

Comments on Laurence C. Goody's "A Time-Weighted Graticule for the 2T Sine-Squared Pulse"

By HANS SCHMID

In the above paper published in the *Journal* in June 1976 (pages 397 to 400), L. C. Goody proposes that the familiar K -factor graticule for the $2T$ pulse shape (K_{2T}) be changed to a P -factor graticule. In the conclusion of his paper, Goody states that "Using the latest information on time weighting for the 525-line NTSC television system . . . a straight-line graticule for the $2T$ pulse can be defined with dimensions significantly different from the scaled version of the British graticule" and ". . . the departure is significant enough to warrant the consideration of this proposal as a North American standard." Figure 1 shows the two graticules superimposed together with a distorted $2T$ pulse, so that the reader can form an opinion about this proposal. The reader will note that the differences between both graticules are on the order of an oscilloscope trace thickness (noise-free at that). I do not consider these differences significant enough from a practical point of view to warrant the creation of double standards.

Incidentally, the $2T$ pulse shape graticule (whether P - or K -factor) is unnecessary for overshoots (as seen in Fig. 1) or undershoots, because the respective pulse-to-bar ratios for the $2T$

pulse are more effective. There remains only $2T$ pulse ringing as the reason for the graticule, but a ringing $2T$ pulse indicates a malfunction so severe that it is immaterial whether, for example, the ringing has a P -factor of 1.6% or a K -factor of 2%. So why have a $2T$ pulse graticule at all?

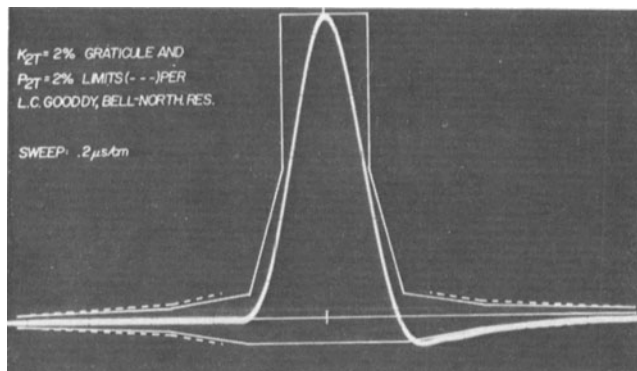


Fig. 1. Comparison of graticules for standard $2T$ K -factor and proposed $2T$ P -factor.

Letter submitted on 17 February 1977 by Hans Schmid (address given above).

Rebuttal to the Above Letter

The following points are made for the adoption of a 'P' Graticule and for the use of a $2T$ Pulse, in regard to Mr. Schmid's comments.

Trace Thickness

For a given reference distortion, e.g. 2%, the difference between the P and K graticules is about 1.4 IRE scale units maximum (i.e. from 6.6 IRE to 8 IRE at the point of maximum difference). This is an increase of 21% in the graticule dimension at a most critical point, a result which is not insignificant. In regard to trace thickness, this involves an error in performance estimation which is statistically based on the graticule dimension. If the graticule dimension is increased by a given amount, the effect of trace thickness will be shifted to the new dimension and statistically the

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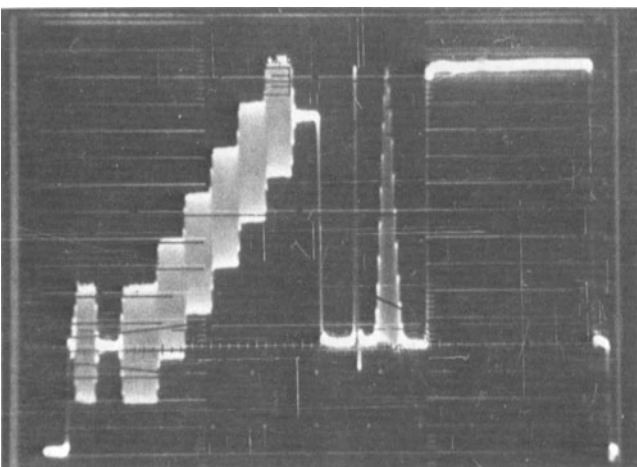


Fig. 1. Composite Signal No. 1, based on original Satellite Technical and Operational Committee — Television (STOC-TV) format according to CCIR provisions. (See C. A. Stoccos' paper on STOC-TV Guidelines for Waveform Graticules, *Journal*, Nov. 1976.)

By LAURENCE C. GOODY

increased tolerance will be realized. Taking Mr. Schmid's argument one step further, it could be argued that a tolerance based on subjective measurements should be increased to account for trace thickness and perhaps even noise. Such arguments are not valid because trace thickness effects on the waveform distortion are taken into consideration when the distortion is evaluated.

Necessity of $2T$ Pulse Shape Measurements

Mr. Schmid's arguments that ringing preceding or following a $2T$ pulse should not occur are based on the assumption that the circuit which generates such ringing must contain unwanted deviations in gain and delay vs frequency response or even cutoff characteristics below 4.0 MHz. As a broadcaster dealing with circuits with relatively wideband characteristics, this is a valid conclusion. The major portion of video transmission circuits do not, however, exhibit wideband characteristics. Satellite and terrestrial microwave circuits are not unrestricted in bandwidth

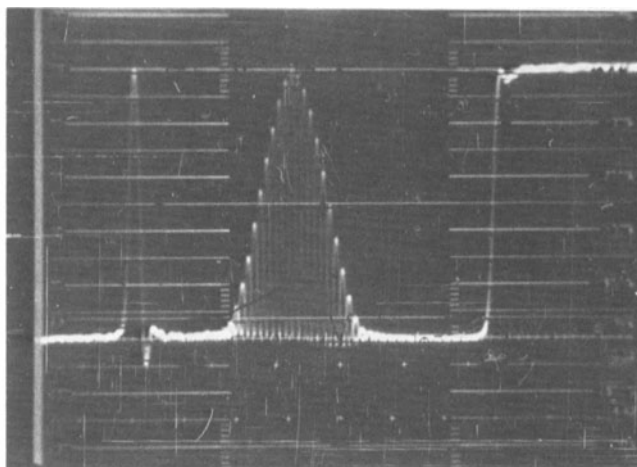


Fig. 2. Time expansion of the three signals of interest (central part of the waveform of Fig. 1), showing $2T$ pulse, $12\frac{1}{2}T$ modulated pulse, and leading edge of line bar or T step. Note ringing on the trailing edge of the $2T$ pulse and on the leading edge at the top of the T step signal.