

SMPTÉ RECOMMENDED PRACTICE

RP 6-1985

Recorded Carrier Frequencies and Pre-emphasis Characteristics for 2-in Quadruplex Video Magnetic Tape Recording for 525-Line/60-Field Television Systems



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1. Scope

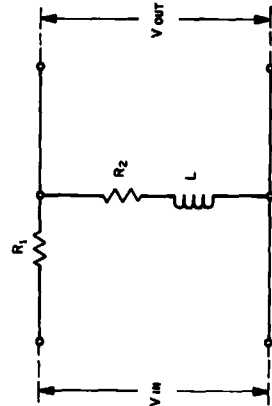
1.1 This practice specifies parameters of the recorded information essential to the interchange of 2-in quadruplex video magnetic tape recording of monochrome and NTSC color signals for 525-line/60-field television systems. The parameters include video pre-emphasis characteristics and recorded carrier frequencies for all recording practices and video pilot specifications for practice SHBP.

1.2 Practices defined are:

- 1.2.1 Practice SHBP. This practice is suitable for color and monochrome signals. A video pilot signal is added to the recorded information to be used as a playback reference.
- 1.2.2 Practice HB. This practice is suitable for color and monochrome signals.
- 1.2.3 Practice LBM. This practice is suitable only for monochrome signals. It is considered to be obsolete and is included for reference purposes only.
- 1.2.4 Practice LBC. This practice is suitable for color and monochrome signals. (It is considered to be obsolete and is included for reference purposes only.)

3. Pre-emphasis

3.1 Pre-emphasis is defined by the frequency and phase characteristics of a network as shown in the figure. Accuracy of pre-emphasis time constants shall be maintained by including source and load impedances (not shown) in the calculation of circuit values.



Video Pre-emphasis Characteristic Circuit

$$\tau_1 = \frac{L}{R_1 + R_2}$$

$$\tau_2 = \frac{L}{R_2}$$

$$\frac{V_{out}}{V_{in}} = \left(\frac{j\omega\tau_2 + 1}{j\omega\tau_1 + 1} \right) \left(\frac{\tau_1}{\tau_2} \right)$$

$$\omega = 2\pi f$$

2. Recording Chain

2.1 A recording chain consisting of elements specified by this practice will contain, in order of signal flow, the following elements:

- 2.1.1 Video processing and signal generating circuits used only for practice SHBP.
- 2.1.2 A video pre-emphasis network.
- 2.1.3 A linear frequency modulator having constant deviation with respect to the modulating video frequencies.
- 2.1.4 An amplifier of the frequency-modulated carrier to provide alternating-current drive to the pole tips.

4. Recorded Carrier Frequencies

Carrier frequencies corresponding to reference video levels shall be as indicated in the table below:

	SHBP	HB	LBM	LBC
Peak White (MHz)	10.7	10.0	6.8	6.5
Blanking (MHz)	9.9	7.9	5.0	5.79
Sync Tip (MHz)	9.58	7.06	4.28	5.5
Tolerance (MHz)	± 0.02 ± 0.05 ± 0.05 ± 0.05 ± 0.05			

5. Head Current

5.1 The amplitude vs frequency characteristic of the recording current applied to the head shall produce a recording such that reproduced video, with no reproduce equalization changes, is the same as the following reference recording.

5.2 The reference recording is made with a flat amplitude-vs-frequency current drive to a head with metal pole tips.

6. Practice SHBP

6.1 All recordings made using this practice shall have a video pilot signal added to the video information prior to the frequency-modulation process.

6.2 Monochrome television signals shall have a pseudo-burst added to sync tip and horizontal blanking interval for the purpose of identification and pilot generation. (See Sec. 6.6.)

6.3 Unless otherwise indicated, all parameter specifications show relationships among pilot, burst, and video information prior to pre-emphasis. The point of insertion of generated signals into the video information path is not specified.

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3.2 Time constant values specifying the pre-emphasis network for each practice are listed in the table below:

	SHBP	HB	LBM	LBC
Time constant τ_1 (nanoseconds)	383.3	240	26.4	31.7
Time constant τ_2 (nanoseconds)	2500	600	132	240
Tolerance	± 0.25% Not speci-fied Not speci-fied Not speci-fied			

6.4 Pilot Band Protection Filtering. In order to ensure that no spurious components from the input video signal are recorded in the pilot frequency band, a band-reject filter shall be placed in the video signal path prior to addition of the pilot signal. Attenuation of all components within ± 100 kHz of the pilot frequency shall be 16 dB or greater.

6.5 Pilot specifications:

6.5.1 The pilot frequency shall be exactly 1.5 times the color subcarrier or pseudo-burst frequency of the video information to be recorded.

6.5.2 The pilot phase shall be such that positive- or negative-going zero crossings of pilot coincide with the negative-going zero crossings of the R-Y color component signal. Tolerance of zero crossing coincidence shall be ± 2.3 nanoseconds for color signals. Phase and tolerances are unspecified for monochrome signals.

6.5.3 Amplitude of the pilot is defined by a measurement in the FM spectrum at the output of the modulator to reduce tolerance errors associated with the input video signal.

With no chroma signal present (except burst), the amplitudes of the first order pilot sidebands shall be 24 dB ± 0.2 dB below the amplitude of the unmodulated carrier. (This pilot amplitude corresponds to a peak-to-peak video pilot level equal to 1/6 of the sync tip to peak white level of a full amplitude video signal.)

6.5.4 The amplitude of any spurious components shall be at least 30 dB below the pilot level.

6.6 Pseudo-burst specifications for monochrome signal only.

6.6.1 The pseudo burst shall start 0.4 μs ± 0.2 μs after the 50-percent amplitude point of the leading edge of sync. The start of pseudo burst is defined by the zero crossing that precedes the first half cycle of subcarrier that is 50-percent or greater of the pseudo-burst amplitude.

6.6.2 The pseudo burst shall end 7.8 μs ± 0.4 μs after the 50-percent amplitude point of the leading edge of sync. The end of the pseudo burst is defined by the zero crossing that follows the last half cycle of subcarrier that is 50-percent or greater of pseudo-burst amplitude.

6.6.3 The 10 to 90 percent rise and fall times of pseudo-burst envelope shall be less than 0.5 μs. The leading edge of sync, 10 to 90 percent points, shall contain no burst.

6.6.4 The amplitude of the pseudo burst shall be 40 IRE units \pm 4 IRE units.

6.6.5 The amplitude of any spurious components shall be at least 33 dB below the pseudo-burst level. DC components produced by insertion of the

pseudo burst into the video signal shall be less than \pm 1 IRE unit.

6.6.6 The frequency of the pseudo burst shall be $3.58 \text{ MHz} \pm 0.02 \text{ MHz}$. Rate of change of the frequency of the pseudo burst shall be less than 1 kHz per second.

SMPT E RECOMMENDED PRACTICE

RP 47-1985



Electronic Method of Dropout Detection and Counting

1. Scope

This practice specifies the method of electronic dropout detection and counting for 2-in quadruplex video magnetic tape recordings made in accordance with Practice HB of SMPT E Recommended Practice RP 6-1985. Recorded Carrier Frequencies and Pre-emphasis Characteristics for 2-in Quadruplex Video Magnetic Tape Recording for 325-Line/60 Field Television Systems.

2. Dropout Definition

A momentary random reduction of the recovered frequency modulated (RF) playback signal that is sufficient to cause a substantial impairment in the video output signal of a quadruplex video tape recorder.

3. Specifications

The dropout to be detected shall have an RF signal reduction of 16 dB or more for 5 microseconds or longer.

4. Detection

4.1 Recorder Alignment

4.1.1 The tip penetration shall be 2 mils for record and playback (This penetration may not correspond to that specified in SMPT E Recommended Practices.)

4.1.2 The tip projection shall be between 1.5 and 2.5 mils (See Appendix A1).

4.1.3 Equalization shall be in accord with Practice HB of SMPT E Recommended Practice RP 6, producing a flat input-to-output response.

4.1.4 The recovered playback signal prior to limiting shall not vary more than 2 dB over four head passes, including amplitude variations due to geometrical error.

4.2 Test Signal. Any test signal may be used: color bars or sync and set up are preferred (See Appendix A2).

4.3 Electronic Dropout Counter. The dropout counter shall be capable of utilizing the above-mentioned signals and specifications.

4.4 Operation. The dropout counter shall be interfaced into the playback system of the video recorder so that a standard amplitude of the unlimited RF signal can be applied to the level detector of the dropout counter. This point is usually the video head switcher output.

Appendix

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

A.1. The range of tip projection from 1.3 to 2.5 mils permits versatility in the heads used for dropout testing and is adequate in most cases. For the highest degree of repeatability, heads with a tip projection of 2.0 to 2.2 mils should be used.

gives the best repeatability and minimizes machine-to-machine variables.

A.3. A detailed report by the SMPT E Tapes and Reels Subcommittee is presented in "Dropout Considerations in Video Tape Recordings and Proposed Recommendations." *Jour. SMPT E*, 81: 401-403, May 1972.

A.2. For dropout evaluation, the sync and set up signal