REPORT 476-1

COLORIMETRIC STANDARDS IN COLOUR TELEVISION

(Question 1/11)

(1970-1974)

1. In 1953, when the NTSC colour television system was adopted for transmission in the United States of America, the colorimetry of the system was based on three specific primary colours and a reference white. The coordinates of the primaries were: *

Red:	$x = 0.67$	$y = 0.33$
Green:	$x = 0.21$	$y = 0.71$
Blue:	$x = 0.14$	$y = 0.08$

The reference white chosen was standard

White C:	$x = 0.310$	$y = 0.316$

2. When the PAL and SECAM systems were first designed, they were based upon the colorimetric standards of NTSC. As a result, the coefficients used for determining the signals involved in coding PAL and SECAM (the luminance signal and the colour-difference signals) were directly based upon the chromaticities given in § 1.

3. However, it has been recognized that there have been continuing changes in the chromaticities of the phosphors used in making colour picture tubes over the years, and that those actually used do not have the same primary chromaticities as those which served to establish the coding of systems. Nevertheless, in all systems the coefficients used for determining the signals involved in coding (the luminance signal and the colour-difference signals) are directly based upon the chromaticities and white point given in § 1.

4. Several solutions have been proposed or implemented, in different countries, for compensating or correcting the effect upon colour reproduction of this difference between the receiver characteristics and the standards given in § 1.

5. The United States of America continues to base the colorimetry of its transmissions upon NTSC primaries whose chromaticities and white point are defined in § 1. Studio monitors are adjusted to a reference white of D_{65}. However, because picture tubes do not yet contain phosphors whose chromaticities are the same (or very nearly the same) as those defined in § 1, approximate corrections, involving operations upon the electrical signals, are made in receivers in order to achieve satisfactory colour reproduction. Further, to achieve greater consistency in colour transmissions, the United States of America recommends that the picture monitors used in studios should also contain correction circuits which cause the colour reproduction to approximate to that which would have been obtained if the picture tubes used in the monitors had contained phosphors with the primary chromaticities shown in § 1.

6. In Japan, the colorimetry of the system is based upon the primary chromaticities and white point given in § 1. Studio monitors are adjusted to a white point of D, 9300 K.

7. In the 625-line PAL and SECAM systems, the colorimetry is now based upon the three specific primary colours: **

Red:	$x = 0.64$	$y = 0.33$
Green:	$x = 0.29$	$y = 0.60$
Blue:	$x = 0.15$	$y = 0.06$

and reference white D_{65} **.

These chromaticities are closely representative of the phosphors incorporated in the picture tubes of many of the receivers and studio monitors used in those countries that have adopted the 625-line PAL and SECAM systems. Thus, in such receivers and monitors, no electrical corrections are required in order to achieve good colour reproduction. Further, in order to improve the consistency of colour reproduction, when the television receiver is switched from one programme to another, it has been suggested that the chromaticities of the phosphors used in studio monitors should be standardized. The assessment is based upon a method of tolerance which takes account of both the primary chromaticities of the tube phosphors and the effect of their combined chromaticities upon the reproduction of a typical skin tone.

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* The coordinates are given in the CIE system (1931).

** These coordinates are given in the CIE system (1931). For 625-line SECAM systems, it is provisionally permitted (for existing equipment), to use the chromaticity coordinates and reference white given in § 1.

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CCIR Documents

[1966-69]: XI/136 (United Kingdom); XI/194 (Netherlands).

[1970-74]: 11/1 (EBU); 11/63 (USA); 11/229 (EBU); 11/237 (USA); 11/264 (United Kingdom).

REPORT 801-4

THE PRESENT STATE OF HIGH-DEFINITION TELEVISION

(Question 27/11, Study Programmes 27A/11 and 27B/11)

(1974-1978-1982-1986-1990)

PART 1 - INTRODUCTION

Television is one of the most widely available means of communication. Large screen, high-definition television is the target for the next step in television, and may bring about a new standard system which will be common throughout the world. It will perform the same function better and will also provide a powerful tool for other uses. These will include film production for the cinema and for television, printing, medical applications and scientific work.

The move to HDTV production offers new opportunities to simplify programme exchange and to bring together the production of programmes for television and for the cinema. A single standard would be beneficial to producers, as well as broadcasting organizations.

Figure 1, which is based on a suggestion by Prof. Krivocheev, is a simplified schematic of the expected future environment for HDTV, as it relates to broadcasting. The central element is the HDTV production centre, whose activities in programme production and programme exchange will be similar to those of today's production centre. While most of these activities will be in high definition, provision must be made to work with a number of other contribution formats, such as current 525- or 625-line television in analogue or digital forms, film, etc. The introduction of high-definition television offers a new opportunity to simplify the exchanges of both recorded and live programme material.

A feature of HDTV production is the capability to produce films suitable for projection in the cinema. Thus a high-quality video-to-film transfer process will be particularly important for the production centre.

HDTV signals from the production centre will pass to the delivery network at the broadcast distribution interface. Delivery to the viewer may use one of a number of possible methods including terrestrial broadcasting (e.g., VHF or UHF), satellites, cables (e.g., coaxial or fibre - optical fibres are considered to be one of the most promising transmission media for wideband HDTV) or pre-recorded media (e.g., cassettes or disks). Each has particular characteristics and, as a consequence, the HDTV signal must be converted into a form appropriate for each delivery method. This will be accomplished in an encoder or converter between the HDTV signal at the broadcast interface and the delivery interface.