound separation in a projection print is frequently judged by screening in a review room. It is important that the standard thread-path in this review room projector be set accurately to the value specified in this standard minus 1 frame for every 50 feet (15 meters) separating the loudspeaker from the observer. Otherwise, nonstandard prints may be produced.

A2. The outer edge of the magnetic striping ideally should be 0.007 inch (0.18 mm) from the edge of the film.