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DÜSSELDORF
21.5-1.6 1990
CCIR

XVIIth PLENARY ASSEMBLY
DÜSSELDORF, 1990

INTERNATIONAL TELECOMMUNICATION UNION

REPORTS OF THE CCIR, 1990

(ALSO DECISIONS)

ANNEX TO VOLUME XI – PART 1

BROADCASTING SERVICE (TELEVISION)

CCIR INTERNATIONAL RADIO CONSULTATIVE COMMITTEE

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92-61-04291-0

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BROADCASTING SERVICE (TELEVISION)

(Study Group 11)

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SECTION 11A: CHARACTERISTICS OF SYSTEMS FOR MONOCHROME AND COLOUR TELEVISION

REPORT 624-4

CHARACTERISTICS OF TELEVISION SYSTEMS

(Question 1/11)

(1974-1978-1982-1986-1990)

The following Tables, given for information purposes, contain details of a number of different television systems in use at the time of the XVIIth Plenary Assembly of the CCIR, Düsseldorf, 1990.

A list of countries and geographical areas, and the television systems used, are given in Annex I.

Specifications of the SECAM IV colour television system, which is still under consideration, are given in Annex II.

Information on the results of the comparative laboratory tests carried out on the various colour television systems in the period 1963-1966 by broadcasting authorities, administrations and industrial organizations, together with the main parameters of systems may be found in Reports 406 and 407, XIIth Plenary Assembly, New Delhi, 1970.

All television systems listed in this Report employ an aspect ratio of the picture display (width/height) of 4/3, a scanning sequence from left to right and from top to bottom and an interlace ratio of 2/1, resulting in a picture (frame) frequency of half the field frequency. All systems are capable of operating independently of the power supply frequency.

TABLE I – *Basic characteristics of video and synchronizing signals*

Item	Caracteristics		System								
			M	N ([1])	B, G	H	I	D, K	K1	L	Rec. 472 ([2])
1	Number of lines per picture (frame)		525	625	625	625	625	625	625	625	625
2	Field frequency, nominal value (fields/second) ([3])		60 (59.94)	50	50	50	50	50	50	50	50
3	Line frequency f_H and tolerance when operated non-synchronously (Hz) ([3]) ([4])		15 750 (15 734.264 ± 0.0003%)	15 625 ± 0.15% (± 0.00014%)	15 625 ([5]) ± 0.02% (± 0.0001%)	15 625 ± 0.02% (± 0.0001%)	15 625 ± 0.00002% ([6])	15 625 ([5]) ± 0.02% (± 0.0001%)	15 625 ± 0.02% (± 0.0001%)	15 625 ± 0.02% (± 0.0001%)	15 625 ± 0.02% (± 0.0001%)
3 *(a)*	Maximum variation rate of line frequency valid for monochrome transmission (%/s) ([7]) ([8])		0.15		0.05	0.05	0.05	0.05	0.05	0.05	
4 ([10])	Nominal and peak levels of the composite video signal (see Fig. 1) (%)	blanking level (reference level)	0	0	0	0	0	0	0	0	
		peak-white-level	100	100	100	100	100	100	100	100	
		synchronizing level	−40	−40 (−43)	−43	−43	−43	−43	−43	−43	
		difference between black and blanking level	7.5 ± 2.5 ([9])	7.5 ± 2.5 (0)	0	0	0	0-7	0 (colour) 0-7 (mono.)	0 (colour) 0-7 (mono.)	$0\ ^{+5}_{-0}$
		peak level including chrominance signal	120		133 ([11])		133	115 ([12])	115 ([12])	124 ([12])	

TABLE I *(continued)*

Item	Caracteristics	System								
		M	N ([1])	B, G	H	I	D, K	K1	L	Rec. 472 ([2])
5	Assumed gamma of display device for which pre-correction of monochrome signal is made	2.2	2.2 (2.8)	2.8 ([13])						([14])
6	Nominal video bandwidth (MHz)	4.2	4.2	5	5	5.5	6	6	6	5.0 or 5.5 or 6.0
7	Line synchronization	see Table I-1								
8	Field synchronization	see Table I-2								

([1]) The values in brackets apply to the combination N/PAL used in Argentina.

([2]) Figures are given for comparison.

([3]) Figures in brackets are valid for colour transmission.

([4]) In order to take full advantage of precision offset when the interfering carrier falls in the sideband of the upper video range (greater than 2 MHz) of the wanted signal a line-frequency stability of at least 2×10^{-7} is necessary.

([5]) The exact value of the tolerance for line frequency when the reference of synchronism is being changed requires further study.

([6]) When the reference of synchronism is being changed, this may be relaxed to 15 625 ± 0.02%.

([7]) These values are not valid when the reference of synchronism is being changed.

([8]) Further study is required to define maximum variation rate of line frequency valid for colour transmission. In the UK and Japan this is 0.1 Hz/s /CCIR, 1982-86b; CCIR, 1986-90/.

([9]) In Japan values $0\ ^{+\ 10}_{-\ \ 0}$ are used.

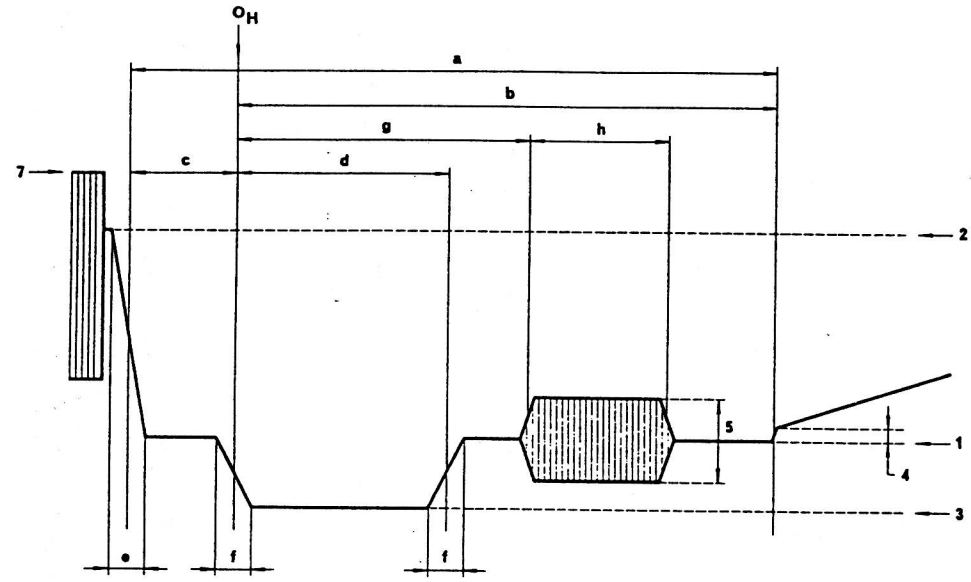
([10]) It is also customary to define certain signal levels in 625-line systems, as follows:
Synchronizing level = 0
Blanking level = 30
Peak white-level = 100
For this scale, the peak level including chrominance signal for system D, K/SECAM equals 110.7. (See [CCIR, 1982-86a].) According to common studio operating practices, peak white-level = 100 corresponds to 1.0 V measured across a matched 75 ohms termination.

([11]) Value applies to PAL signals.

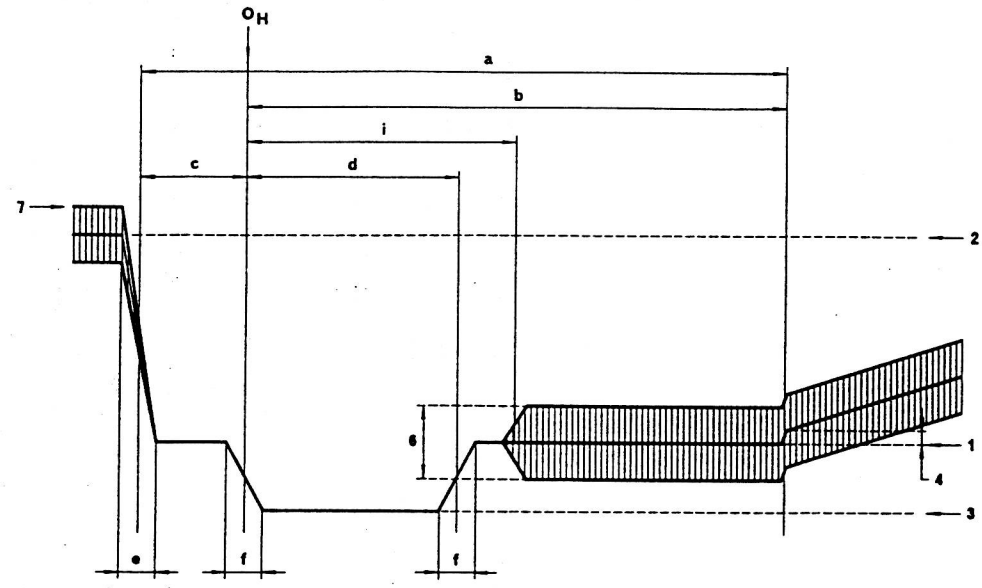
([12]) Values apply to SECAM signals. For programme exchange the value is 115.

([13]) Assumed value for overall gamma approximately 1.2. The gamma of the picture tube is defined as the slope of the curve giving the logarithm of the luminance reproduced as a function of the logarithm of the video signal voltage when the brightness control of the receiver is set so as to make this curve as straight as possible in a luminance range corresponding to a contrast of at least 1/40.

([14]) In Recommendation 472, a gamma value for the picture signal is given as approximately 0.4.



(a) NTSC and PAL systems



(b) SECAM system

FIGURE 1 – *Levels in the composite signal and details of line-synchronizing signals*

1 blanking level
2 peak white-level
3 synchronizing level
4 difference between black and blanking levels
5 peak-to-peak value of burst
6 peak-to-peak value of colour sub-carrier
7 peak level including chrominance signal

TABLE I-1 – *Details of line synchronizing signals (see Fig. 1)*
Durations (measured between half-amplitude points on the appropriate edges) for various systems

Symbol	Characteristics	M [1]	N [2]	B, G, H, I, D, K, K1, L (see also Rec. 472)
H	Nominal line period (μs)	63.492 (63.5555)	64	64 [3]
a	Line-blanking interval (μs)	10.2 to 11.4 [8] (10.9 ± 0.2)	10.24 to 11.52 (12 ± 0.3)	12 ± 0.3 [4]
b	Interval between time datum (O_H) and back edge of line-blanking pulse (μs)	8.9 to 10.3 (9.2 to 10.3)	8.96 to 10.24 (10.5)	10.5 [5]
c	Front porch (μs)	1.27 to 2.54 (1.27 to 2.22)	1.28 to 2.56 (1.5 ± 0.3)	1.5 ± 0.3 [4] [6]
d	Synchronizing pulse (μs)	4.19 to 5.71 [8] (4.7 ± 0.1)	4.22 to 5.76 (4.7 ± 0.2)	4.7 ± 0.2
e	Build-up time (10 to 90%) of the edges of the line-blanking pulse (μs)	⩽ 0.64 (⩽ 0.48)	⩽ 0.64 (0.3 ± 0.1)	0.3 ± 0.1
f	Build-up time (10 to 90%) of the edges of the line-synchronizing pulses (μs)	⩽ 0.25	⩽ 0.25 (0.2 ± 0.1)	0.2 ± 0.1 [7]

[1] Values in brackets apply to M/NTSC.

[2] The values in brackets apply to the combination N/PAL used in Argentina.

[3] In France, and the countries of the OIRT, the tolerance for the instantaneous line period value is ± 0.032 μs.

[4] In 625-line countries using Teletext System B as specified in the Annex to Recommendation 653 to reduce the possibilities of data loss, the following values are preferred [CCIR, 1982-86c and d]:

a) line blanking interval: $12^{+0.0}_{-0.3}$ μs

c) front porch: $1.5^{+0.3}_{-0.0}$ μs

[5] Average calculated value, for information. For system I the value is 10.4 [CCIR, 1982-86b].

[6] For system I, the values are 1.65 ± 0.1.

[7] For system I, the values are 0.25 ± 0.05.

[8] In Japan, the values in brackets apply to studio facilities.

FIGURE 2 – *Details of field-synchronizing waveforms*

FIGURES 2-1 – *Diagrams applicable to all systems except M*

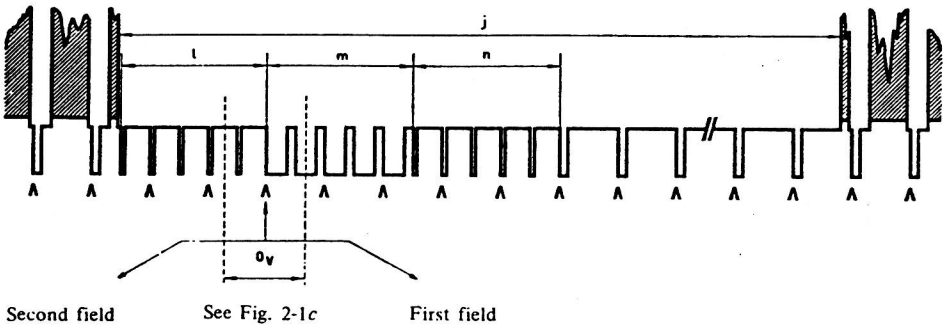


FIGURE 2-1*a* – *Signal at beginning of each first field*

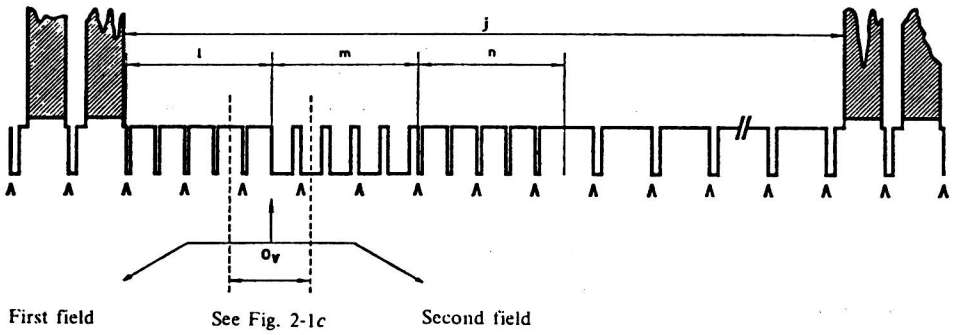
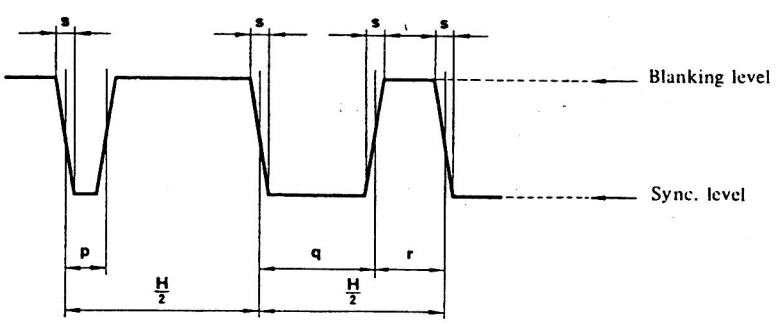


FIGURE 2-1*b* – *Signal at beginning of each second field*

Note 1. – ΛΛΛ indicates an unbroken sequence of edges of line-synchronizing pulses throughout the field-blanking period.

Note 2. – At the beginning of each first field, the edge of the field-synchronizing pulse, O_V, coincides with the edge of a line-synchronizing pulse if *l* is an *odd* number of half-line periods as shown.

Note 3. – At the beginning of each second field, the edge of the field-synchronizing pulse, O_V, falls midway between the edges of two line-synchronizing pulses if *l* is an *odd* number of half-line periods as shown.



(The durations are measured between the half-amplitude points on the appropriate edges)

FIGURE 2-1*c* – *Details of equalizing and synchronizing pulses*

FIGURE 2 – *Details of field-synchronizing waveforms*

FIGURES 2-2 – *Diagrams applicable to system M*

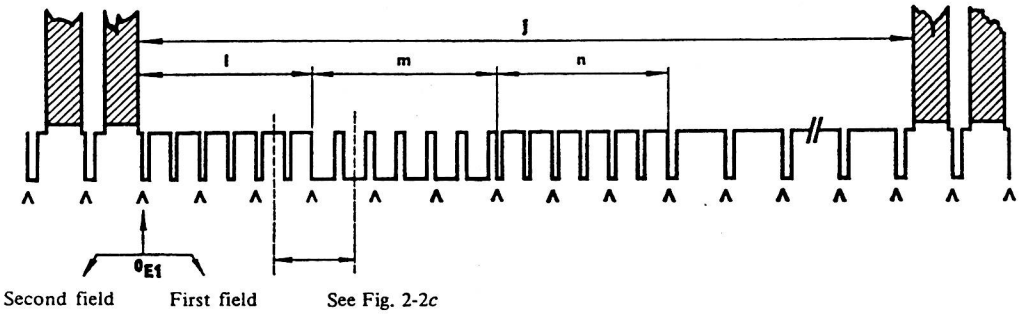


FIGURE 2-2*a* – *Signal at beginning of each first field*

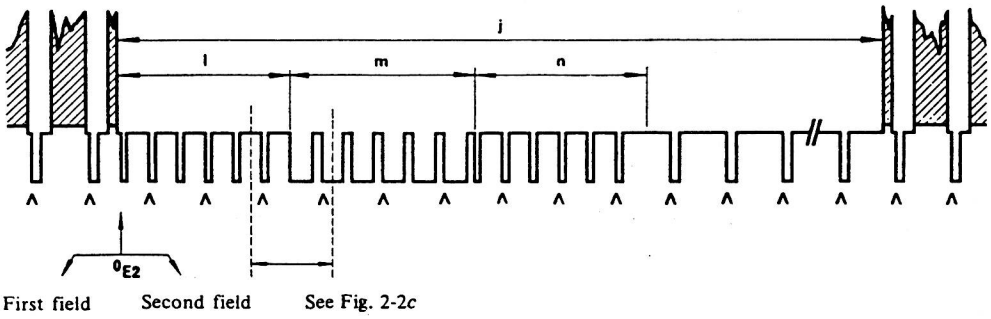


FIGURE 2-2*b* – *Signal at beginning of each second field*

Note 1. – Λ indicates an unbroken sequence of edges of line-synchronizing pulses throughout the field-blanking period.

Note 2. – Field-one line numbers start with the first equalizing pulse in Field 1, designated O_{E1} in Fig. 2-2*a*.

Note 3. – Field-two line numbers start with the second equalizing pulse in Field 2, one-half-line period after O_{E2} in Fig. 2-3*b*.

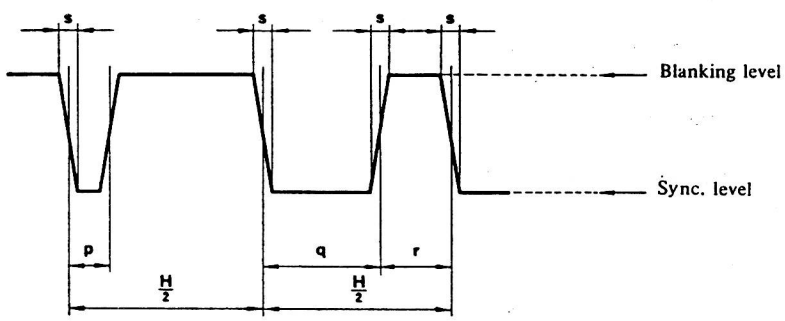


FIGURE 2-2*c* – *Details of equalizing and synchronizing pulses*

TABLE I-2 – *Details of field synchronizing signals (see Fig. 2)*

Duration (measured between half-amplitude points on the appropriate edges) for various systems

Symbol	Characteristics	M	N (1)	B, G, H, I, D, K, K1, L (see also Rec. 472)
v	Field period (ms)	16.667 (2) (16.6833)	20	20
j	Field-blanking interval (for *H* and *a*, see Table I-1)	(19 to 21) *H* + *a* (3)	(19 to 25) *H* + *a* (25 *H* + *a*)	25 *H* + *a*
j' (4)	Build-up time (10 to 90%) of the edges of field-blanking pulses (μs)	⩽ 6.35	⩽ 6.35 (0.3 ± 0.1)	0.3 ± 0.1
k (4)	Interval between front edge of field-blanking interval and front edge of first equalizing pulse (μs)	(1.5 ± 0.1)		3 ± 2 (5) (systems B/SECAM, G/SECAM, D, K, K1 and L only; no ref. in Rec. 472)
l	Duration of first sequence of equalizing pulses	3 *H*	3 *H*. (2.5 *H*)	2.5 *H*
m	Duration of sequence of synchronizing pulses	3 *H*	3 *H* (2.5 *H*)	2.5 *H*
n	Duration of second sequence of equalizing pulses	3 *H*	3 *H* (2.5 *H*)	2.5 *H*
p	Duration of equalizing pulse (μs)	(2.3 ± 0.1) (6)	2.30 to 2.56 (2.35 ± 0.1)	2.35 ± 0.1
q	Duration of field-synchronizing pulse (μs)	27.1 (nominal value)	26.52 to 28.16 (27.3)	27.3 (7) (nominal value)
r	Interval between field-synchronizing pulse (μs)	(4.7 ± 0.1)	3.84 to 5.63 (4.7 ± 0.2)	4.7 ± 0.2 (8)
s	Build-up time (10 to 90%) of synchronizing and equalizing pulses (μs)	⩽ 0.25	⩽ 0.25 (0.2 ± 0.1)	0.2 ± 0.1 (9)

(1) The values in brackets apply to the combination N/PAL used in Argentina.

(2) The value in brackets applies to the M/NTSC system.

(3) The value $0.07\ v\ {}^{+\ 0.012\ v}_{-\ 0}$ is used in Japan

where v is the field period.

(4) Not indicated in the diagram.

(5) This value is to be specified more precisely at a later date.

(6) The following specification is also applied in Japan: an equalizing pulse has 0.45 to 0.5 times the area of a line-synchronizing pulse.

(7) For system I: 27.3 ± 0.1.

(8) For system I: 4.7 ± 0.1.

(9) For system I: 0.25 ± 0.05.