RP 84-1996
Revision of RP 84-1992

SMPTE RECOMMENDED PRACTICE

Reference Carrier Frequencies and Preemphasis Characteristics for 1-in Type B Helical-Scan Television Analog Recording

1 Scope

This practice specifies the video reference frequencies to which the carrier is deviated and the associated video preemphasis for 1-in type B helical-scan television tape recording. (The video deemphasis to be used in reproduction is specified indirectly by requiring a flat input-to-output video response along with a specified preemphasis in recording.)

2 Electrical parameters

2.1 Modulation system

The video information shall be recorded in the form of an rf signal frequency modulated by the video signal. The instantaneous frequencies of the rf signal shall vary linearly with respect to the amplitude of the modulating signal.

2.2 Characteristic frequencies

The instantaneous frequencies of the rf signal corresponding to characteristic levels of the video signal shall be as specified in table 1.

2.3 Preemphasis and deemphasis

The time constants of the video emphasis networks shall be as defined in table 2.

Table 1 – Video levels

Video levels	MHz
Synchronization tip	7.06 nom
Blanking	7.90 ± 0.05
Peak white	10.00 ± 0.05

Table 2 – Time constants

Time constants	ns
t_1	240
t_2	600

Annex A (informative)
Transmission characteristics of the signal chain

The transmission characteristics of the signal chain of a television tape recorder may be defined by one of two methods which are in agreement:

A.1 Definition of the recording chain

For reference purposes, an ideal recording chain is defined as consisting of (a) a modulator having a flat frequency response with respect to the modulating video frequencies, (b) an rf section having a transfer characteristic that produces constant amplitude alternating magnetic flux in the video head pole tips when driven by an alternating signal from the modulator having constant amplitude, and (c) a video preemphasis network inserted before the modulation stage.

The preemphasis is then defined by the frequency and phase characteristic of a network, such as that shown in figure 1, fed from a low-impedance source and feeding a high-impedance load.

The ideal recording chain described above is intended to be taken as a basis for producing reference tapes to be used for the alignment of television tape recorders.

When using present-day recording chains, the following points should be considered:

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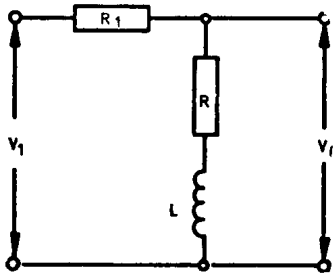
An approximately linear relationship exists between the magnetic flux emanating from the video head pole tips and the rf current flowing through the video head windings.



$$t_1 = \frac{L}{R_1 + R}$$

$$t_2 = \frac{L}{R}$$

$$\frac{V_0}{V_1} = \frac{jwt_2 + 1\ t_1}{jwt_1 + 1\ t_2}$$

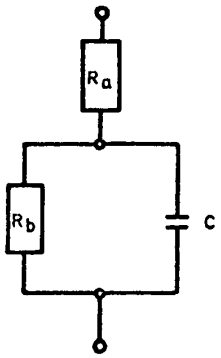
Figure A.1 – Preemphasis

The amplitude of the recording current in the video heads should be such as to produce maximum rf output in replay at the frequency corresponding to mid-gray level.

A.2 Definition of the playback chain

The deemphasis characteristic is introduced following the demodulator in the signal playback circuitry. (To obtain a flat input-to-output video response over the passband of interest, a complementary video preemphasis characteristic is introduced ahead of the frequency modulator stage during recording.)

The video deemphasis curves are defined as the normalized impedance of the two-terminal network, as shown in figure A.2 where t_1 and t_2 are time constants in microseconds, R is resistance in ohms, and C is capacitance in microfarads.



$$t_1 = \frac{R_a R_b}{R_a + R_b} C$$

$$t_2 = R_b C$$

Figure A.2 – Deemphasis

The deemphasis network is introduced following the demodulator in the signal playback circuitry. (To obtain a flat input-to-output video response over the passband of interest, a complementary preemphasis network is introduced ahead of the frequency modulator stage during recording.)

This definition assumes that all preemphasis and deemphasis are placed in the video portion of the signal path and that the response of the rf portion of the signal path is flat over the passband of interest. Ideally, the magnitude of the remanent flux on a recorded tape should be independent of frequency over the frequency range of interest, but since there is no practical way of measuring it, the most practical approach is to ensure that the recording current in the video heads is independent of frequency over the passband of interest.

Annex B (informative)
Bibliography

ANSI/SMPTE 15M-1992, Television Analog Recording — 1-in Type B Helical Scan — Basic System Parameters