SMPTE RECOMMENDED PRACTICE — RP 116-1983

Dimensions of Photographic Control and Data Record on 35-mm Motion-Picture Camera Negatives

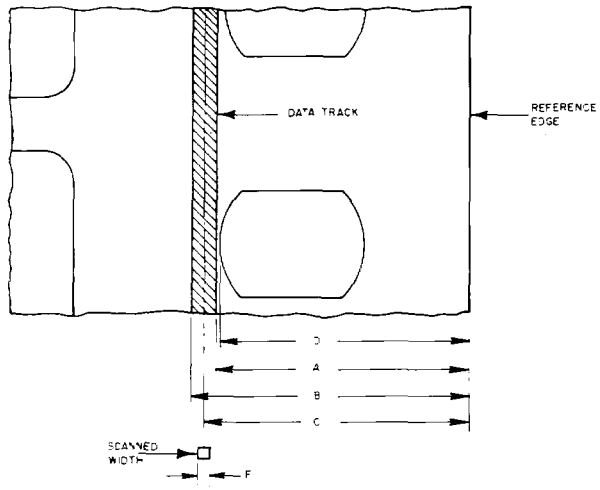
1. *Scope*

This practice specifies the lateral location and dimensions of a photographic control and data record on 35-mm motion-picture camera negatives, the width scanned by the control and data recorder and reproducer, the camera aperture, and the reproducer spectral sensitivity.

2. *Data Record*

2.1 The dimensions and lateral location of the control and data record shall be as specified in the figure and table.

2.2 The recording and reproducing slit images shall be positioned at an angle of 90° ± 1° to the reference edge of the film.



Dimensions	Inches	Millimeters
A	0.191 ± 0.001	4.85 ± 0.03
B	0.211 ± 0.001	5.36 ± 0.03
C	0.201 ± 0.001	5.11 ± 0.03
D	0.189 ref	4.80 ref
F	0.005 ± 0.001	0.13 ± 0.03

Approved 15 June 1983

3. *Camera Aperture*

Cameras intended for recording a control and data record must have a modified aperture which positions the picture edge next to the sound record area at 0.214 in (5.44 mm) minimum from the reference edge of the film. This is Dimension D as specified in American National Standard Dimensions of 35 mm Motion-Picture Camera Aperture Images, ANSI PH22.59-1974 (R1981).

4. *Reproducer Spectral Sensitivity*

The peak or maximum response of the combination of the control and data track reproducer, *light source, filter, and receptor shall* be at 550 + 130 — 0 nanometers. The integrated response of this combination to all wavelengths greater than 800 nm shall be less than 5 percent of the total integrated response measured from 400 to 800 nm.

Appendix

(The Appendix is not a part of this SMPTE Recommended Practice, but is included for information purposes only.)

The spectral response specified in Section 4 is intended to ensure that the control and data track will be adequately reproduced whether the track image is formed of dyes, silver, or dyes and silver. Restriction of the infrared response is necessary because the dyes used in conventional color motion-picture films do not absorb infrared light effectively. Since dirt and scratches on the film will absorb infrared light, restriction of the infrared response will improve the signal-to-noise ratio of the system.

SMPTE RECOMMENDED PRACTICE — RP 112-1983

Reference Carrier Frequencies, Pre-emphasis Characteristic and Audio and Control Signals for ½-in Type H Helical-Scan Video Tape Cassette Recording

1. *Scope*

This practice specifies the reference frequencies for deviation of the frequency modulated carrier and the associated video pre-emphasis characteristic for ½-in Type H helical-scan video tape cassette recording of 525-line monochrome and NTSC color television signals. In addition, the characteristics of the audio and control signals are specified.

2. *Video Signal*

2.1 FM Recording of Luminance Component

2.1.1 Low-Pass Filter for Separation. Luminance component of the composite video signal is separated by a low-pass filter, the attenuation of which is more than 40 dB at the chrominance subcarrier frequency.

2.1.2 Modulation Characteristics. FM carrier frequencies corresponding to reference video levels are as shown below:

Reference white level (100 IRE Units)	4.4 ± 0.1 MHz
Reference sync level (—40 IRE Units)	3.4 ± 0.1 MHz
Frequency deviation, white to sync (140 IRE Units)	1.0 ± 0.1 MHz

2.1.3 Pre-emphasis and Clipping. Luminance signal shall be emphasized and clipped prior to frequency modulation. The characteristics of the pre-emphasis network are shown in Fig. 1 and clipping levels are as shown below:

White clipping level
160 + 10 —5 percent from sync tip
Dark clipping level
—40 ± 10 percent from sync tip

2.1.4 High-Pass Filter for FM Signal. The amplitude/frequency response of the FM high-pass filter shall be in accordance with Fig. 2.

2.1.5 Recording Level. The recording current shall have the optimum value over the entire FM carrier bandwidth. (Optimum record current is the recording current value which is necessary to obtain the maximum output signal level during playback.)

2.2 NTSC Chrominance Signal Recording

2.2.1 Recording Method. The chrominance signal is separated from the NTSC color video signal through a band-pass filter with its bandwidth of 3.58 ± 0.50 MHz at the —3 dB points. The separated chrominance component shall then be down-converted so that its new carrier frequency equals 40 times the horizontal scanning rate (629.371 Hz). The recording process is illustrated in Fig. 3.

2.2.2 Phase Rotation of Chrominance Signal. The chrominance signal shall have phase shift at every horizontal sync as follows:

Video 1 track +90°
Video 2 track —90°

Phase shift should be completed prior to the color burst. Dimensions for the video tracks are specified in American National Standard For Video Recording — ½-in Type H Cassette — Records, ANSI V98.32M-1983.

2.2.3 Amplitude Modulation Recording. The chrominance signal is recorded as an amplitude-modulated carrier. Its record level should be adjusted so that the playback level is 7 to 10 dB below the level corresponding to the saturation recorded signal.

2.2.4 Color Burst Amplitude Doubler. Amplitude of color burst is increased by 6.0 ± 0.5 dB prior to recording.

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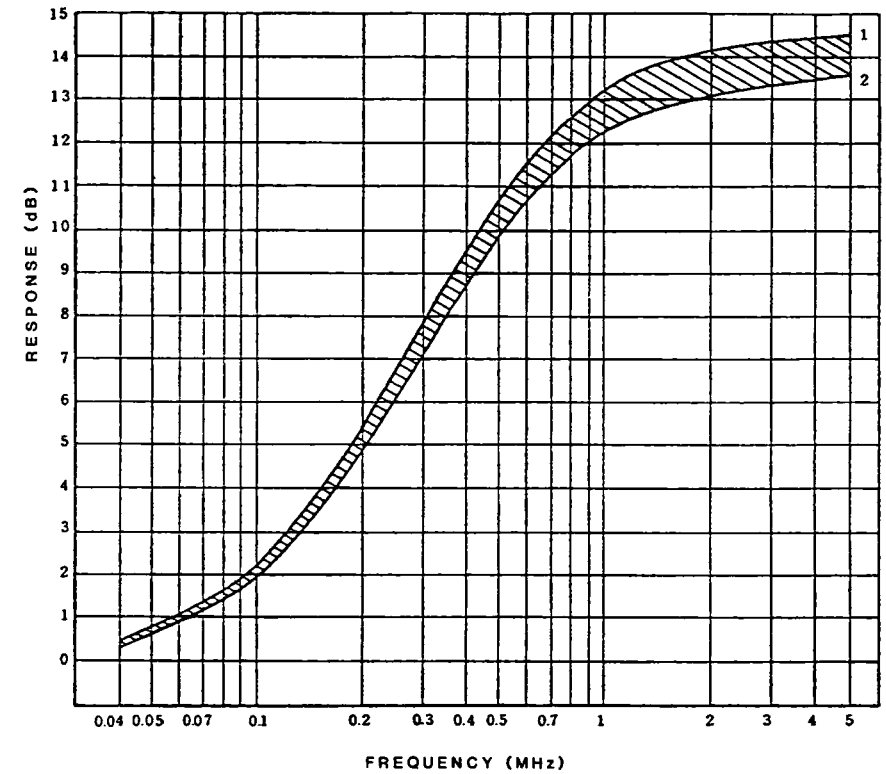
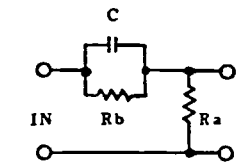




$$T = C \cdot Rb = 1.3\ \mu\text{sec} \pm 0.05\ \mu\text{sec} \quad \begin{cases} T = 1.35\ \mu\text{sec} \\ X = 4.3 \end{cases} \quad \ldots\ldots(1)$$

$$X = \frac{Rb}{Ra} = 4 \pm 0.3 \quad \begin{cases} T = 1.25\ \mu\text{sec} \\ X = 3.7 \end{cases} \quad \ldots\ldots(2)$$

Fig. 1
Pre-emphasis Characteristic of Luminance Signal

3. *Audio Signal*

Reproducing de-emphasis shall be in accordance with Fig. 4. The time constants are 120 and 3180 μs.

4. *Control Signal*

4.1 Recording Signal. A positive-going edge of recorded control pulse signal shall be in coincidence with the start of video 1 track scan as shown in Fig. 5. (See ANSI V98.32M-1983.)

4.2 Polarity. The control signal shall be recorded so that the rotating drum side of the control head poles would be north polarized when the pulse signal is positive.

4.3 Recording Current Waveform. The rise time shall be less than 200 μs.

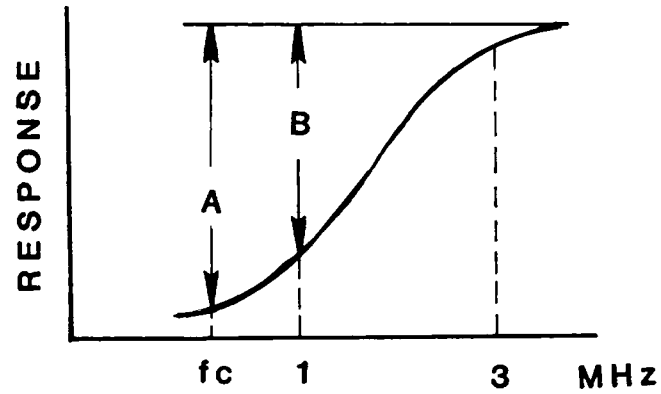


Fig. 2
FM High-Pass Filter

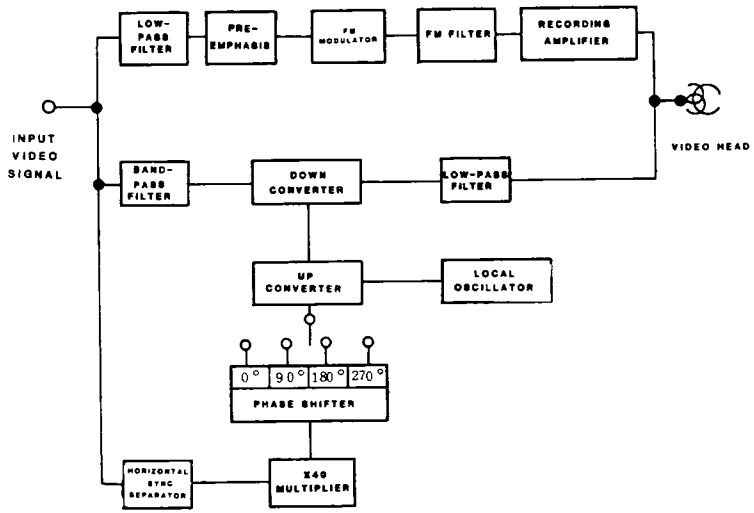
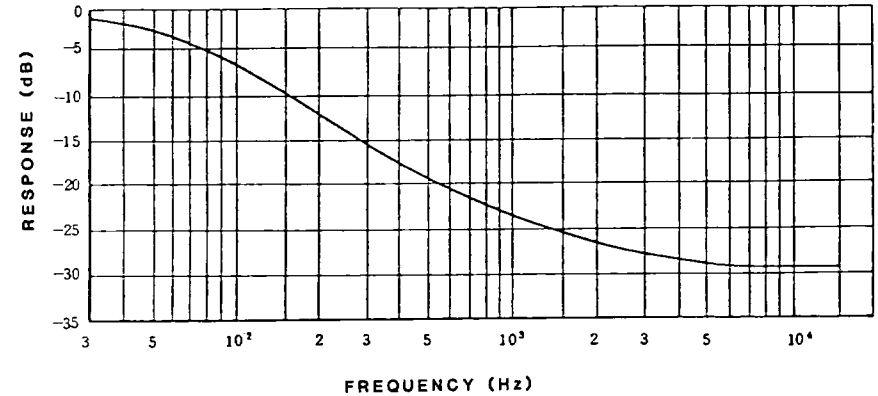


Fig. 3
Recording Color Video Signal



Frequency (Hz)	Response (dB)
30	— 1.3
40	— 2.1
50	— 3.0
70	— 4.7
100	— 7.0
200	— 12.2
300	— 15.5
400	— 17.7
500	— 19.5
600	— 20.8
700	— 21.9
800	— 22.7
1000	— 24.1
1500	— 26.0
2000	— 26.9
3000	— 27.7
4000	— 28.0
5000	— 28.2
7000	— 28.3
10 000	— 28.4
15 000	— 28.4

Fig. 4
Reproducing De-emphasis of Audio Signal