

The Society is grateful to John M. Waner for supplying French, Spanish and German translations of his abstract.

### Considérations relatives à la production de film couleur pour la télévision en couleurs

JOHN M. WANER [411]

Une sous-commission mixte issue du comité de la télévision et du comité de la couleur s'est réunie pour travailler à l'élaboration de méthodes recommandées concernant les gammes de densité et de contraste des films couleur destinés à la t.v. en couleurs. Au cours des travaux de la sous-commission il apparut évident que le contrôle optimum de la gamme de densité de la copie diffusée ne pouvait être obtenu que lorsque la prise de vue initiale était soigneusement contrôlée; par conséquent il était essentiel d'apporter un additif aux méthodes recommandées, qui traiterait dans le détail des "considérations relatives à la production de film couleur pour la télévision en couleurs."

Certains facteurs de la transmission et de la réception des films pour la t.v. en couleurs font qu'il est souhaitable de contrôler les caractéristiques du tirage couleur, et le degré ainsi que le type de contrôle applicable sont influencés par les propriétés du film couleur. La gamme de densité du tirage couleur est contrôlée d'une façon beaucoup plus efficace et économique au cours de la mise en scène et de la prise de vue que lors du tirage final. La lumière réfléchie par certains éléments d'une scène largement illuminée, que l'on desire reproduire avec un bon rendu des détails, doit être maintenue entre deux limites maximum et minimum recommandées, afin de contrôler "le blanc" et "le noir" de "référence" de chaque scène, et les tons "chair" doivent être en relation convenable avec ces limites. Pour une scène de plein jour en intérieur, un rapport des éclairages de 2 à 1 est conseillé. On peut utiliser des rapports plus élevés pour obtenir des effets spéciaux ou bien dans les scènes de nuit.

### Consideraciones en la producción de películas en color para televisar en color

JOHN M. WANER [411]

Un subcomité relacionado con los Comités Sobre Televisión y Color se ha estado ocupando de establecer normas recomendables para escalas de densidad y contraste que puedan aplicarse a las películas en color para televisar en color. En el curso de las labores de dicho subcomité se notó que el control óptimo en la escala de densidad de la copia de exhibición sólo se puede conseguir cuando la fotografía del motivo original fué cuidadosamente controlada; por tanto, se consideró preciso suministrar un apéndice en conexión con el procedimiento recomendado que trate con algún detalle de las "Consideraciones en la Producción de Películas en Color para Televisar en Color."

Ciertos factores en la transmisión y recepción de películas en color para televisión manifiestan la conveniencia de controlar las características de la copia o impresión en color; el grado y tipo de los controles que es posible aplicar son afectados por las propiedades de la película en color. La escala de densidad de la copia en color puede controlarse con más efectividad y economía en el escenario mismo y al tiempo de tomar la fotografía, en lugar de en la impresión o copia final. La reflectancia de aquellos elementos completamente iluminados de la escena que se desean reproducir con buen detalle deberán de mantenerse dentro de los límites mínimos y máximos recomendados, para poder controlar el "blanco de referencia" y el "negro de referencia" de cada una de las escenas y, los tonos de la cara deben quedar en relación propia a dichos límites. Para una escena en el interior totalmente iluminada, por el día, se recomienda una relación en la iluminación de 2:1. Para conseguir efectos especiales y para escenas nocturnas podrán emplearse relaciones mayores.

### Erwägung bei der Herstellung von Farbfilm für Farbfernsehen

JOHN M. WANER [411]

Ein vereinigter Unterausschuss der Fernseh- und Farbenkommissionen hat daran gearbeitet, eine empfohlene Verfahrungsweise für Dichte- und Härtegradbereich für Farbfilm aufzustellen. Während dieser Arbeit wurde es klar, dass die grösste Regelung des Dichtebereichs der Verleihkopie nur dann erzielt werden kann, wenn die ursprüngliche Photographie sorgfältig kontrolliert wird. Es wurde daher für notwendig gehalten, der empfohlenen Verfahrungsweise einen Zusatz beizufügen, der in grösseren Einzelheiten die Erwägungen bei der Herstellung von Farbfilm erörtert.

Gewisse Umstände in der Sendung und im Empfang von Farbfilm machen es wünschenswert, die Eigenschaften der Farbkopie zu kontrollieren; und Grad und Art der Kontrolle, die man anwenden kann, werden von Eigenschaften des Farbfilms beeinflusst. Dichtebereich der Farbkopie wird am besten und billigsten während der künstlerischen Vorbereitung und während des Photographierens kontrolliert und nicht in der Endkopie. Die Abstrahlung der voll beleuchteten Szenenbestandteile, die in ausführlichen Einzelheiten zu reproduzieren sind, sollte in den empfohlenen Grenzen gehalten werden, um die Weiss-schwarzwertbezugspegel der Szenen zu kontrollieren. Gesichtstönung sollte zu diesen Grenzen passend in Beziehung stehen. Für eine voll beleuchtete Innenszene bei Tageslicht wird ein Lichtverhältnis von 2:1 empfohlen. Ein höheres Verhältnis kann für besondere Effekte und Nachtszenen angewandt werden.

## standards and recommended practices

### Approved SMPTE Recommended Practices

In April 1964, the Society's Board of Governors gave final approval to the two Recommended Practices published here. Individual copies of these SMPTE Recommended Practices may be obtained from Society Headquarters, 9 East 41 Street, New York, New York 10017.

SMPTE Recommended Practice RP 16-1964, Specifications of Tracking Control Record for 2-In. Video Magnetic Tape Recordings, specifies the dimensional relationships among the tracking-control signal, the frame-pulse signal and the vertical synchronizing signal for the quadruplex system of recording on

2-in. video magnetic tape at both 15 and 7.5 inches per second tape speeds.

SMPTE Recommended Practice RP 17-1964, A Photographic Recording Technique for Measuring High-Speed Camera Image Unsteadiness, describes a unique and simple method of testing for image unsteadiness. As a periodic camera check, this method provides an excellent history of mechanical deterioration which, if overlooked, would result in serious camera damage.—A.E.A.

# Specifications of Tracking Control Record for 2-In. Video Magnetic Tape Recordings

Approved by the Video Tape Recording and Standards Committees, this proposal was published for trial and comment in the October 1963 Journal. The recommendation received final approval by the Society's Board of Governors in April 1964.

## 1. Scope

This recommended practice specifies the recorded dimensional relationships among (a) tracking-control signal, (b) frame-pulse signal, and (c) vertical synchronizing signal for 2-in. video magnetic tape recordings.

## 2. Dimensions

2.1 The dimensional relationships among the tracking control record, frame pulse record, and video record, not specified elsewhere in this practice, shall be as specified in Figs. 1a and 1b and in the table.

2.2 Dimensions pertaining to the video, audio, and control records on 2-in. magnetic tape shall be as specified in the appropriate American Standards.

## 3. Magnetic Coating

With the direction of tape motion shown, the magnetic coating is on the surface facing the observer.

## 4. Frame Pulses

4.1 A pulse to identify the position of the vertical synchronizing pulse shall be superimposed on the tracking control signal.

4.2 One pulse shall be recorded per television frame to identify the vertical blanking interval that is preceded by a full horizontal line when the tape is recorded at 15 in./sec and to identify the vertical blanking interval that is preceded by a half horizontal line when the tape is recorded at 7.5 in./sec.

4.3 The pulse shall be positioned so that the centerline of the recorded pulse and the extended centerline of the area between the second and third video tracks after the track containing the vertical synchronizing pulse shall intersect within  $\pm 0.002$  in. at the reference edge of the tape when the recording is made at 15 in./sec tape speed (Fig. 1a). The pulse shall be positioned so that the centerline of the fifth video track after the track containing the vertical synchronizing pulse shall intersect within  $\pm 0.002$  in. at the reference edge of the tape when the recording is made at 7.5 in./sec tape speed (Fig. 1b).

4.4 The amplitude of the frame pulse current shall be greater than 150 percent of the peak-to-peak value of the tracking control signal current in the record head.

4.5 The polarity of the pulse with respect to the tracking control signal shall be as shown in Figure 1a.

## 5. Tracking Control Signal

5.1 The frequency of the tracking-control signal shall be

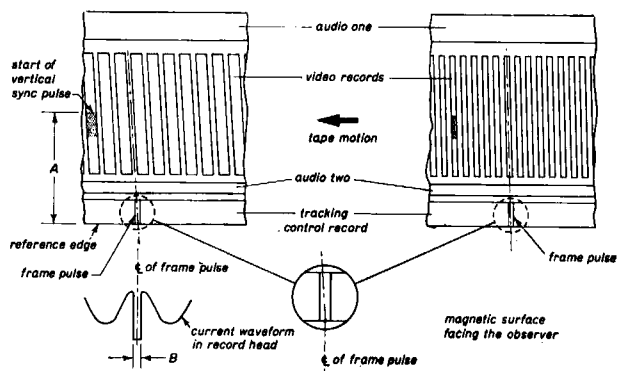


Fig. 1a. 15 in./sec

Fig. 1b. 7.5 in./sec

Di- men- sions	Inches		Millimeters		Seconds
	Min- imum	Max- imum	Min- imum	Max- imum	
A	1.10	1.20	27.9	30.5	60 $\mu$ sec* $\pm 10$ $\mu$ sec
B					

\* Measured at 50 percent amplitude points. Widths observable and measurable on developed tape will vary with recording level and properties of developing solution.

four times the field frequency of the television video signal.

5.2 The amplitude of the tracking-control signal current in the recording head shall be such that the tape is driven to the verge of saturation. This amplitude can be established by the method described in the Appendix.

5.3 The tracking-control signal shall be positioned so that a point of maximum record current and the extended centerline of the area between the second and third video tracks after the track containing the vertical synchronizing pulse shall coincide within  $\pm 0.001$  in. at the reference edge of the tape when the recording is made at 15 in./sec tape speed.

The tracking-control signal shall be positioned so that a point of maximum record current and the extended centerline of the fifth video track after the track containing the vertical synchronizing pulse shall coincide within  $\pm 0.001$  in. at the reference edge of the tape when the recording is made at 7.5 in./sec tape speed.

5.4 The point of maximum record current coinciding with the frame pulse shall be one that immediately follows an area on the control record to which a south-seeking pole of a compass will be attracted.

5.5 The wave shape of the tracking-control signal current in the record head should be sinusoidal.

## APPENDIX

(This Appendix is not a part of SMPTE Recommended Practice RP 16-1964, Specifications of Tracking Control Record for 2-In. Video Magnetic Tape Recordings, but is included to facilitate its use.)

1. The transfer characteristic of magnetic tape is nonlinear. The  $B_r$ ,  $I_r$  curve of the tape as recorded has a shape indicated in Fig. 2a. When a sinusoidal record current (Fig. 2c) is applied to the record head, the resulting recorded flux density is as shown

in Fig. 2b. The playback voltage waveform (Fig. 2d) is the first derivative of the recorded flux. Thus, the zero axis crossing region of the playback signal corresponds to the maximum recorded flux region. The verge of saturation is considered to be the condition where the recorded flux waveform is just noticeably flattened on its peaks. This flattening of the flux peaks results in an inflection in the playback signal waveform in the zero axis crossing region. The verge of saturation can thus be determined by increasing the record current until a just perceptible inflection occurs in the zero axis crossing region of the playback signal.

2. Areas to which a compass is attracted (see Section 5.4) do not coincide with point of maximum record current. The compass will be attracted to two areas (X, as shown in Fig. 2) adjacent to the point where the record current crosses the zero axis. The two areas will appear as bars when the track is developed with carbonyl iron or an equivalent material.

3. The location of vertical sync and the frame pulse, as specified herein, will apply only if the recorder video head and capstan servos are referenced to the incoming video signal or its sync generator.

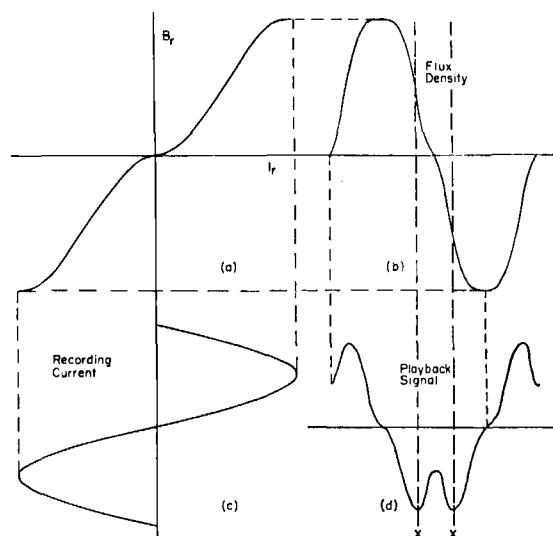


Figure 2

## SMPTE RECOMMENDED PRACTICE RP 17-1964

# A Photographic Recording Technique for Measuring High-Speed Camera Image Unsteadiness

This Recommended Practice originated in the Subcommittee on High-Speed Camera Steadiness on October 9, 1959. The technique has been revised and improved in an attempt (1) to overcome the very serious problem of making several thousand microscope measurements of consecutive reference images on motion-picture film; e.g., at least 16,000 readings per 100 ft of 16mm film and (2) to obtain a permanent data write-out system for lifetime camera evaluation. The improved technique was described in a paper presented at the 90th SMPTE Semi-annual Convention on October 3, 1961.<sup>1</sup>

It has been the experience of the committee that the achievement of optimum high-speed camera performance depends not only on accuracy in manufacturing tolerances, but also on periodic camera maintenance when and if indicated by the unsteadiness measurement technique. Furthermore, costly repairs may be reduced since serious camera damage is usually preceded by gross image unsteadiness.

Approved by the Instrumentation and High-Speed Photography Committee and the Standards Committee, the proposal was published for trial and comment in the January 1964 Journal. The recommendation received final approval by the Society's Board of Governors on April 12, 1964.

### 1. Scope

- 1.1 *Specification.* This recommendation specifies a photographic method of recording and measuring high-speed motion-picture image unsteadiness.
- 1.2 *Image-Steadiness Methods.* Existing image-steadiness methods are applicable to professional motion-picture cameras showing vertical image-steadiness accuracy within 0.0004 in.<sup>2,3</sup>

<sup>1</sup> A. E. Quinn, "A photographic recording technique for measuring high-speed motion-picture camera image steadiness," presented on October 3, 1961, at the Society's Convention at Lake Placid, N. Y. A manuscript is expected to be available for publication during the latter part of 1964.

<sup>2</sup> A. C. Robertson, "A method of measuring the steadiness of motion picture cameras," Jour. SMPTE, 68: 21-25, Jan. 1959.

<sup>3</sup> M. G. Townsley, "A method for measuring the steadiness of motion picture cameras," Jour. SMPE, 43: 45-50, July 1944.

1.3 *Application.* The procedure for measuring image unsteadiness, described in this Recommended Practice, is far more practical for high-speed, rotating-prism motion-picture cameras usually showing unsteadiness characteristics greater than 0.0004 in.

### 2. Measurements Procedure

#### 2.1 Film Exposure

- 2.1.1 *Double Exposure.* Film shall be double exposed to produce overlapped images of the plus sign target.
- 2.1.2 *Target.* The target shall be opaque, except for a plus sign transmitting sufficient light for exposure through lines no wider than 1mm on an 8 by 10 in. field.
- 2.1.3 *Backlighting.* The target shall be backlit.
- 2.1.4 *First Exposure.* The first exposure shall be made in a professional camera known to afford image steadiness within 0.0004 in.
- 2.1.5 *Second Exposure.* The second exposure shall be made in a high-speed motion-picture camera, as shown in Fig. 1.

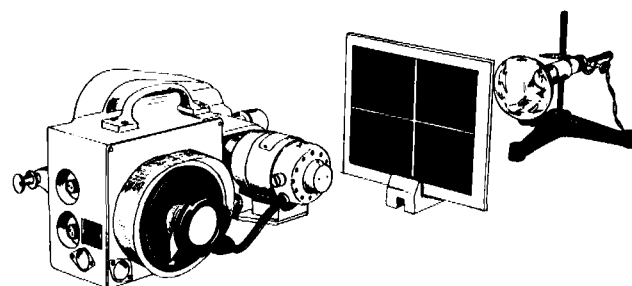


Fig. 1. Typical set-up for second exposure.

2.1.6 *Exposure Adjustments.* Exposure shall be adjusted for each camera to produce equal density for both plus sign images.

### 3. Recording Unsteadiness Data

3.1 *Projection.* Processed film shall be projected onto a

rotating drum wrapped with recording-type paper (cut  $1\frac{1}{2}$  in. by 24 in.), as shown in Fig. 2.

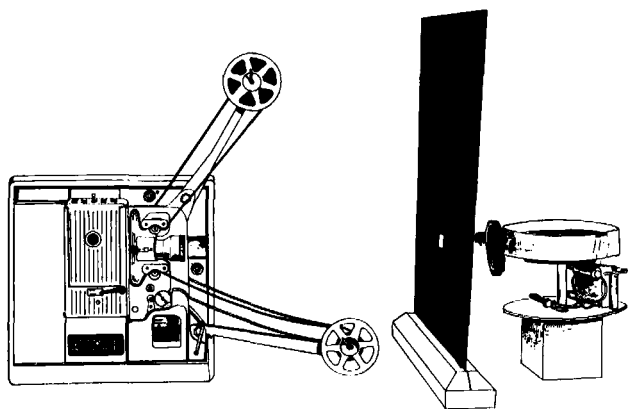


Fig. 2. Projection of test film onto drum wrapped with recording paper.

- 3.1.1 The projector shall be positioned approximately 24 in. from the drum, with both horizontal lines focused on the recording paper and through a  $\frac{1}{8}$  in. vertical slit positioned directly in front of the recording drum.
- 3.1.2 The vertical slit shall transmit very small, dotlike sections of both horizontal lines representing the image characteristics of the reference camera and the high-speed camera.
- 3.1.3 The recorder shall rotate horizontally one revolution per 100 ft of projection (or 6 in. per minute), as shown in Fig. 3.

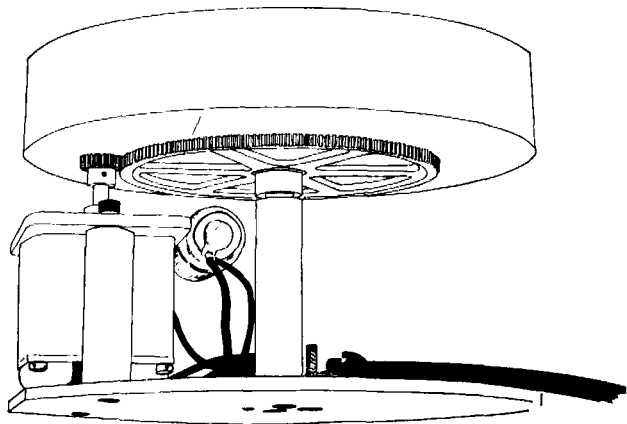


Fig. 3. Driving mechanism of recording drum.

3.2 *Vertical Unsteadiness.* The photographic record shall be processed conventionally and the camera evaluated for vertical unsteadiness.

3.3 *Horizontal unsteadiness* shall be recorded in a similar manner by rotating the normally vertical lines  $90^\circ$  optically with a mirror or dove prism, as shown in Fig. 4.

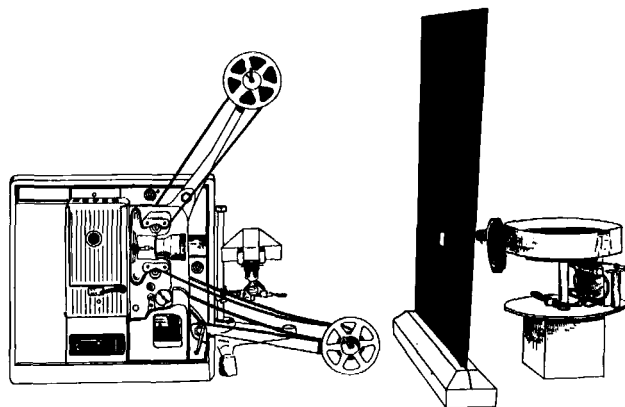


Fig. 4. Position of dove prism for recording horizontal unsteadiness.

#### 4. Characteristics of Recording

- 4.1 *Differential* in amplitude between the traces indicates relative image unsteadiness of the high-speed camera, since projector unsteadiness is cancelled.
- 4.2 *Comparisons.* The permanent recording should be compared with previous recordings to determine the degree of degradation.

#### 5. Calculation of Image Displacement

Actual image displacement on the high-speed camera film shall be calculated by determining the magnification factor between the focal plane of the projector and the recording paper. When using a 2-in. projection lens 2 ft from the recording drum, the magnification is approximately 10X. A typical trace is shown in Fig. 5.

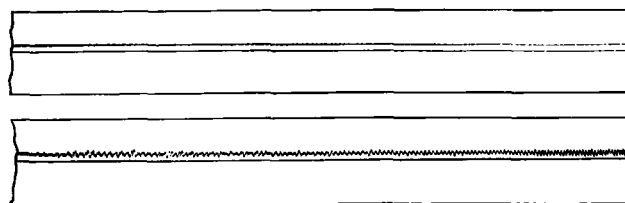


Fig. 5. Typical trace shown on recording paper.