RP 6-1994
Revision of RP 6-1985

SMPTE RECOMMENDED PRACTICE

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

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 preemphasis 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 obsolescent 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 obsolescent and is included for reference purposes only.)

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 preemphasis 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.

3 Preemphasis

3.1 Preemphasis is defined by the frequency and phase characteristics of a network as shown in figure 1. Accuracy of preemphasis time constants shall be maintained by including source and load impedances (not shown) in the calculation of circuit values.

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

	SHBP	HB	LBM	LBC
Time constant τ_1 (ns)	333.3	240	26.4	31.7
Time constant τ_2 (ns)	2500	600	132	240
Tolerance	± 0.25%	Not specified	Not specified	Not specified

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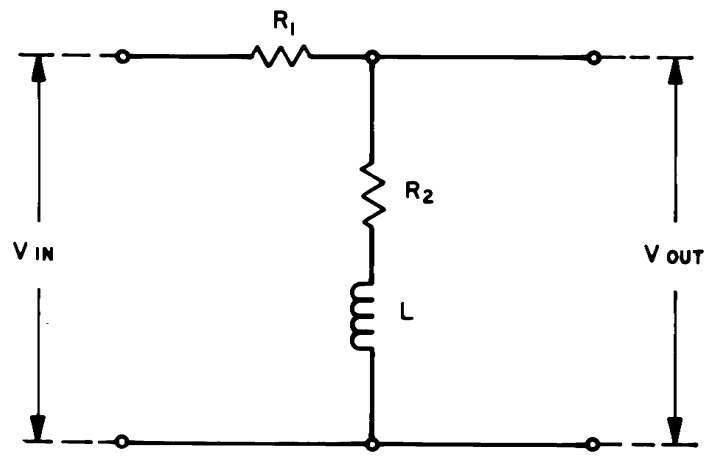

$$\tau_1 = \frac{L}{R_1 + R_2}$$

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

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

$$\omega = 2\pi f$$

Figure 1 – Video preemphasis characteristic circuit

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

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 6.6).

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

6.4 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 ns 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 amplitude 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 ⅙ 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% 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% or greater of the pseudo-burst amplitude.

6.6.2 The pseudo burst shall end 7.8 µs ± 0.4 µs after the 50% 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% or greater of pseudo-burst amplitude.

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

6.6.4 The amplitude of the pseudo burst shall be 40 IRE units ± 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 ± 1 IRE unit.

6.6.6 The frequency of the pseudo burst shall be 3.58 MHz ± 0.02 MHz. Rate of change of the frequency of the pseudo burst shall be less than 1 kHz per second.