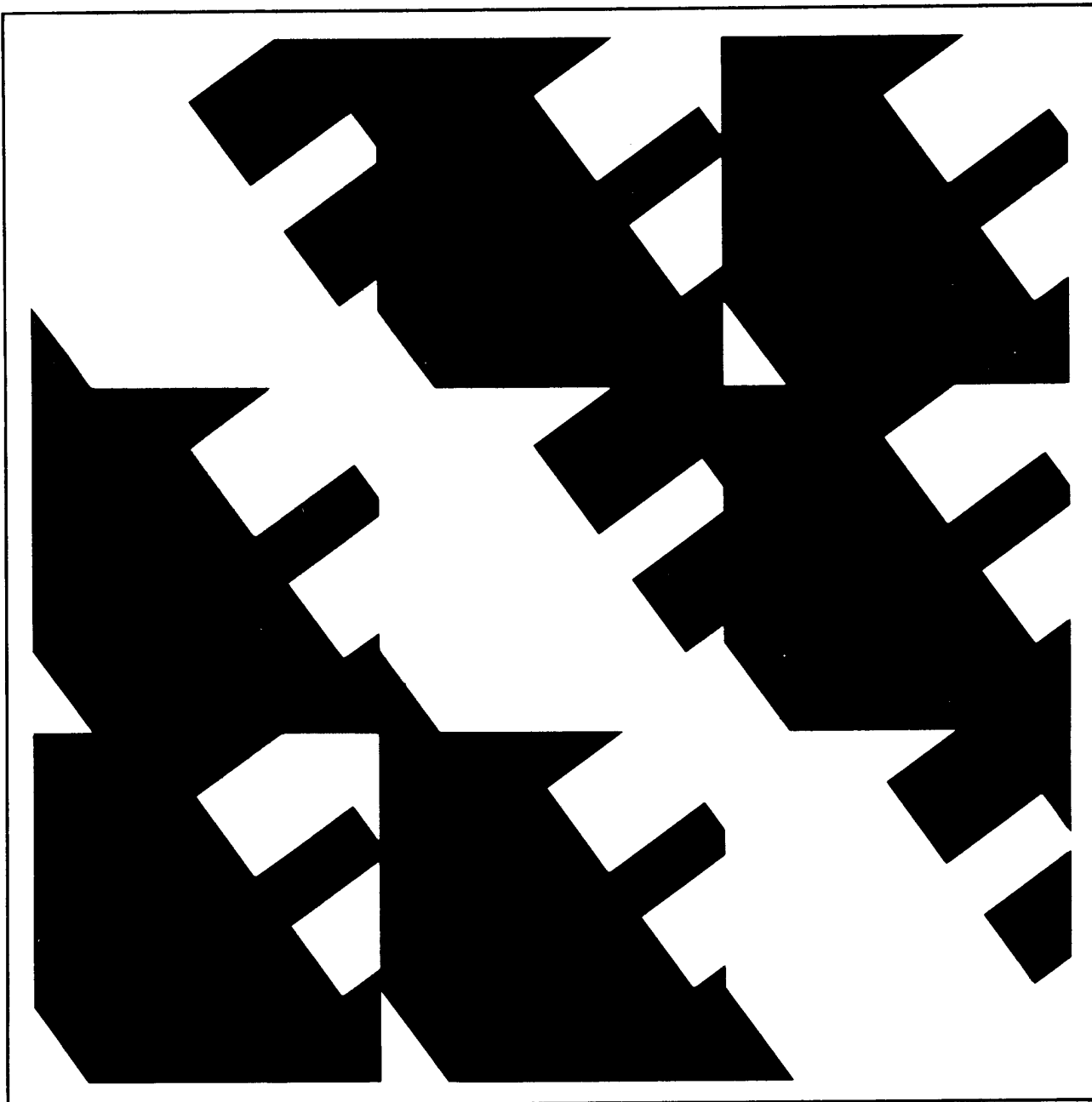


IEEE Standards on Television: Measurement of Differential Gain and Differential Phase

ANSI/IEEE Std 206-1960



Published by The Institute of Electrical and Electronics Engineers, Inc. 345 East 47th Street, New York, NY 10017, USA

SH01255

An American National Standard

IEEE Standards on Television: Measurement of Differential Gain and Differential Phase

COMMITTEE PERSONNEL

Subcommittee on Video Signal Transmission Methods of Measurement

J. M. Barstow 1954-1955	F. J. Herr 1958-1959	E. B. Pores 1955-1959
K. B. Benson 1954-1957	H. P. Kelly 1955-1957	E. H. Schreiber 1954-1959
R. I. Brown 1955-1957	H. Mate 1956-1959	L. Staschover 1955-1959
R. D. Chipp 1954-1958	L. R. Moffett 1954-1955	D. Taylor 1958-1959
M. H. Diehl 1955-1958	R. M. Morris 1954-1959	B. F. Tybout 1954-1955
S. Doba, Jr. 1954-1955	K. E. Mullenger 1954-1955	J. W. Wentworth 1956-1959
A. B. Ettlinger 1957-1959	R. S. O'Brien 1954-1957	W. B. Whalley 1957-1959
M. E. Gloystein 1954-1957	J. R. Popkin-Curman 1956-1959	J. F. Wiggins 1958-1959

Committee on Video Techniques

G. L. FREDENDALL, <i>Chairman</i> 1959-	J. M. BARSTOW, <i>Vice-Chairman</i> 1959-
S. DOBA, JR., <i>Chairman</i> 1957-1959	G. L. FREDENDALL, <i>Vice-Chairman</i> 1957-1959
I. C. Abrahams 1957-1959	V. J. Duke 1957-1959
S. W. Athey 1957-1959	J. R. Hefele 1957-1959
A. J. Baracket 1957-1958	J. L. Jones 1957-1959
J. M. Barstow 1957-1959	R. T. Petruzzelli 1957-1958
J. H. Battison 1957-1958	W. J. Poch 1957-1959
E. E. Benham 1957-1958	
K. B. Benson 1957-1959	
E. M. Coan 1957-1958	
L. B. Davis 1957-1958	
S. Deutsch 1958-1959	
S. Doba, Jr. 1959-	

Ad Hoc Subcommittee for the Review of the Proposed Standard on the Measurement of Differential Gain and Differential Phase, 1959

W. T. WINTRINGHAM, *Chairman*
W. F. Bailey
J. M. Barstow
S. Doba, Jr.
J. G. Kreer, Jr.
C. H. Page

Standards Committee 1959-1960

R. F. SHEA, <i>Chairman</i>	C. H. PAGE, <i>Vice-Chairman</i>
J. G. KREER, JR., <i>Vice-Chairman</i>	L. G. CUMMING, <i>Vice-Chairman</i>
J. Avins	P. Mertz
W. F. Bailey	H. I. Metz
M. W. Baldwin, Jr.	H. R. Minno
J. T. Bangert	E. Mittelman
W. R. Bennett	L. H. Montgomery, Jr.
J. G. Brainerd	G. A. Morton
D. R. Brown	R. C. Moyer
P. S. Carter	J. H. Mulligan, Jr.
A. G. Clavier	A. A. Oliner
S. Doba, Jr.	M. L. Phillips
P. Elias	R. L. Pritchard
G. A. Espersen	P. A. Redhead
R. J. Farber	R. Serrell
D. G. Fink	W. A. Shipman
G. L. Fredendall	H. R. Terhune
E. A. Gerber	E. Weber
A. B. Glenn	R. B. Wilcox
V. M. Graham	W. T. Wintringham
R. A. Hackbusch	
R. T. Haviland	
A. G. Jensen	
R. W. Johnston	
I. Kerney	
A. E. Kerwien	
G. S. Ley	
Wayne Mason	
D. E. Maxwell	

Measurements Coordinator

J. G. Kreer, Jr.

Approved June 11, 1959
Reaffirmed September 20, 1972
Reaffirmed June 16, 1978
IEEE Standards Board

Approved December 4, 1961
Reaffirmed November 10, 1969
Reaffirmed July 18, 1979
American National Standards Institute

© Copyright 1960 by
The Institute of Electrical and Electronics Engineers, Inc

1. INTRODUCTION

1.1 Definitions

THIS Standard describes a method for measuring differential gain and differential phase in equipment transmitting either monochrome or color television signals. The characteristics to be measured are defined as follows.

Differential Gain.¹ In a video transmission system, the difference between (a) the ratio of the output amplitudes of a small, high-frequency sinewave signal at two stated levels of a low-frequency signal on which it is superimposed, and (b) unity.

Note 1: Differential gain may be expressed in per cent by multiplying the above difference by 100.

Note 2: Differential gain may be expressed in db by multiplying the common logarithm of the ratio described in (a) above by 20.

Note 3: In this definition, level means a specified position on an amplitude scale applied to a signal waveform.

Note 4: The low- and high-frequency signals must be specified. For purposes of this standard these signals will be as they are afterwards described in this paper.

Differential Phase.² In a video transmission system, the difference in output phase of a small, high-frequency sinewave signal at two stated levels of a low-frequency signal on which it is superimposed.

Note 1: Notes 3 and 4 applied to Differential Gain above, apply also to Differential Phase.

1.2 Scope of Application

The primary application of this Standard is intended to be in the field of routine operational and maintenance tests, where rapid interpretation and communication of test results is necessary or desirable. The basic techniques described here are also applicable to laboratory measurements, proof-of-performance tests, and detailed maintenance procedures.

2. ANALYSIS OF THE MEASUREMENT PROBLEM

2.1 Characteristics of Television Signals

Certain significant characteristics of both monochrome and color television signals are illustrated by Fig. 1. Color television signals differ from monochrome signals, shown in Fig. 1(a), primarily by the addition of two other signal components, which are shown separately in Fig. 1(b). These are:

¹ This is a revision of the definition of differential gain in "IRE Standards on Television: Definitions of Television Signal Measurement Terms, 1955 (55 IRE 23. S1)," Proc. IRE, vol. 43, pp. 619-622; May, 1955.

² This is a revision of the definition of differential phase in "IRE Standards on Television: Definitions of Television Signal Measurement Terms, 1955 (55 IRE 23. S1)," Proc. IRE, vol. 43, pp. 619-622; May, 1955.

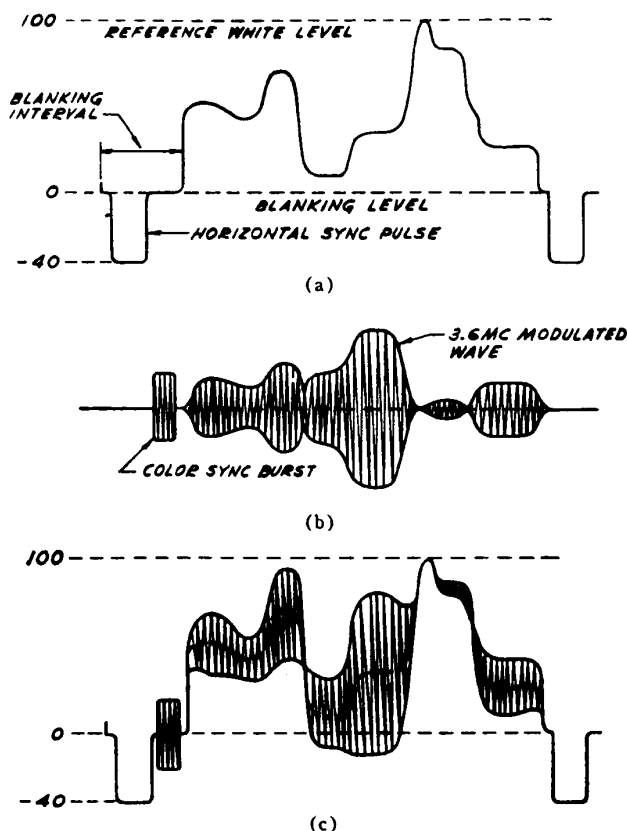


Fig. 1—Waveforms of typical television signals. (a) Luminance or monochrome signal. (b) Chrominance and color sync signals. (c) Composite-color signal.

2.1.1—A burst of about 9 cycles at a subcarrier frequency of approximately 3.6 mc transmitted during the blanking interval following each horizontal sync pulse except during the equalizing pulse and vertical sync pulse intervals. This serves as a phase reference for subcarrier regenerators in color monitors, receivers and test equipment.

2.1.2—A chrominance signal, consisting of the sidebands of the phase-and-amplitude-modulated subcarrier, transmitted during active scanning time. To a first degree of approximation, the phase of the chrominance signal controls dominant wavelength in the reproduced picture, while the amplitude controls purity.

The composite color signal, consisting of the sum of the various components, appears as shown in Fig. 1(c). Note that the effective axis of the chrominance signal may vary through the luminance range since this axis coincides with the level of the monochrome signal component.

2.2 Effects of Differential Gain and Differential Phase

A necessary condition for distortion-free transmission of a color signal is that neither the amplitude nor the phase of the chrominance signal be altered as a function of the level of the associated luminance signal, and that the luminance signal be unaffected by its own level.