ROHDE&SCHWARZ
BROADCASTING DIVISION

Signals produced by

CCVS + Component Generator SAF

and

CCVS Generator SFF

Standard M/NTSC and M/PAL

Signals which have a valid component structure but do not comply with composite format in M/NTSC and M/PAL are not generated by the SFF. These signals are marked with a " * ".

gr - 09.07.01
Subject to change

ROHDE&SCHWARZ
BROADCASTING DIVISION

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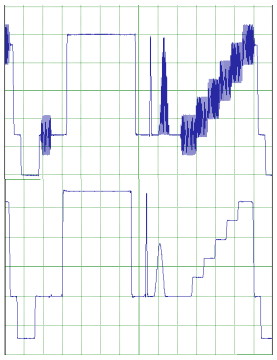
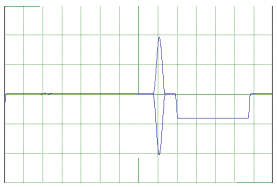
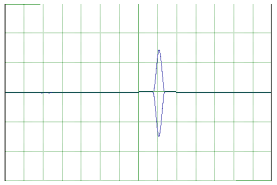
1.2 Signal Description







ITS 1
NTC7 COMPOSITE SIGNAL

CCVS

Description:
The luminance bar is followed by a 2T pulse (HAD 250 ns) and a modulated 12.5T pulse (HAD 1.56 µs) all with amplitudes of 100 IRE. The 5 steps reach an amplitude of 90 IRE . The superposed subcarrier has
U_{PP} = 40 IRE at φ = 180°.

Y

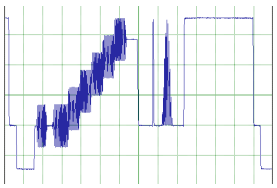
Applications:
This signal combination is mainly used as test line for automatic measurement and monitoring of TV signals. The luminance bar also serves as amplitude reference for automatic level control.
The following distortions can be measured using the NTC7 COMP. signal:
Luminance bar:

Cb

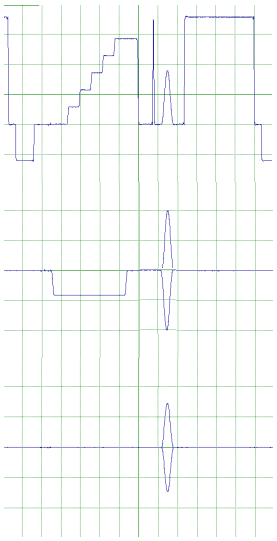
level errors, line time waveform distortion,overshoot and rounding
2T pulse:
amplitude errors, group delay indicator and reflection
12.5T pulse:
amplitude, intermodulation and delay differences

Cr

between luminance and chrominance
Modulated staircase:
differential gain and phase, line time nonlinearity



CCVS



Y

Cb

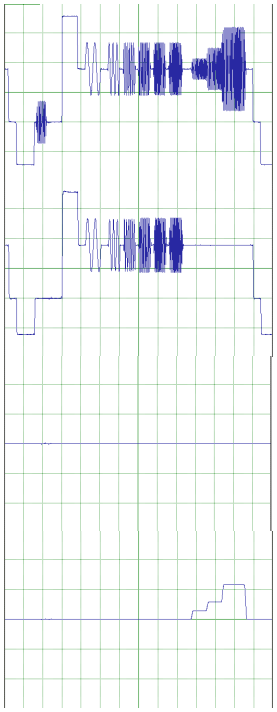
Cr

ITS 2
NTC7 COMBINED SIGNAL

Description:
This signal consists of a 100 IRE luminance bar, a multiburst with U_{PP} = 50 IRE and a modulated pedestal superimposed on a 50 IRE grey level. The luminance bar has a risetime of 125 ns and a width of 4µs. Six individual sine wave bursts compose the multiburst. The frequencies are: 0.5, 1, 2, 3, 3.579 and 4.2 MHz.

Applications:
Irregularities of the amplitude vs frequency response in the time domain can be determined with the aid of the multiburst. The modulated pedestal permits chrominance/luminance intermodulationand subcarrier phase and amplitude to be determined

ITS 3
FCC COMPOSITE SIGNAL



CCVS

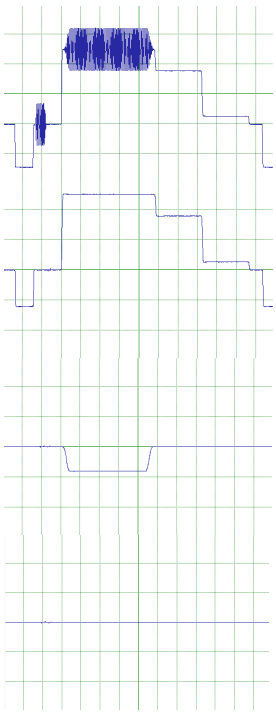
Y

Cb

Cr

Description:
This signal consists of
- a 5 step staircase modulated with the subcarrier, the maximum luminance amplitude being 80 IRE
- a 2T pulse
- a modulated 12.5T pulse and
- a 100 IRE luminance bar.

Applications:
5 step staircase with superimposed subcarrier:
determination of the differential phase and gain of the subcarrier
2T pulse:
testing amplitude, echoing and group delay response of the transmission link
12.5 T pulse:
precise assessment of the amplitude and group delay response in the region of the subcarrier referred to the lower frequency range of the luminance signal
100 IRE luminance bar:
measurement of pulse distortions at low frequencies by evaluating the pulse top and is used as the white level reference



CCVS

Y

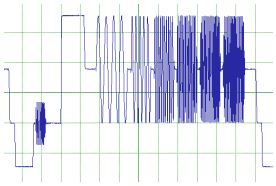
Cb

Cr

ITS4
VIRS (Vertical Interval Reference Signal)

Description:
This is a reference signal which is generally inserted into the line 19 of the first field. The signal components are:
- 70 IRE luminance bar modulated with the subcarrier of U_{PP} = 40 IRE at φ = 180° followed by a
- 50 IRE grey pedestal and ends with a
- 7.5 IRE setup.

Applications:
The signal is used as the reference for the chrominance to correct phase and amplitude errors on the transmission link.

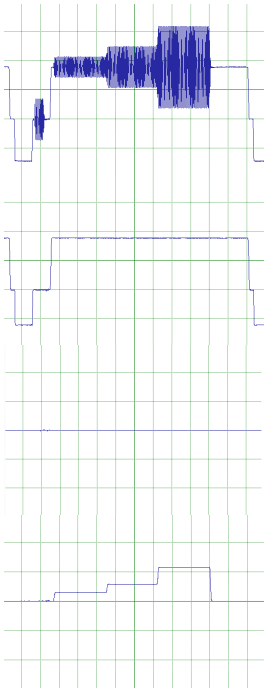


CCVS

ITS 5
MULTIBURST

Description:
A 100 IRE reference pulse is followed by six sine wave bursts of 0.5, 1, 2, 3, 3.579 and 4.2 MHz. The amplitude of the bursts is U_{PP} = 100 IRE on a 50 IRE luminance pedestal.

Applications:
Irregularities of the amplitude vs frequency response in the time domain can be determined with the aid of the multiburst.



CCVS

Y

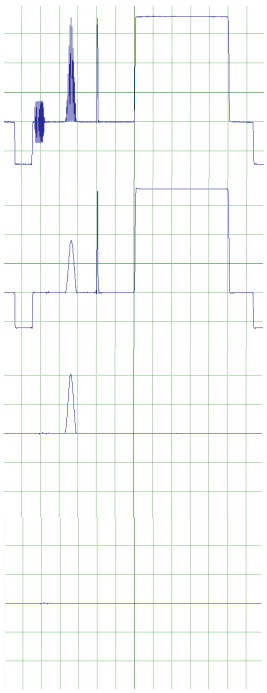
Cb

Cr

ITS 6
MODULATED PEDESTAL

Description:
The subcarrier burst of different amplitudes is superimposed on a 50 IRE grey pedestal. The subcarrier´s phase is φ = 90° and the levels are U_{PP} = 20, 40 and 80 IRE .

Applications:
- determination of chrominance/luminance intermodulation
- subcarrier phase error as function of the SC level
- subcarrier amplitude error as function of the SC level



ITS 7
CCVS **12.5T 2T BAR**

Description:
The 12.5T pulse (HAD 1.56 µs) is followed by a 2T pulse (HAD 250 ns) and the luminance bar all with amplitudes of 100 IRE.
The subcarrier has U_{PP} = 100 IRE at φ = 180°.

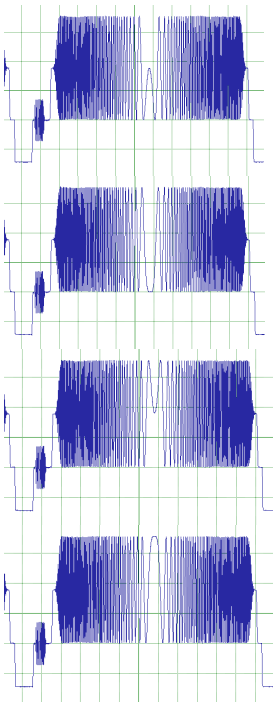
Y

Applications:
12.5 T pulse:
precise assessment of the amplitude and group delay response in the region of the subcarrier referred to the lower frequency range of the luminance signal.

Cb

2T pulse:
testing amplitude, echoing and group delay
response of the transmission link
100 IRE luminance bar:
measurement of pulse distortions at low frequencies by evaluating the pulse top and is used as the white level reference

Cr



ITS 8, 9, 10, 11
H SWEEP 1, H SWEEP 2, H SWEEP 3, H SWEEP 4

CCVS

Description:
The H SWEEP covers the whole frequency range over a line, starting at 5.5 MHz at the beginning of the line going down to 0 Hz in the middle of the line and rising again to 5.5 MHz at the end of the line.The signal has 100IRE amplitude and a flat frequency response at a high energy density

CCVS

over the whole frequency range. It is superimposed on a 50 IRE grey level.
It is generated with the phases:
180° (H SWEEP 1), 270° (H SWEEP 2),
0° (H SWEEP 3) and 90° (H SWEEP 4).

CCVS

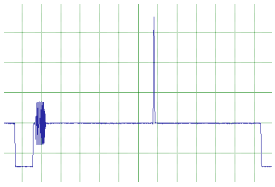
Applications:
If the signal is analyzed in the time domain, both amplitude and group delay vs frequency response can clearly be seen. In case of pure amplitude vs frequency distortion the sweep envelope is distorted symmetrically with respect to the middle of the line, in case of pure

CCVS

group delay distortion the sweep envelope has ripple which is unsymmetrical with respect to the middle of the line. If both amplitude and group delay distortion are present, the unsymmetrical ripple and the envelope which is symmetrical with respect to the middle of the line are superposed.

As the H SWEEP is generated with the phases 0°/90° and 180°/270° the amplitude response and the group delay response can be displayed in the frequency domain by means of the Complex Fourier Transform without the discontinuities which occur using only one H SWEEP.
To limit effects of nonlinear distortions the H SWEEPs 1 and 2 should be inverted and added to the H SWEEPs 3 and 4. This ensures reliable analysis.

ITS 12
2T PULSE

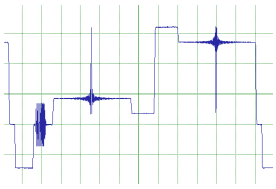


CCVS

Description:
A $\cos^2$ pulse with a half amplitude duration (HAD) of 250 ns is positioned in the middle of the active line.

Applications:
amplitude errors, group delay indicator and reflections to ± 26µs.

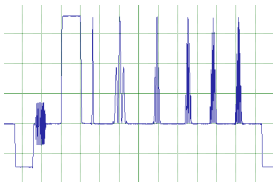
ITS 13
SIN X/X



CCVS

Description:
In the analogue world the SIN X/X pulse is generated by applying a Dirac pulse, which should be as ideal as possible, to a group delay compensated low pass filter. The special feature of of the pulse produced in this way is that its energy is distributed uniformly over the the whole frequency spectrum. Therefore the amplitude and group delay responses are flat within the flat frequency range of the used lowpass filter.
The SIN X/X signal from the SAF and SFF contains twoof these pulses, which in this case are generated digitally by calculating the pulses within a video bandwidth of 6 MHz with theoretical flat amplitude and group delay response. The first is a positive going pulse with an amplitude of 575 mV superposed on a 125 mV grey level, the second is a negativ going pulse with an amplitude of 575 mV superimposed on a 575 mV grey level.

Applications:
To find the frequency response of a DUT the SIN X/X signal can be analyzed directly with a spectrum analyzer. In order to limit the effects of non linear distortion, a positive going and a negative going SIN X/X is generated. Inverting one of them and adding it to the other suppresses in optimal manner the influence of this distortion.
The signal is a very sensitive indicator of group delay distortion. When distortion is present, the preshoot and postshoot are displayed with different amplitudes on the oscilloscope. Using an FFT analyzer the amplitude and group delay vs frequency response of this signal can be analyzed precisely. Because of its low energy content this signal must not be noisy; in this case a H SWEEP is the better alternative.

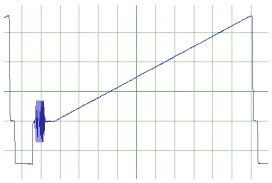


CCVS

ITS 14
MULTIPULSE

Description:
A sequence of modulated $\cos^2$ pulses with 100 IRE amplitude follow a luminance bar (width 4µs) and a 2T pulse (HAD 250ns) with 100 IRE amplitude.
The first pulse is modulated with 1 MHz and has a HAD of 2µs. All others have a HAD of 1µs and are modulated with 2, 3, 4 and 5 MHz.

Applications:
The amplitudes of the modulated $\cos^2$ pulses are referred to the luminance bar at the start of the line to determine the amplitude vs frequency response. In this way, the deviation from the nominal amplitude can be determined at each frequency. To determine the group delay vs frequency response, the baseline distortion of the sine waves oscillations, which are generated symmetrically with respect to the center of each pulse, are analyzed.

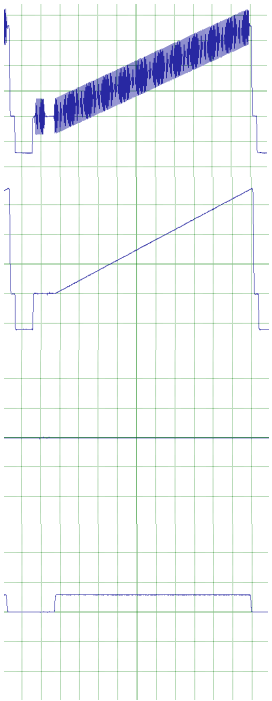


CCVS

ITS 15
RAMP

Description:
The ramp signal is a sawtooth which rises over the whole active line and has an amplitude of 100 IRE.

Applications:
The ramp signal, like various staircase signals, is used to check line time nonlinearity. It can also be used to measure S/N ratio (signal to noise) over the whole level range or to measure quantization noise in A/D and D/A converter systems.



CCVS

Y

Cb

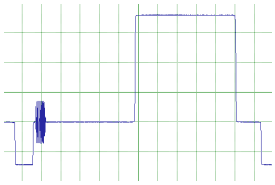
Cr

ITS 16
RAMP MOD. 40 IRE

Description:
A subcarrier with U_{pp} = 40 IRE is superposed on sawtooth which rises over the whole active line and has an amplitude of 100 IRE.

Applications:
The signal is used to measure nonlinear distortions, like differential gain and phase, on the subcarrier.

ITS 17
15 KHz

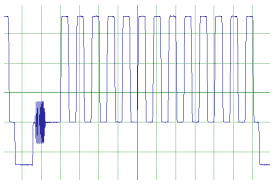


CCVS

Description:
A line time squarewave with 100 IRE amplitude and a rise time of 250 ns is generated.

Applications:
The 15 KHz squarewave can be used to measure the gain and the pulse response at medium frequencies with respect to the video bandwidth. This is shown by line time tilt.

ITS 18
250 KHz

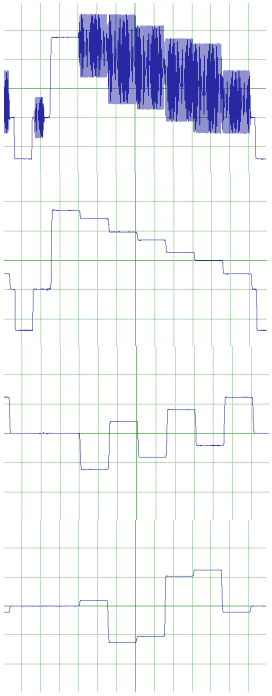


CCVS

Description:
This signal is composed of squarewave pulses with a frequency of 250 KHz and a rise time of 250 ns.

Applications:
The squarewave signal is used to measure the pulse response at medium frequencies with respect to the video bandwidth, e.g. overshoots and rounding.

ITS 19
COLOUR BARS 77/7.5/77/7.5



CCVS

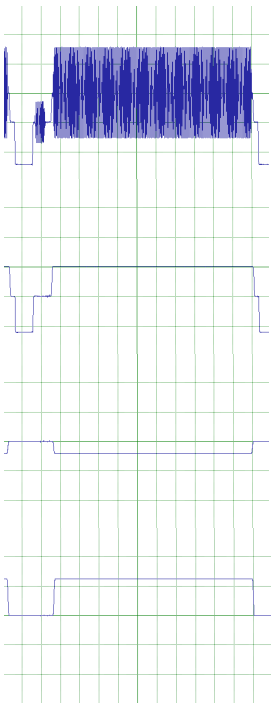
Description:
In accordance with RS - 189 - A the colour bars are produced with 77 IRE luminance amplitude and 77 IRE colour saturation at 7.5 IRE setup.

Applications:
The colour bars are the standard signal for checking and setting the phase and level of a CCVS and for a quick check of colour monitors. The colour coding in particular can be rapidly and simply checked with a vectorscope.

Y

Cb

Cr



CCVS

Y

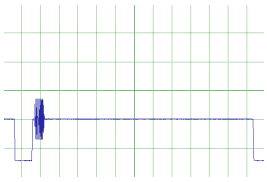
Cb

Cr

ITS 20
RED FIELD

Description:
The amplitude phase and rise time are the same as those of the red bar in the 77/7.5/77/7.5 colour bars.

Applications:
The red area signal is particularly suitable for assessing and measuring unwanted amplitude and phase modulation of the subcarrier such as it occurs with VTRs. The unwanted modulation is called "colour noise", or AM noise and PM noise.

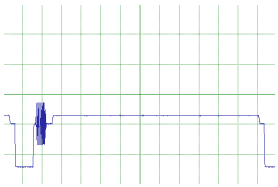


CCVS

ITS 21
BLACKBURST

Description:
The BLACKBURST furnishes all sync pulses and bursts.
The active line is at blanking level (0 IRE).

Applications:
This signal is used as genlock signal for external equipment.

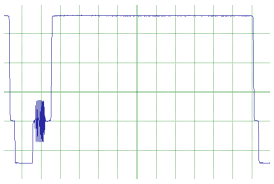


CCVS

ITS 22
BLACK

Description:
The BLACKBURST furnishes all sync pulses and bursts. The active line is at 7.5 IRE.

Applications:This signal is used as genlock signal for external equipment (see also ITS 21) and for adjusting the black level at monitors



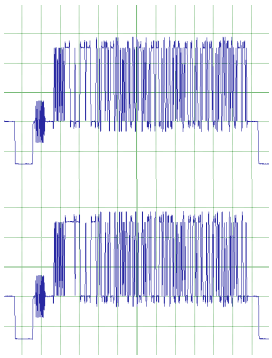
CCVS

ITS 23
WHITE 100 IRE

Description:
This signal is a white bar with 100 IRE amplitude, which covers the whole active line.

Applications:
- testing clamping circuits at 100 IRE APL
- measuring noise voltage as a function of modulation
- testing the maximum beam current of CRTs

ITS 24, 25
TELETEXT TESTLINE 1, 2



CCVS

Description:
The teletext testlines consist of two fixed data signals of 5.72727 Mbit/s. After the 16 bit run in (sequence of ones and zeros) follows the framing code FFhex and data defined for measuring purpose. The data toggles from TESTLINE 1 to TESTLINE 2. This is assumed to be an optimal sumulation of program teletext.
The basic amplitude is 70 IRE.

CCVS

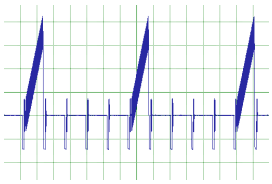
Applications:
Measuring
- timing within the line
- number of run in bits
- decoding margin
- timing margin
- basic and peak to peak amplitude

2. Signal Group APL (Average Picture Level)

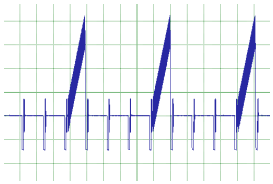
2.1 List of Signals

APL			
1	APL 10 %	5	APL 10/90 %
2	APL 12.5 %	6	APL 12.5/87.5 %
3	APL 90 %	7	BOUNCE
4	APL 87 %		

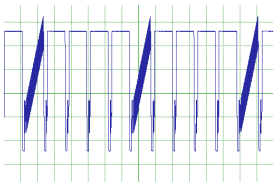
2.2 Signal Description



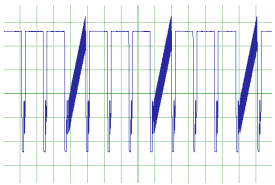
10%



12.5%



90%



87.5%

APL 1, 2, 3, 4
APL 10%, 12.5%, 90%, 87.5%

Description:

Name	Period in lines	Lines black	Lines white	Signal(selectable, see table)
APL 10 %	5	4	0	Ramp mod. 200 mV
APL 12.5%	4	3	0	Ramp mod. 200 mV
APL 90 %	5	0	4	Ramp mod. 200 mV
APL 87.5%	4	0	3	Ramp mod. 200 mV

Selectable Signals:

BLACKBURST	2T PULSE	CORING
NTC 7 COMPOSIT	SIN X/X	5 STEPS
NTC 7 COMBINED	MULTIPULSE	10 STEPS
FCC COMPOSITE	BLACK	5 STEPS MOD. 40 IRE
VIRS	GREY 10 IRE	10 STEPS MOD. 40 IRE
MULTIBURST	GREY 50 IRE	RAMP
MOD. PEDESTAL	GREY 90 IRE	RAMP MOD.1MHz 40 IRE
H SWEEP 1	WHITE 100 IRE	RAMP MOD. 40 IRE
H SWEEP 2	12.5T 2T BAR	COLOUR BARS 77/7.5/77/7.5
H SWEEP 3	15 KHz	RED FIELD
H SWEEP 4	250	

Applications:
- measuring signal parameters according to the selected signal line at constant average picture level,
  for example RAMP MOD. 200mV:
  differential gain and phase

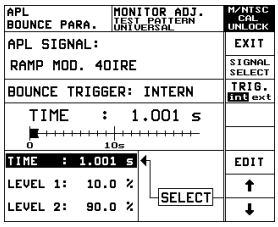
APL 5, 6
APL 10/90%, 12.5/87.5%

Description:
The signal alternates between APL 10% or 12.5% and 90% or 87.5%. The time interval is adjustable.

Applications:
- measuring signal parameters according to the selected signal line when the average picture level is changing in jumps
- testing clamping circuits and sync seperators

APL 7
BOUNCE

Description:
During the selected time interval the grey level jumps between the selected levels.



Setting facilities provided by the APL menu:
The softkey of the last menu line named "MODIFY APL + BOUNCE PARAMETER" opens the menu page as shown at the left side:
- to select the signal (SELECT SIGNAL)
- to switch over from the internally selected time interval to the external trigger facility TRIG INT/EXT (connector X 64 at the rear of the instrument)
- selecting the time interval (TIME)
- setting the levels between the APL jumps (LEVEL 1, LEVEL 2)

The TIME interval is valid for all alternating APL signals, LEVEL 1 and LEVEL 2 only for the BOUNCE signal (APL 7).

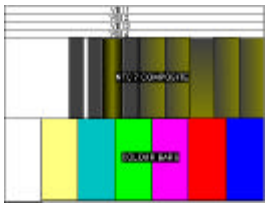
Applications:
- testing clamping circuits and sync seperators
- amplitude vs frequency response for white, black and adjustable levels as required for transmitter measurements

3. Signal Group SPECIAL

3.1 List of Signals

SPECIAL			
1	VTR SIGNAL	13	DELAY TEST 1 MHz *
2	TELETEXT TESTSIGNAL	14	H SWEEP 4.2 MHz Y,Cb,Cr
3	SPLITLEVEL	15	C.BARS 125 ns 77/7.5/77/7.5
4	CORING	16	C.BARS 200 ns 77/7.5/77/7.5
5	SIN X/X	17	RAMP + Y, Cb, Cr *
6	15 KHz 125 ns	18	RAMP - Y, Cb, Cr *
7	250 KHz 125ns	19	STAIRCASE + Y, Cb, Cr *
8	VECTORSCOPE TEST	20	STAIRCASE - Y, Cb, Cr *
9	GREY 10 IRE	21	TRIANGLE 1 Y, Cb, Cr *
10	GREY 50 IRE	22	TRIANGLE 2 Y, Cb, Cr *
11	GREY 90 IRE	23	NONLINEARITY TEST
12	BOWTIE	24	COLOUR CUBE
*			

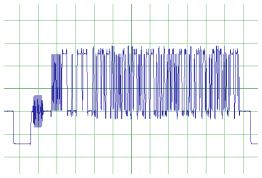
3.2 Signal Description



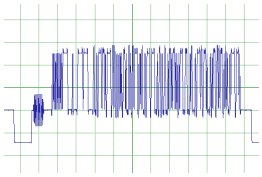
SPECIAL 1
VTR SIGNAL

Description:
At the start of the picture area the ITS area is repeatedthree times, in each case separated by 16 lines. The upper half of the remaining picture area is occupied by the NTC 7 COMPOSITE SIGNAL the lower half by the COLOUR BARS 77/7.5/77/7.5

Applications:
The signal is used as a reference leader for manual or automatic VTR alignment. The additional triple repetition of insertion line area means that each video head with
four head machines can be investigated separately with a video analyzer.



CCVS

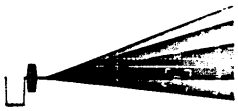


CCVS

SPECIAL 2
TELETEXT TESTSIGNAL

Description:
The teletext test signal (eye test pattern) consists of a fixed data signal of 5.72727 Mbit/sec and a reference sequence signal of ones and zeros (run in) with the same bit rate. Alternating from line to line the two signals are produced with positive and
negative polarity so that a fixed sequence of four lines is obtained.

Applications:
On an oscilloscope triggering at the positive (or negative) data transition this signal makes it easy to recognize where the 50% crossings of the data signal occur with respect to the reference clock. This clock (run in) consists of only one frequency and is therefore an accurate timing reference. This measurement determines the teletext parameter "Eye Width" or "Timing Margin".
At the peak points of the reference clock the difference of the most positive amplitude of a "zero" data and the most negative level of a "one" data determines the "Eye Height" or "Decoding Margin".



SPECIAL 3
CCVS SPLIT LEVEL

Y

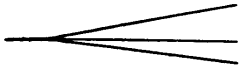
Description:
The active picture on the monitor is split into three areas:

top	red wedge
center	green wedge
bottom	blue wedge

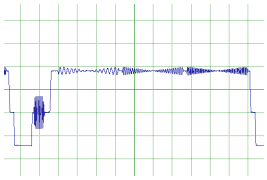
The components Y, Cb and Cr of this signal are selected so that ramps with 100 IRE amplitude are produced in the three primary colours in the RGB format.

Cb

Applications:
- testing the RGB matrix formation
- checking A/D converters in the RGB channels for missing codes
- measuring the line time nonlinearity in the RGB channels



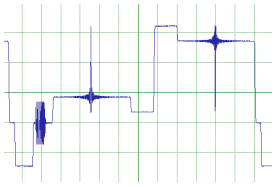
Cr



SPECIAL 4
CORING

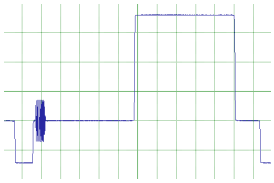
CCVS

Description:
The CORING signal comprises three triangular butterfly pulses modulated with the frequencies 1, 2 and 3 MHz. Each butterfly is 16 µs wide with an amplitude of 10 IRE. They are superposed on a 50 IRE grey level .Applications:
Coring circuits are used in cameras and video recorders to improve the signal - to - noise ratio. The coring circuit removes low amplitude noise at higher frequencies by selective suppression. However the resolution of fine picture details may be affected. The coring signal is an important aid for setting and checking the turn off levels of coring circuits.
The length of the area in the middle of each butterfly where the sine wave is suppressed shows up to which level the circuitry is active.



SPECIAL 5
SIN X/X

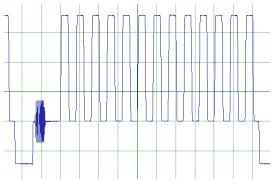
CCVS Description:In the analogue world the SIN X/X pulse is generated by applying a Dirac pulse, which should be as ideal as possible, to a group delay compensated low pass filter. The special feature of of the pulse produced in this way is that its energy is distributed uniformly over the the whole frequency spectrum. Therefore the amplitude and group delay responses are flat within the flat frequency range of the used lowpass filter.
The SIN X/X signal from the SAF and SFF contains two of these pulses, which in this case are generated digitally by calculating the pulses within a video bandwidth of 6 MHz with theoretical flat amplitude and group delay response. The first is a positive going pulse with an amplitude of 575 mV superposed on a 125 mV grey level, the second is a negativ going pulse with an amplitude of 575 mV superimposed on a 575 mV grey level.
Applications:
To find the frequency response of a DUT the SIN X/X signal can be analyzed directly with a spectrum analyzer. In order to limit the effects of non linear distortion, a positive going and a negative going SIN X/X is generated. Inverting one of them and adding it to the other suppresses in optimal manner the influence of this distortion.
The signal is a very sensitive indicator of group delay distortion. When distortion is present, the preshoot and postshoot are displayed with different amplitudes on the oscilloscope. Using an FFT analyzer the amplitude and group delay vs frequency response of this signal can be analyzed precisely. Because of its low energy content his signal must not be noisy; in this case a H SWEEP is the better alternative.



SPECIAL 6

CCVS **15 KHz 125 ns**

Description:
A line time squarewave with 100 IRE amplitude and a rise time of 125 ns is generated.
Applications:
- the 15 KHz squarewave can be used to measure the gain and the pulse response at medium frequencies with respect to the video bandwidth. This is shown by line time tilt
- aligning of the group delay using preshoots and postshoots on the 125 ns edge and the 15 KHz /125 ns mask used for TV transmitter measurements

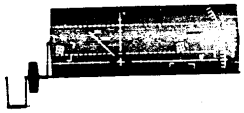


SPECIAL 7
250 KHz 125ns

CCVS Description:
A 250 KHz squarewave with 100 IRE amplitude and a rise time of 125 ns is generated.

Applications:
- the squarewave signal is used to measure the pulse response at medium frequencies with respect to the video bandwidth, e.g. overshoots and rounding.- aligning of the group delay using preshoots and postshoots on the 125 ns edge and the 250 KHz /125 ns mask

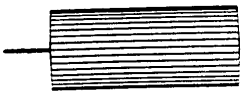
SPECIAL 8
VECTORSCOPE TEST



CCVS

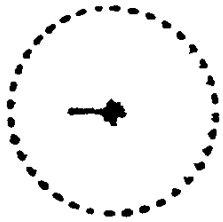
Description:
Colour subcarrier bursts with U_{pp} = 100 IRE are superposed on a 50 IRE grey level. Over the frame there are 36 areas each 13 lines long, where the subcarrier
phase is incremented in steps of 10 °.Applications:
If the vectorscope is aligned correctly, this signal is displayed as a circle of 36 dots on the screen.

Y

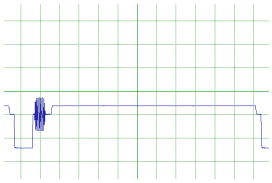


Cb

Cr

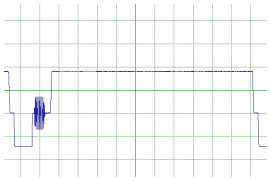


Vectorscope

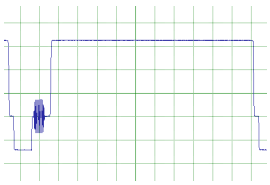


SPECIAL 9, 10, 11
CCVS **GREY 10, 50, 90 IRE**

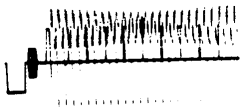
Description:
Grey signals with luminance levels of 10, 50 and 90 IRE.



Applications:
(similar to APL 7 BOUNCE or ITS 23 WHITE)
CCVS
- checking the S/N ratio at different grey levels
- measuring the amplitude vs frequency response via externally loaded sweep signal depending on the luminance level
- Checking CRT beam currents at various grey levels

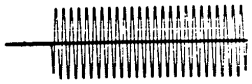


CCVS

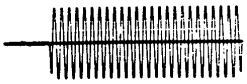


CCVS

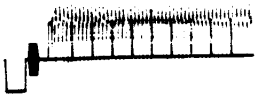
Y



Cb



Cr

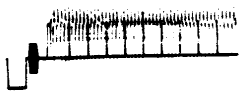


BOWTIE

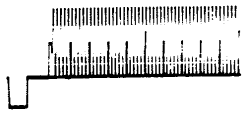
SPECIAL 12
BOWTIE *

Description:
The Y component alternately contains measurement markers (interval 10ns) or a 500 KHz sine wave signal with U_{pp} = 100 IRE. The Cb and Cr components each contain a 502 KHz sine wave with U_{pp} = 100 IRE. The signal in CCVS is not legal.

Applications:
By substraction Y - Cb or Y - Cr , a 2 KHz beat frequency is produced. If the delays of both components are the same, the zero crossing lies exactly in the middle of the active line (exactly on the zero measurement marker).
The delay difference between the components can be read off at the amplitude minimum.



CCVS



Y

Cb

Cr

SPECIAL 13
DELAY TEST 1 MHz *

Description:Like BOWTIE only Y has a 1 MHz and Cb and Cr both have a 1.002 MHz sine wave. The distance of the measurement markers has 5 ns.

Applications:
Same as for BOWTIE but with twice the measurement accuracy.

SPECIAL 14
H SWEEP 4.2 MHz Y, Cb, Cr

CCVS

Description:
The monitor is devided in three areas:

top	H SWEEP in Y
center	H SWEEP in Cr and
bottom	H SWEEP in Cb

Y

Applications:
The amplitude and group delay vs frequency response can be analyzed for each component separately on an oscilloscope.
In case of pure amplitude vs frequency distortion the sweep envelope is distorted symmetrically with respect to the middle of the line, in case of pure group delay

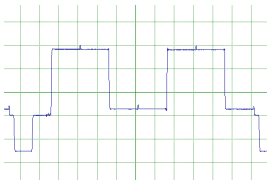
Cb

distortion the sweep envelope has ripple which is unsymmetrical with respect to the middle of the line. If both amplitude and group delay distortion are present, the unsymmetrical ripple and the envelope which is symmetrical with respect to the middle of the line are superposed.

Cr

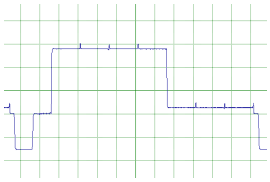
The amplitude response and the group delay response can also be displayed in the frequency domain by means of the Fourier Transform. The H SWEEP´s very high spectral density over the whole frequency range ensures in this case very accurate results even in noisy signals.

SPECIAL 15, 16
C. BARS 125 ns, 200 ns 77/7.5/77/7.5



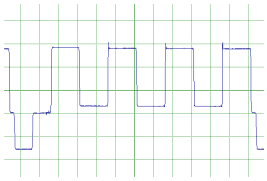
R

Description:
The colour bars are specified to RS - 189 - A only the rise and fall times of the bar transitions are equal in all components Y, Cb, Cr and R, G, B with 125 ns or 200 ns. A RGB analogue matrix therefore should not produce peaks and troughs when it is supplied by Y, Cb and Cr.

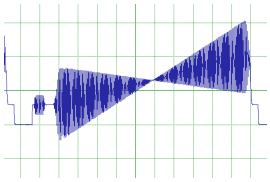


G

Applications:
- transient response in case of signals with high bandwidth (125 ns corresponds to 8 MHz).
- colour purity
- see also ITS 19



B

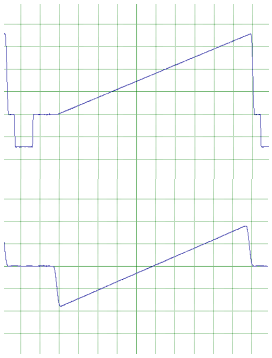


SPECIAL 17

RAMP + Y, Cb, Cr *

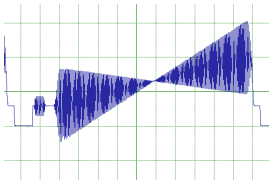
Description:

CCVS The components contain: Y a ramp 0 IRE to 100 IRE
Cb, Cr a ramp -50 IRE to +50 IRE
This signal is not valid with composite format.
Applications:
- line time nonlinearity in analogue component systems
- A/D converter tests in the Y, Cb, Cr branches with digital signal



Y processing, testing for linearity and missing codes with rising ramp signals over full level in the active line.

Cb = Cr

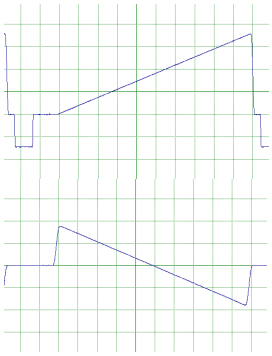


SPECIAL 18

RAMP - Y, Cb, Cr *

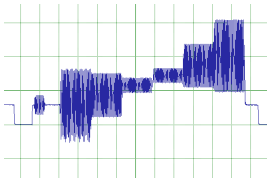
Description:

CCVS The components contain:Y a ramp 0 IRE to 100 IRE
Cb, Cr a ramp +50 IRE to -50 IRE
This signal is not valid with composite format.



Y Applications:
- line time nonlinearity in analogue component systems
- A/D converter tests in the Y, Cb, Cr branches with digital signal processing, testing for linearity and missing codes with rising ramp (Y) and falling ramp (Cb, Cr) signals over full level in the active line.

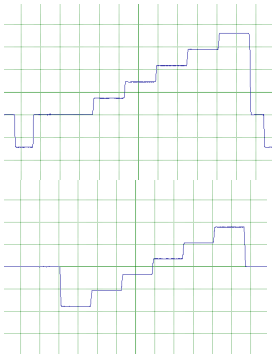
Cb = Cr



SPECIAL 19

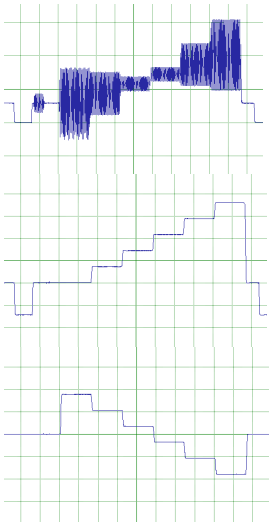
CCVS **STAICASE + Y, Cb, Cr** *

Description:
The components contain: Y a 5 step staircase 0 IRE to 100 IRE
Cb, Cr a 5 step staircase -50 IRE to +50 IRE
This signal is not valid with composite format.
Applications:



Y Line time nonlinearity measurement for all three components with spike filters on rising staircases.

Cb = Cr



SPECIAL 20

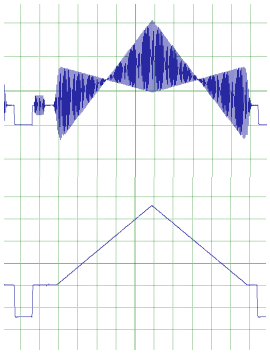
CCVS **STAIRCASE - Y, Cb, Cr** *****

Description:
The components contain: Y a 5 step staircase 0 IRE to 100 IRE
Cb, Cr a 5 step staircase +50 IRE to -50 IRE
This signal is not valid with composite format.

Applications:

Y Line time nonlinearity measurement for all three components with spike filters on rising (Y) and falling (Cb, Cr) staircases.

Cb = Cr

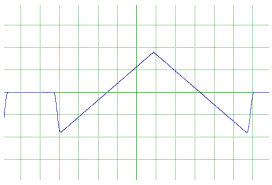


SPECIAL 21

CCVS **TRIANGLE 1 Y, Cb, Cr** *****

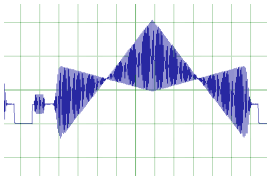
Description:
The components contain:
Y a triangular voltage in the active line going from 0 IRE at the begin-ning to 100 IRE in the middle of the line to 0 IREat the end of the line.

Y Cb, Cr a triangular voltage in the active lines going from - 50 IRE at the beginning of the line to+ 50 IRE in the center of the line to - 50 IRE at the end of the line.
This signal is not valid with composite format.

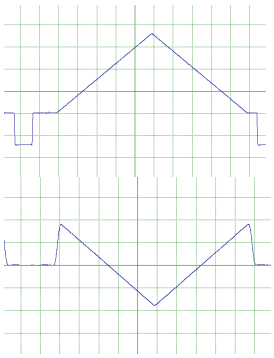


Applications:
- line time nonlinearity with both signal polarities in one line

Cb = Cr - rapid test on A/D converters for linearity deviations and missing codes with rising and falling ramps in all three components.



CCVS **SPECIAL 22**
TRIANGLE 2 Y, Cb, Cr *****

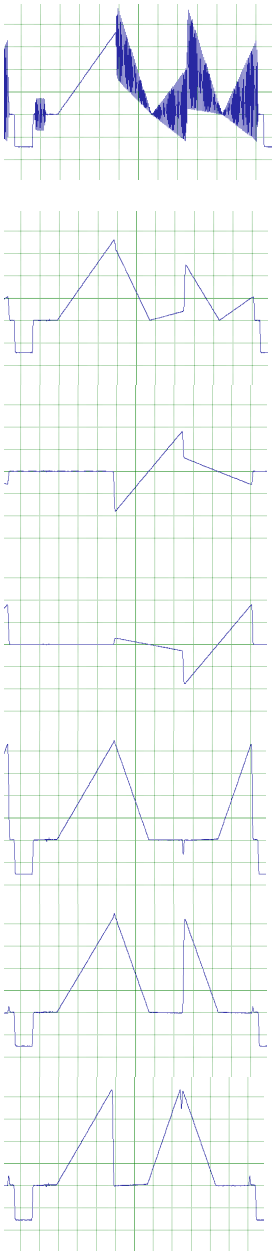


Description:
Like SPECIAL 21, but the polarity of Cb and Cr is inverted.
This signal is not valid with composite format.

Applications:
See SPECIAL 21

Y

Cb = Cr



CCVS

Y

Cb

Cr

R

G

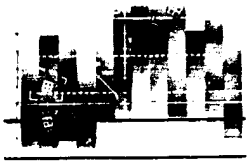
B

SPECIAL 23
NONLINEARITY TEST

Description:
Ramp signals in Y, Cb and Cr which in RGB mode give ramps with maximum level (0 to 100 IRE) and different gradients. The NONLINEARIY TEST is generated to the IBA Code of Practice, 1987. This is a valid composite signal.

Applications:
Testing nonlinearities in Y,Cb, Cr and for the most part with RGB using suitable spike filters (Code of Practice, Section 7, Ref. 7.50).

SPECIAL 24
COLOUR CUBE

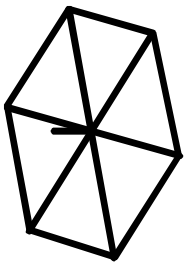


CCVS field

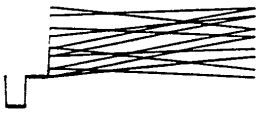
CCVS line

Description:
Ramp signals in Y, Cb, Cr which, with composite (CCVS) coding, describe the limits of the valid signals (see vectorscope). This is particularly clear in RGB mode.

Applications:
Detecting gamut errors

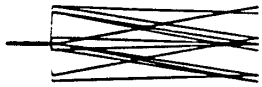


Vectorscope

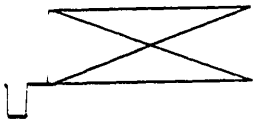


Y

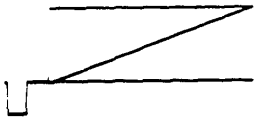
Cb



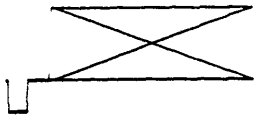
Cr



R



G



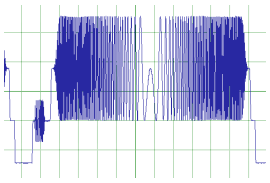
B

4. Signal Group SWEEP + BURST

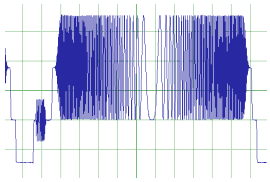
4.1 List of Signals

SWEEP + BURST	
1 H SWEEP	6 RGB SWEEP 3.25 MHz
2 V SWEEP	7 RGB SWEEP 4.2 MHz
3 MULTIBURST	8 BURST WITH VAR.FREQUENCY
4 MULTIPULSE	9 V SWEEP WITH VAR.MARKER
5 CORING	

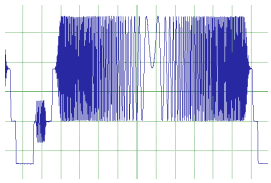
4.2 Signal Description



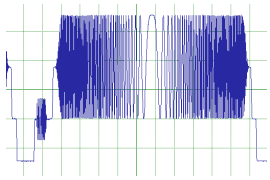
CCVS



CCVS



CCVS



CCVS

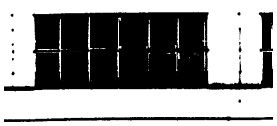
SWEEP + BURST 1
H SWEEP

Description:
The H SWEEP signals ITS 8, 9, 10, 11 which cover the frequency range 5.5 - 0 - 5.5 MHz, each take up a quarter of the monitor screen:

1st quarter	H SWEEP 3	0°
2nd quarter	H SWEEP 4	90°
3rd quarter	H SWEEP 1	180°
4th quarter	H SWEEP 2	270°

Applications:
Measurements as described under ITS 8, 9, 10, and 11, but full field measurements.

SWEEP + BURST 2
V SWEEP



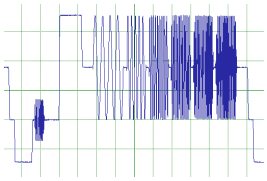
CCVS
field

Description:
SWEEP signal with field frequency:

initial frequency	50 KHz
final frequency	6 MHz
frequency marker at multiples of	1 MHz
frequency deviation per line	25 KHz

Applications:
Determination of amplitude vs frequency response with high frequency resolution

SWEEP + BURST 3
MULTIBURST

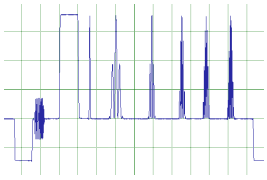


CCVS

Description:
A 100 IRE reference pulse is followed by six sine wave bursts of 0.5, 1, 2, 3, 3.579 and 4.2 MHz. The amplitude of the bursts is U_{PP} = 100 IRE on a 50 IRE luminance pedestal.

Applications:
Irregularities of the amplitude vs frequency response in the time domain can be determined with the aid of the multiburst.

SWEEP + BURST 4
MULTIPULSE

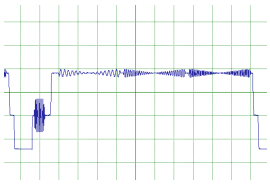


CCVS

Description:
A 100 IRE reference pulse is followed by six sine wave bursts of 0.5, 1, 2, 3, 3.579 and 4.2 MHz. The amplitude of the bursts is U_{PP} = 100 IRE on a 50 IRE luminance pedestal.

Applications:
Irregularities of the amplitude vs frequency response in the time domain can be determined with the aid of the multiburst.

SWEEP + BURST 5
CORING

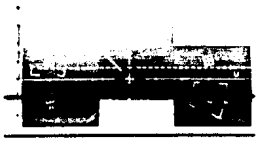


CCVS

Description:
The CORING signal comprises three triangular butterfly pulses modulated with the frequencies 1, 2 and 3 MHz. Each butterfly is 16 µs wide with an amplitude of 10 IRE. They are superposed on a 50 IRE grey level .

Applications:
Coring circuits are used in cameras and video recorders to improve the signal - to - noise ratio. The coring circuit removes low amplitude noise at higher frequencies by selective suppression. However the resolution of fine picture details may be affected. The coring signal is an important aid for setting and checking the turn off levels of coring circuits.
The length of the area in the middle of each butterfly where the sine wave is suppressed shows up to which level the circuitry is active.

SWEEP + BURST 6
RGB SWEEP 3.25 MHz



CCVS field

Description:
H SWEEP signals with the 3.25 - 0 - 3.25 MHz format using Y, Cb, Cr coding which in RGB format gives H SWEEPs in the pure primary colours with the maxi-mum legal level range of 0 to 100 IRE. The sweeps aredisplayed sequentially on the monitor:

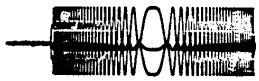
CCVS line

top	red
center	green
bottom	blue

Y

Applications:
- frequency response of amplitude and group delay in the RGB channels
- timing errors when the component signals are compressed to obtain MAC signals as a function of frequency

Cb



Cr

R = G = B

SWEEP + BURST 7
H SWEEP 4.2 MHz

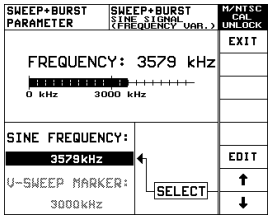
Description:
H SWEEP signals with the 4.2 - 0 - 4.2 MHz format using Y, Cb, Cr coding which in RGB format gives H SWEEPs in the pure primary colours with the maximum legal level range of 0 to 100 IRE. The sweeps are displayed sequentially on the monitor:

top	red
center	green
bottom	blue

(see also SWEEP+BURST 6)

Applications:
- frequency response of amplitude and group delay in the RGB channels
- timing errors when the component signals are compressed to obtain MAC signals as a function of frequency

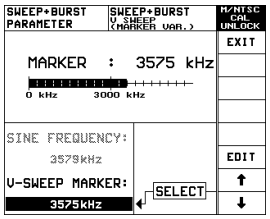
SWEEP + BURST 8
SINE SIGNAL (FREQUENCY VAR)



Description:
A sine wave signal with selectable frequency in the range 0 to 6 MHz in steps of 1 KHz and U_{pp} = 100 IRE is superimposed to a 50 IRE grey level.

Applications:
Base band:
- accurate measurements at critical frequencies, such as subcarrier
Transmitter measurement:
- precise determination of Nyquist slope in vestigial side band operation
- intermodulations measurement or checking the adjacent channel emission

SWEEP + BURST 9
V SWEEP (MARKER VARIABLE)



Description:
V SWEEP like SWEEP + BURST 2 without the markers for 3 and 5 MHz, but with a variable frequency marker which is settable line per line over vertical sweep and the corresponding frequency is indicated on the display.

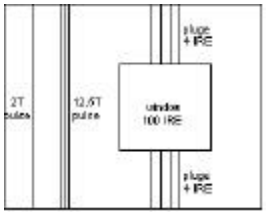
Applications:
Determination of amplitude vs frequency response wth high frequency resolution. The marker shows the exact frequency where for instance critical distortions occur.

5. Signal Group PULSE + BAR

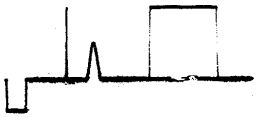
5.1 List of Signals

PULSE + BAR			
1	WINDOW PLUGE	7	250 KHz
2	12.5T 2T BAR	8	60 Hz 1
3	MULTIPULSE	9	60 Hz 2
4	2T PULSE	10	60 Hz 3
5	SIN X/X	11	NTC 7 COMPOSITE
6	15 KHz	12	FCC COMPOSITE

5.2 Signal Description



CCVS



Y

Cb

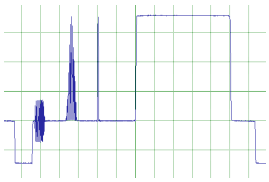
Cr

PULSE + BAR 1
WINDOW PLUGE

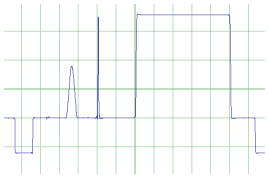
Description:

The WINDOW + PLUGE signal comprises the following signal elements:
The first vertical half of the full field signal includes a 2T pulse and a modulated 12.5T pulse with SC at φ = 0°
The second vertical half of the full field signal includes in the upper and the lower part
a PLUGE signal of ± 4 IRE
and in the centre
a white window.
The signal elements are arranged on a black (0 IRE) background.

Applications:
Thanks to the integral window, field time tilts and line time tilts can be displayed. Reflections and echos are seen at the evaluation of the 2T pulse. The group delay and the amplitude response at the subcarrier is measured using the 12.5 T pulse.
The black alignment of monitors is done with the PLUGE signal. (PLUGE = Picture line up generator)



CCVS

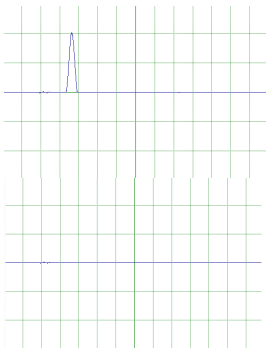


Y

PULSE + BAR 2
12.5 T 2T BAR

Description:
The 12.5T pulse (HAD 1.56 µs) is followed by a 2T pulse (HAD 250 ns) and the luminance bar all with amplitudes of 100 IRE.
The subcarrier has U_{PP} = 100 IRE at φ = 180°.

Applications:
12.5 T pulse:
precise assessment of the amplitude and group delay response in the region of the subcarrier referred to the lower frequency range of the luminance signal.



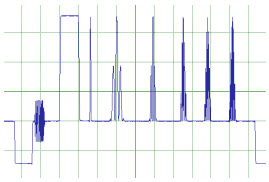
Cb

2T pulse:
testing amplitude, echoing and group delay response of the transmission link

100 IRE luminance bar:
measurement of pulse distortions at low frequencies by evaluating the pulse top and is
used as the white level reference

Cr

PULSE + BAR 3
MULTIPULSE

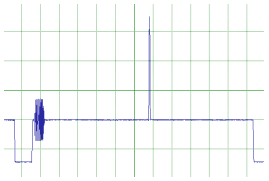


CCVS

Description:
A 100 IRE reference pulse is followed by six sine wave bursts of 0.5, 1, 2, 3, 3.579 and 4.2 MHz. The amplitude of the bursts is U_{PP} = 100 IRE on a 50 IRE luminance pedestal.

Applications:
Irregularities of the amplitude vs frequency response in the time domain can be determined with the aid of the multiburst.

PULSE + BAR 4
2T PULSE

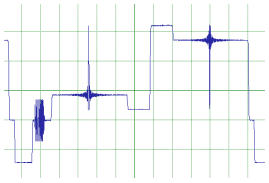


CCVS

Description:
A $\cos^2$ pulse with a half amplitude duration (HAD) of 250 ns is positioned in the middle of the active line.

Applications:
amplitude errors, group delay indicator and
reflections to ± 26µs.

PULSE + BAR 5
SIN X/X

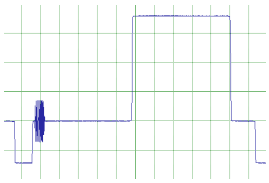


CCVS

Description:
In the analogue world the SIN X/X pulse is generated by applying a Dirac pulse, which should be as ideal aspossible, to a group delay compensated low pass filter. The special feature of of the pulse produced in this way is that its energy is distributed uniformly over the the whole frequency spectrum. Therefore the amplitude and group delay responses are flat within the flat frequency range of the used lowpass filter.
The SIN X/X signal from the SAF and SFF contains twoof these pulses, which in this case are generated digitally by calculating the pulses within a video bandwidth of 6 MHz with theoretical flat amplitude and group delay response. The first is a positive going pulse with an amplitude of 575 mV superposed on a 125 mV grey level, the second is a negativ going pulse with an amplitude of 575 mV superimposed on a 575 mV grey level.

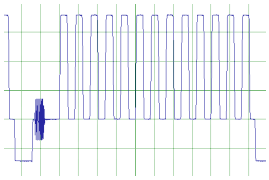
Applications:
To find the frequency response of a DUT the SIN X/X signal can be analyzed directly with a spectrum analyzer. In order to limit the effects of non linear distortion, a positive going and a negative going SIN X/X is generated. Inverting one of them and adding it to the other suppresses in optimal manner the influence of this distortion.
The signal is a very sensitive indicator of group delay distortion. When distortion is present, the preshoot and postshoot are displayed with different amplitudes on the oscilloscope. Using an FFT analyzer the amplitude and group delay vs frequency response of this signal can be analyzed precisely. Because of its low energy content this signal must not be noisy; in this case a H SWEEP is the better alternative.

PULSE + BAR 6
15 KHz

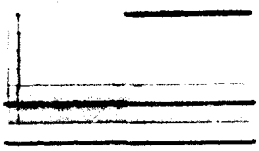


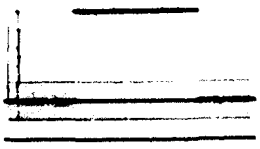
Description:
CCVS A line time squarewave with 100 IRE amplitude and a rise time of 250 ns is generated.
Applications:
The 15 KHz squarewave can be used to measure the gain and the pulse response at medium frequencies with respect to the video bandwidth. This is shown by line time tilt.

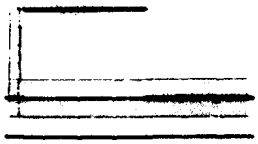
PULSE + BAR 7
250 KHz



Description:
CCVS This signal is composed of squarewave pulses with a frequency of 250 KHz and a rise time of 250 ns.
Applications:
The squarewave signal is used to measure the pulse response at medium frequencies with respect to the video bandwidth, e.g. overshoots and rounding.







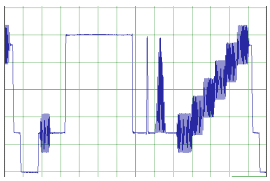
CCVS field 60 Hz 1
CCVS field 60 Hz 2
CCVS field 60 Hz 3

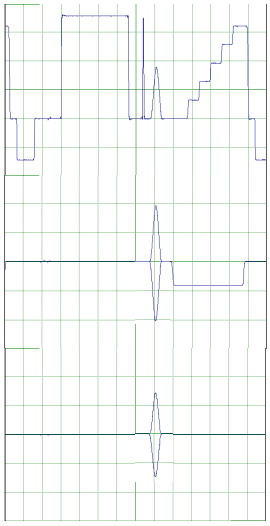
PULSE + BAR 8, 9, 10
60 Hz 1, 60 Hz 2, 60 Hz 3

Description:
This signal is a field repetitive squarewave with 100 IRE amplitude, whose white section lies in the

bottom	60 Hz 1		
center	60 Hz 2 and		
top	60 Hz 3		of the TV-screen.

Applications:
- using this signal, errors in the lowest frequency range of the video signal can be detected, for example effects caused by defective clamping circuits. Faults of this kind are displayed as field time tilt or black level discontinuities.
- when AC coupling is used for this signal, the effects of too low time constants are immediately visible on the oscilloscope.
- test of the high voltage stabilisation on monitors





CCVS

Y

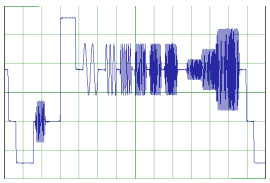
Cb

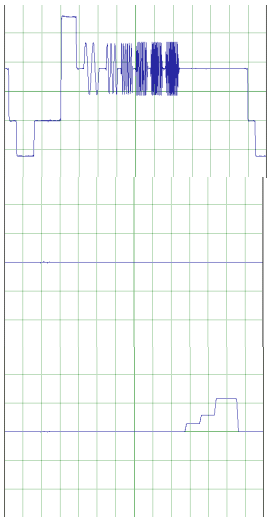
Cr

PULSE + BAR 11
NTC 7 COMPOSITE

Description:
The luminance bar is followed by a 2T pulse (HAD 250 ns) and a modulated 12.5T pulse (HAD 1.56 µs) all with amplitudes of 100 IRE. The 5 steps reach an amplitude of 90 IRE . The superposed subcarrier has
U_{PP} = 40 IRE at φ = 180°.

Applications:
This signal combination is mainly used as test line for automatic measurement and monitoring of TV signals. The luminance bar also serves as amplitude reference for automatic level control.
The following distortions can be measured using the NTC7 COMP. signal:
Luminance bar:
level errors, line time waveform, distortion,overshoot and rounding
2T pulse:
amplitude errors, group delay indicator and reflection
12.5T pulse:
amplitude, intermodulation and delay differences between luminance and chrominance
Modulated staircase:
differential gain and phase, line time nonlinearity





CCVS

Y

Cb

Cr

PULSE + BAR 12
FCC COMPOSITE

Description:
This signal consists of
- a 5 step staircase modulated with the subcarrier, the maximum luminance amplitude being 80 IRE
- a 2T pulse
- a modulated 12.5T pulse and
- a 100 IRE luminance bar.

Applications:
5 step staircase with superimposed subcarrier:
determination of the differential phase and gain of the subcarrier
2T pulse:
testing amplitude, echoing and group delay response of the transmission link

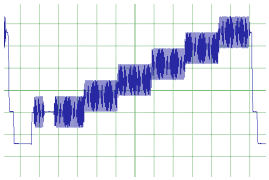
12.5 T pulse:
precise assessment of the amplitude and group delay response in the region of the subcarrier referred to the lower frequency range of the luminance signal.
100 IRE luminance bar:
measurement of pulse distortions at low frequencies by evaluating the pulse top and is used as the white level reference

6. Signal Group LINEARITY

6.1 List of Signals

LINEARITY					
1	5 STEPS		10	SHALLOW RAMP	Y
2	5 STEPS	MOD. 40 IRE	11	SHALLOW RAMP	Y, Cb, Cr *
3	10 STEPS		12	RAMP +	Y, Cb, Cr *
4	10 STEPS	MOD. 40 IRE	13	RAMP -	Y, Cb, Cr *
5	RAMP		14	STAIRCASE+	Y, Cb, Cr *
6	RAMP	MOD. 1 MHz 40 IRE	15	STAIRCASE -	Y, Cb, Cr *
7	RAMP	MOD. 40 IRE	16	TRIANGLE 1	Y, Cb, Cr *
8	V STAIRCASE +		17	TRIANGLE 2	Y, Cb, CR *
9	V STAIRCASE -		18	NONLINEARITY TEST	

6.2 Signal Description

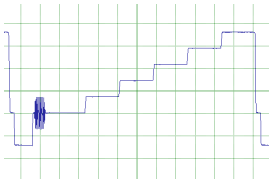


CCVS

LINEARITY 1
5 STEPS

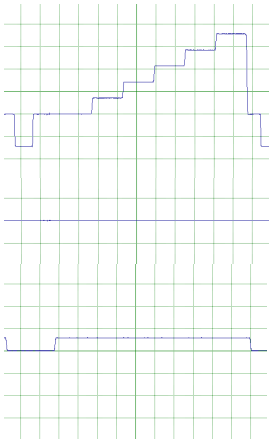
Description:
The active line is devided up into 6 equal sections (8.66 µs). On each section the luminance level increases by 20 IRE. No colour is superposed.

Applications:
Measuring the line time nonlinearity with spike filters or direct measurement of the step amplitudes



CCVS

LINEARITY 2
5 STEP MOD. 40 IRE



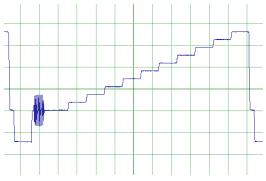
Y

Cb

Cr

Description:
Like LINEARITY 1, but a subcarrier with U_{PP} = 40 IRE and φ = 90° is superposed. As colour is also superposed on black and white, gamut errors are produced in the red and the green channel

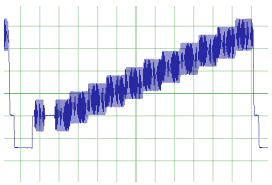
Applications:
Measuring differential distortion (differential gain and phase).



CCVS

LINEARITY 3
10 STEPS

Description:
The active line (52.556 µs) is divided into eleven equal parts (10 steps) each of 4.78 µs length. No colour is superposed.
Applications:
Measuring line time nonlinearity wth spike filters.

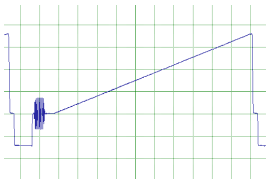


LINEARITY 4
10 STEPS MOD. 40 IRE

Description:

CCVS Like LINEARITY 3, but a subcarrier with U_{PP} = 40 IRE and φ = 90° is superposed. As colour is also superposed on black and white, gamut errors are produced in the red and the green channel

Applications:
Measuring differential distortion (differential gain and phase).

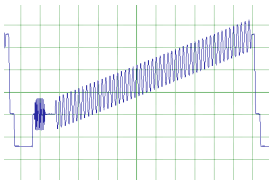


LINEARITY 5
RAMP

Description:

CCVS The ramp signal is a sawtooth which rises over the wholeactive line and has an amplitude of 100 IRE.

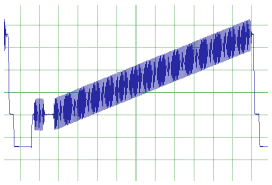
Applications:
The ramp signal, like various staircase signals, is used to check line time nonlinearity. It can also be used to measure S/N ratio (signal to noise) over the whole level range or to measure quantization noise in A/D and D/A converter systems.



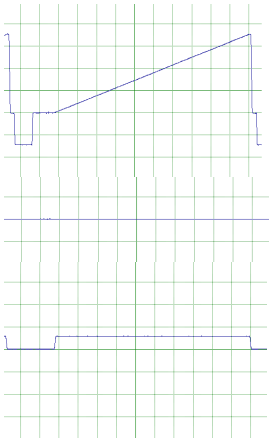
CCVS **LINEARITY 6**
RAMP MOD. 1 MHz 40 IRE

Description:
Like LINEARITY 5, but with a 1 MHz sine wave with U_{pp} = 40 IRE superposed.

Applications:
Measuring line time nonlinearity at 1 MHz



CCVS **LINEARITY 7**
RAMP MOD. 40 IRE



Description:
A subcarrier with U_{pp} = 40 IRE is superposed on sawtooth which rises over the whole active line and has an amplitude of 100 IRE.

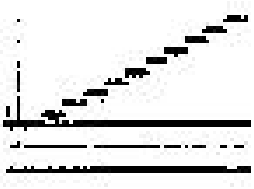
Y

Applications:
The signal is used to measure nonlinear distortions, like differential gain and phase on the subcarrier.

Cb

Cr

LINEARITY 8, 9

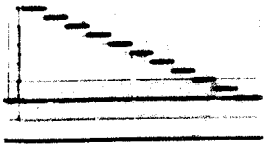


V STAIRCAS E +, V STAIRCASE -

Description:

CCVS field +(pos.)

With this signal the screen is split into eleven areas, each with full screen width and a duration of 22 lines per field so that there is a grey staircase with constant step height in the vertical direction. The amplitude of each step is 10 IRE, therefore the white step has 100 IRE. The staircase has two polarities:



on the screen from top to bottom

-- (neg.) from black to white and
from white to black

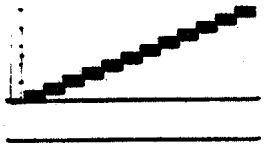
Applications:

-checking linearity over the frequency deviation range in FM systems (for example VTRs)

CCVS line

-testing linearity errors in vertical direction in DSP (Digital Signal Processing) caused by rounding or vertical filtering

LINEARITY 10
SHALLOWRAMP Y



CCVS field

Description:

10 ramps with an amplitude of 70 IRE luminance, each on a 70 IRE higher setup. This means that each level range is covered with a flat ramp.

CCVS line

Applications:

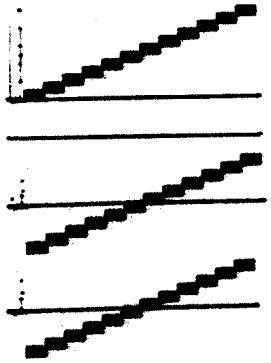
Detecting digitizing errors which are particularly noticable with a shallow ramp. For fine setting use SETUP and Y or CVS in the AMPLITUDE menu.

LINEARITY 11

SHALLOW RAMP Y, Cb, Cr *

CCVS field

Description:
Like LINEARITY 10, but the Cb and Cr components have shallow ramps with the same timing and gradation as the Y component.
initial amplitude for Cb and Cr - 50 IRE
final amplitude for Cb and Cr + 50 IRE

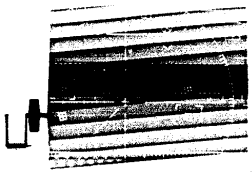


Y field

Applications:
Like LINEARITY 10, but with additional assessment possible in Cb and Cr.

Cb field

Cr field



CCVS line

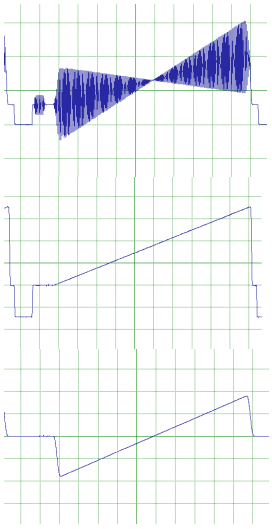
Y line

Cb line

Cr line

LINEARITY 12

RAMP + Y, Cb, Cr *



CCVS

Description:
The components contain:

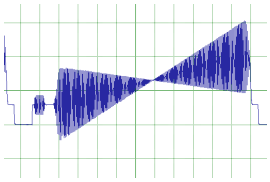
Y	a ramp 0 IRE to 100 IRE
Cb, Cr	a ramp -50 IRE to +50 IRE

This signal is not valid with composite format.

Y

Applications:
- line time nonlinearity in analogue component systems
- A/D converter tests in the Y, Cb, Cr branches with digital signal processing, testing for linearity and missing codes with rising ramp signals over full level in the active line.

Cb = Cr

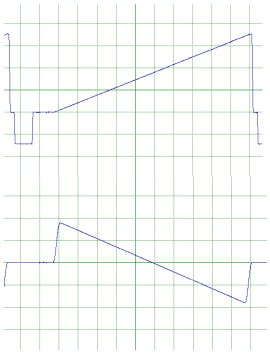


LINEARITY 13
RAMP - Y,Cb, Cr *****

CCVS Description:
The components contain:

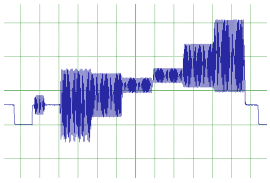
Y	a ramp 0 IRE to 100 IRE
Cb, Cr	a ramp +50 IRE to -50 IRE

This signal is not valid with composite format.



Y Applications:
- line time nonlinearity in analogue component systems
- A/D converter tests in the Y, Cb, Cr branches with digital signal processing, testing for linearity and missing codes with rising ramp (Y) and falling ramp (Cb, Cr) signals over full level in the active line.

Cb = Cr

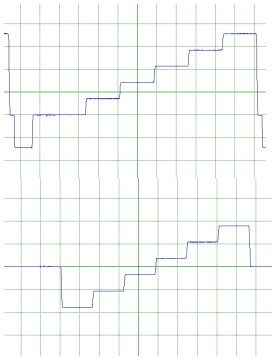


LINEARITY 14
STAIRCASE + Y, Cb, Cr *****

CCVS Description:
Description:
The components contain:

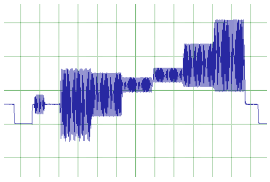
Y	a 5 step staircase 0 IRE to 100 IRE
Cb, Cr	a 5 step staircase - 50 IRE to + 50 IRE

This signal is not valid with composite format.



Y
Applications:
Line time nonlinearity measurement for all three components with spike filters on rising staircases.

Cb = Cr

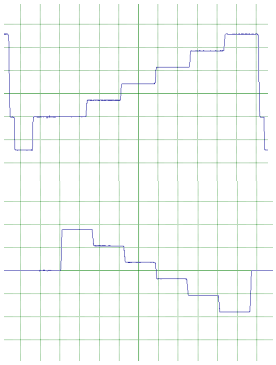


LINEARITY 15
STAIRCASE - Y, Cb, Cr *****

CCVS Description:
The components contain:

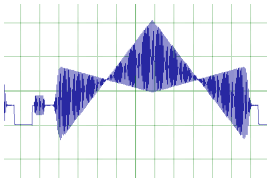
Y	a 5 step staircase 0 IRE to 100 IRE
Cb, Cr	a 5 step staircase + 50 IRE to - 50 IRE

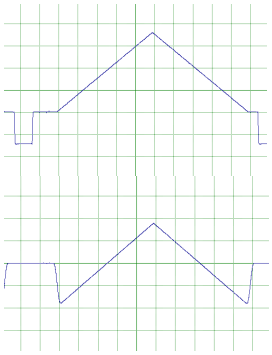
This signal is not valid with composite format.



Y Applications:
Line time nonlinearity measurement for all three components with spike filters on rising (Y) and falling (Cb, Cr) staircases.

Cb = Cr





CCVS

Y

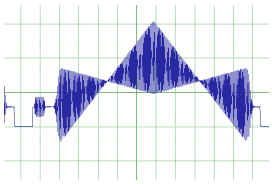
Cb = Cr

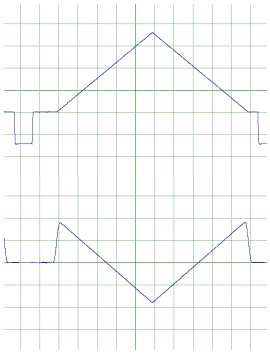
LINEARITY 16

TRIANGLE 1 Y, Cb, Cr *****

Description:
The components contain:
Y a triangular voltage in the active lines going from 0 IRE at the beginning to 100 IRE in the middle of the line to 0 IRE at the end of the line.
Cb, Cr a triangular voltage in the active lines going from - 50 IRE at the beginning of the line to + 50 IRE in the center of the line to - 50 IRE at the
end of the line.

Applications:
- line time nonlinearity with both signal polarities in one line
- rapid test on A/D converters for linearity deviations and missing codes with rising and falling ramps in al three components





CCVS

Y

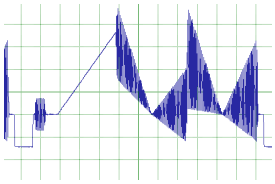
Cb = Cr

LINEARITY 17

TRIANGLE 2 Y, Cb, Cr *****

Description:
Like LINEARITY 16, but the polarity of Cb and Cr is inverted.

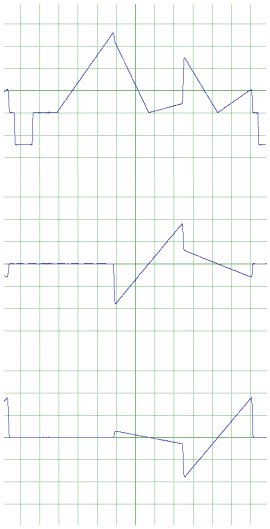
Applications:
See LINEARITY 16



CCVS

LINEARITY 18
NONLINEARITY TEST

Description:
Ramp signals in Y, Cb and Cr which in RGB mode give ramps with maximum level (0 to 100 IRE) and different gradients. The NONLINEARIY
TEST is generated to the IBA Code of Practice, 1987. This a valid composite signal.

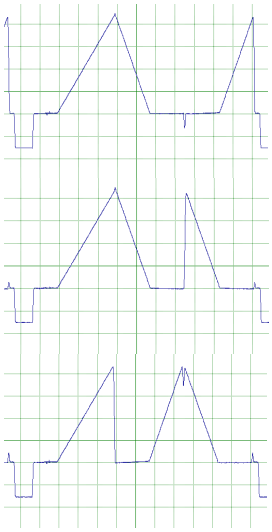


Y

Cb

Cr

Applications:
Testing nonlinearities in Y,Cb, Cr and for the most part with RGB using suitable spike filters (Code of Practice, Section 7, Ref. 7.50).



R

G

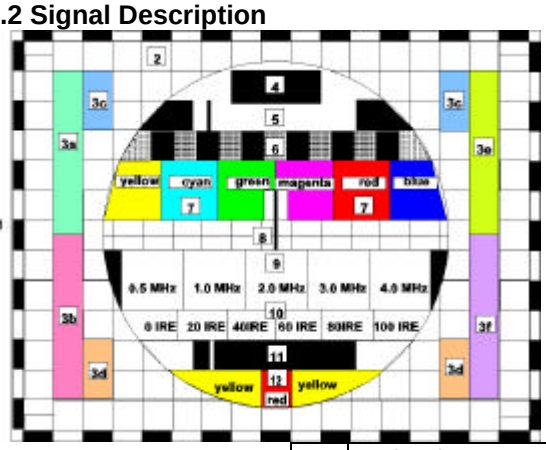
B

7. Signal Group MONITOR ADJUSTMENT

7.1 List of Signals

MONITOR ADJUSTMENT			
1	TEST PATTERN UNIVERSAL	18	MAGENTA FIELD
2	SMPTE BARS	19	RED FIELD
3	MONITOR SETUP PATTERN	20	BLUE FIELD
4	SYSTEM TEST PATTERN	21	BLACK
5	CROSS HATCH	22	GREY 50 IRE
6	CROSS HATCH CIRCLE	23	COLOUR BARS 77/7.5/77/7.5
7	CROSS HATCH DOTS	24	SPLIT FIELD
8	WINDOW PLUGE	25	ICE HOCKEY
9	CROSS HATCH WINDOW 1	26	YELLOW RED YELLOW
10	CROSS HATCH WINDOW 2	27	MOVING CROSS HATCH 1
11	CROSS HATCH WINDOW 3	28	MOVING CROSS HATCH 2
12	CROSS HATCH WINDOW 4	29	CROSS HATCH 16 : 9
13	SPOT	30	CROSS HATCH DOTS 16 : 9
14	WHITE 100 IRE	31	CROSS HATCH CIRCLE 16: 9
15	YELLOW FIELD	32	TEST PATTERN UNVERSAL 16 : 9
16	CYAN FIELD		
17	GREEN FIELD		

7.2 Signal Description



MONITOR ADJUSTMENT 1
TEST PATTERN UNIVERSAL 4 : 3

Applications:

This test pattern is in-ternationally used for testing TV receivers. It comprises a number of signal elements which permit virtually all distortions (e.g. of a receiver) to be seen at a glance.

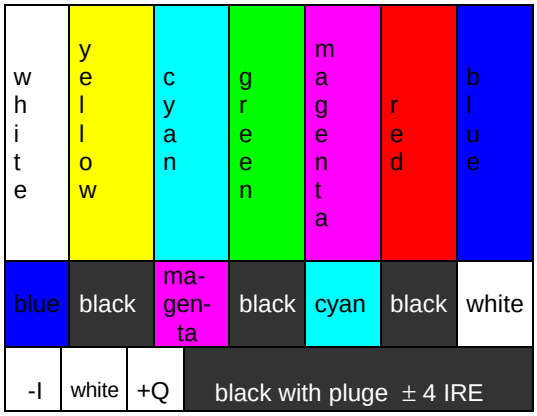
Description:
see above graphic
and table on right side

Applications (continued):
User specific texts can be entered into 3 pre-determined text fields from the front panel and via IEEE 488 bus. As with with all non moveable generator signals, a text line (up to 127 characters) whose position, back-ground and content can be selected by the user, is programmable

No.	Designation	Aspect checked
1	border	picture size, deflection,effect of blanking,synchronization
2	cross hatch, circle	convergence, linearity, beam deflection, focussing, gemetrical distortion
3	R-Y, G-Y and B-Y	colour decoding
3a	B-Y = 0, φ_{sc} = 270°	
3b	B-Y = 0, φ_{sc} = 90°	
3c	G-Y = 0, φ_{sc} = 326°	
3d	G-Y = 0, φ_{sc} = 146°	
3e	R-Y = 0, φ_{sc} = 180°	
3f	R-Y = 0, φ_{sc} = 0°	
4	black window (7.5 IRE) +pluge (if no text is inserted)	streaking, rounding, brightness adjustment of monitors
5	white window with negtive going 2T pulse	reflection
6	250 KHz squarewave (77IRE)	overshoot
7	colour bars (77/7.5/77/7.5)	colour characteristics
8	centre marker	picture centring
9	multiburst	resolution
10	5 step grey scale	linearity, brightness and contrast
11	black window (7.5 IRE) withpositive going 2T pulse (if no text is inserted)	reflection
12	yellow red yellow	chrominance / luminance delay differences

MONITOR ADJUSTMENT 2
SMPTE BARS

Description:



Colour bars

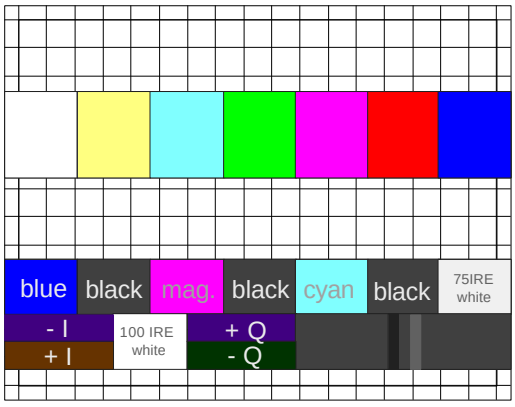
Reverse blue bars

IWQB plus pluge

Applications:
The "reverse blue bar " is arranged such below the regular colour bars that the blue channel is at full amplitude in both signals at the same time. For correct adjustment of the colour reproduction on a monitor, the red and green channels are disabled and the monitor is set such that the two bars cyan/magenta and magenta/cyan appear with the same brightness.The lower part of the signal contains a white pulse and a black signal with ± 4 IRE steps (pluge) for adjusting the monitor brightness and contrast as well as the colour reference signals - I and + Q for adjusting the correct phase relationship with the aid of a vectorscope.

MONITOR ADJUSTMENT 3
MONITOR SETUP PATTERN

Description:
The signal comprises the same components as the SMPTE bars signal. The individual components alternate with the cross hatch pattern, thus yielding a signal combination for complete monitor adjustment.

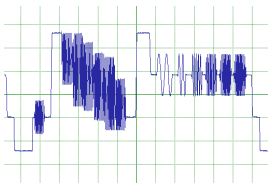


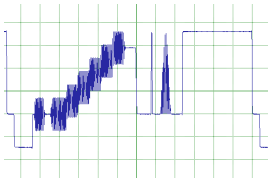
COLOUR BARS

REVERSE BLUE BARS

IWQB plus PLUGE

Applications:
See SMPTE BARS, MONITOR ADJUSTMENT 2



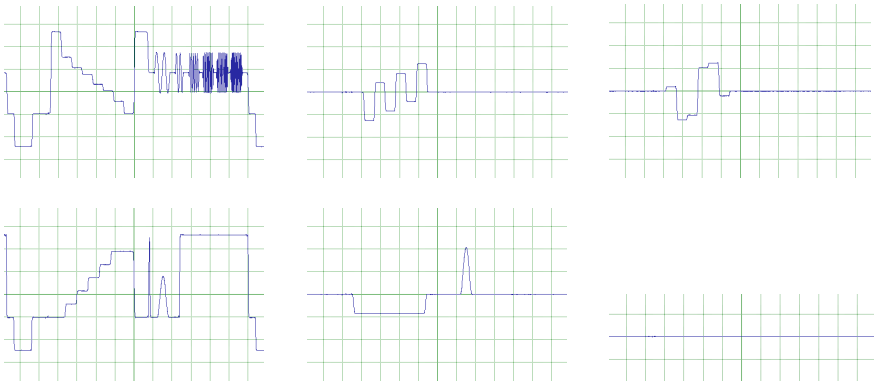


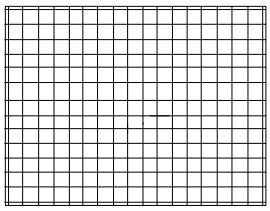
MONITOR ADJUSTMENT 4
SYSTEM TEST PATTERN

CCVS Description:
In the upper half of the picture, colour bars are displayed in the first half and the multiburst in the second half line.The lower half of the picture comprises the FCC COMPOSITE signal.

Applications:
CCVS The SYSTEM TEST PATTERN includes all essential signal elements for measuring linear and nonlinear disrortion.

Y **Cb** **Cr**



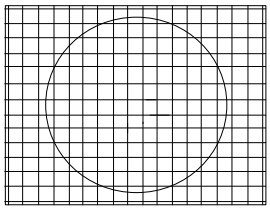


MONITOR ADJUSTMENT 5
CROSS HATCH

Description:

The signal comprises 18 vertical lines with a 2.77 µs spacing plus 14 horizontal lines. The vertical lines are produced by 2T pulses at 100 IRE amplitude whereas the horizontal lines are all white lines at 100 IRE amplitude.

Applications:
This signal permits convergence errors and geometrical distortion of TV receivers and monitors to be assessed. In case of convergence errors, the lines are no longer white but run into the three primary colours RGB. If geometrical distortion is present, the squares do not have the same size over the whole screen and are not quadratic.

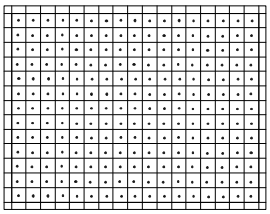


MONITOR ADJUSTMENT 6
CROSS HATCH CIRCLE

Description:

The signal comprises 18 vertical lines with a 2.77 µs spacing plus 14 horizontal lines. The vertical lines are produced by 2T pulses at 100 IRE amplitude whereas the horizontal lines are all white lines at 100 IRE amplitude.
Centered to the middle of the cross hatch a circle is overlayed at 100 IRE white.

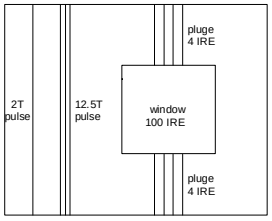
Applications:
This signal permits convergence errors and geometrical distortion of TV receivers and monitors to be assessed. In case of convergence errors, the lines are no longer white but run into the three primary colours RGB. If geometrical distortion is present, the squares do not have the same size over the whole screen and are not quadratic. Also the circle is a precise indicator for geometrical distortion.



MONITOR ADJUSTMENT 7
CROSS HATCH DOTS

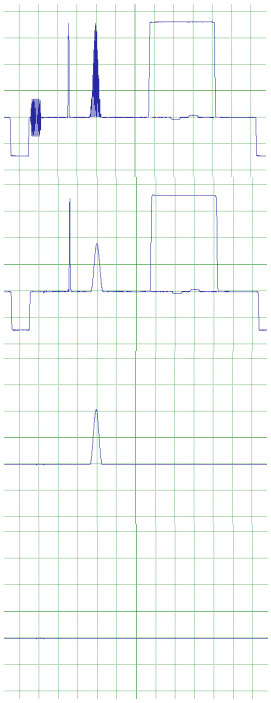
Description:
The signal comprises 18 vertical lines with a 2.77 µs spacing plus 14 horizontal lines. The vertical lines are produced by 2T pulses at 100 IRE amplitude whereas the horizontal lines are all white lines at 100 IRE amplitude.
In the centre of the squares one 2T pulse per field is located.

Applications:
This signal permits convergence errors and geometrical distortion of TV receivers and monitors to be assessed. In case of convergence errors, the lines are no longer white but run into the three primary colours RGB. If geometrical distortion is present, the squares do not have the same size over the whole screen and are not quadratic.



MONITOR ADJUSTMENT 8
WINDOW PLUGE

Description:
The WINDOW + PLUGE signal comprises the following signal elements:
The first vertical half of the full field signal includes a 2T pulse and a modulated 12.5T pulse with SC at φ = 0°



CCVS
Y
Cb
Cr

The second vertical half of the full field signal includes in the upper and the lower part

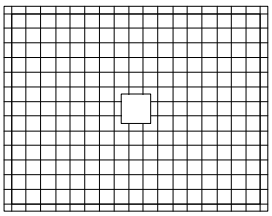
a PLUGE signal of ± 4 IRE

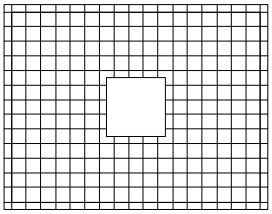
and in the centre

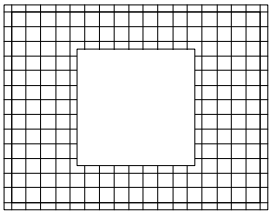
a white window.

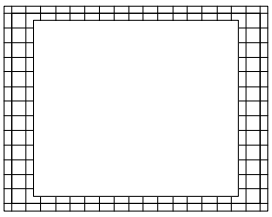
The signal elements are arranged on a black (0 IRE) background.

Applications:
Thanks to the integral window, field time tilts and line time tilts can be displayed. Reflections and echos are seen at the evaluation of the 2T pulse. The group delay and the amplitude response at the subcarrier is measured using the 12.5 T pulse.
The black alignment of monitors is done with the PLUGE signal.
(PLUGE = Picture line up generator)





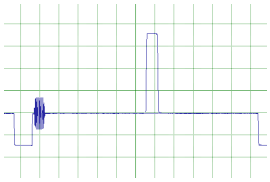




MONITOR ADJUSTMENT 9, 10, 11, 12
CROSS HATCH WINDOW 1, 2, 3, 4

Description:
In the centre of the screen there are white windows of various sizes surrounded by cross hatch pattern

Applications:
- beam current limiting for monitors
-linearity of the monitor deflection units at abrupt brightness transitions
- convergence settings

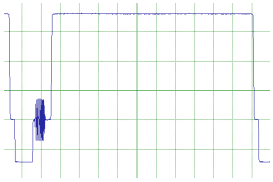


MONITOR ADJUSTMENT 13
SPOT

CCVS

Description:
In the centre of the active picture there is a 100 IRE white spot with a duration of 3 µs and a height of 19 lines per field.

Applications:
Measurement of the beam current of a CRT.



MONITOR ADJUSTMENT 14
WHITE 100 IRE

CCVS

Description:
This signal is a white bar with 100 IRE amplitude, which covers the whole active line.

Applications:
- testing clamping circuits at 100 IRE APL
- measuring noise voltage as a function of modulation
- testing the maximum beam current of CRTs

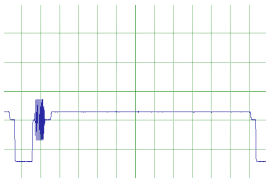
MONITOR ADJUSTMENT 15, 16, 17, 18, 19, 20

YELLOW
CYAN
GREEN
MAGENTA
RED
BLUE

Description:
The colours of the 77/7.5/77/7.5 colour bars are generated individually as full field signals.

Applications:
Checking colour monitors for colour purity when a particular colour covers the whole screen.

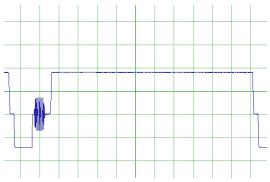
MONITOR ADJUSTMENT 21
BLACK



CCVS

Description:
The BLACKBURST furnishes all sync pulses and bursts. The active line is at 7.5 IRE.

Applications:This signal is used as genlock signal for external equipment (see also ITS 22) and for adjusting the black level at monitors.

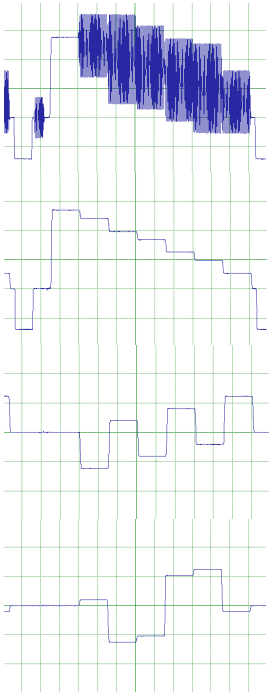


MONITOR ADJUSTMENT 22
GREY 50 IRE

CCVS

Description:
Grey signal with luminance level of 50 IRE.

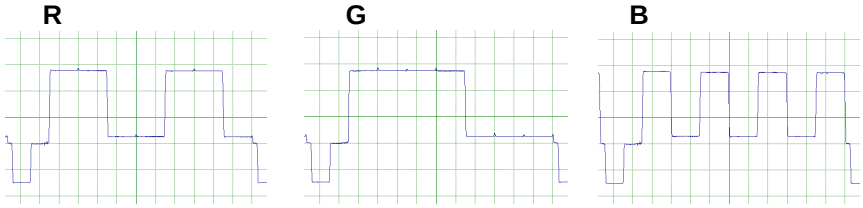
Applications:
- measuring the amplitude vs frequency response via externally loaded sweep signal



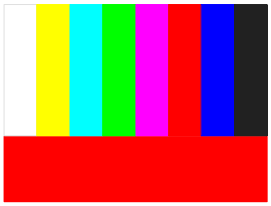
MONITOR ADJUSTMENT 23
COLOUR BARS 77/7.5/77/7.5

Description:
In accordance with RS - 189 - A the colour bars are produced with 77 IRE luminance amplitude and 77 IRE colour saturation at 7.5 IRE setup.

Applications:
The colour bars are the standard signal for checking and setting the phase and level of a CCVS and for a quick check of colour monitors. The colour coding in particular can be rapidly and simply checked with a vectorscope.



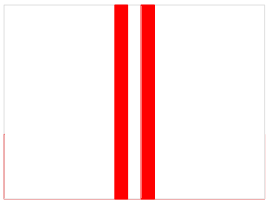
MONITOR ADJUSTMENT 24
SPLIT FIELD



Description:
The upper 2/3 of the screen shows theCOLOUR BARS 77/7.5/77/7.5 the lower 1/3 is filled with the colour of the red bar.

Applications:
This signal is used as tape leader on VTR recording and also as substitution signal when the program signal fails.

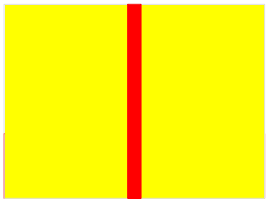
MONITOR ADJUSTMENT 25
ICE HOCKEY



Description:
On a 100 IRE white screen there are two vertical red bars (same red as 77/7.5/77/7.5 colour bars) which are symmetrical about the centre.

Applications:
Measuring the group delay between luminance and chrominance on the screen.

MONITOR ADJUSTMENT 26
YELLOW RED YELLOW



Description:
In the middle of a yellow screen (same yellow as 77/7.5/77/7.5 colour bars) there is a vertical red bar (same red as 77/7.5/77/7.5 colour bars).

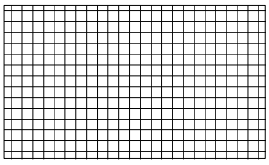
Applications:
Measuring the group delay between yellow (high Cb component), red (high Cr component) and the Y component.

MONITOR ADJUSTMENT 27, 28
MOVING CROSS HATCH 1, 2

Description:
The CROSS HATCH (MONITOR ADJ. 5) moves
from bottom to top and
from right to left

Applications:
Determining the motion vectors for digital signal processing with data reduction.

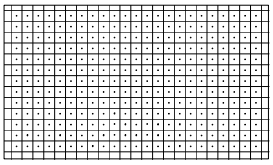
MONITOR ADJUSTMENT 29
CROSS HATCH 16 : 9



Description:
The signal comprises 24 vertical lines with a 2.08 µs spacing plus 14 horizontal lines. The vertical lines are produced by 2T pulses at 100 IRE amplitude whereas the horizontal lines are all white lines at 100 IRE amplitude.

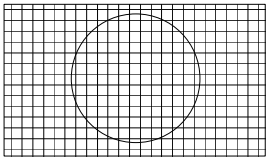
Applications:
This signal permits convergence errors and geometrical distortion of 16 : 9 TV receivers and monitors to be assessed.
In case of convergence errors, the lines are no longer white but run into the three primary colours RGB. If geometrical distortion is present, the squares do not have the same size over the whole screen and are not quadratic.

MONITOR ADJUSTMENT 30
CROSS HATCH DOTS 16 : 9



Description:
The signal comprises 24 vertical lines with a 2.08 µs spacing plus 14 horizontal lines. This is composing an aspect ratio of 16 : 9. The vertical lines are produced by 2T pulses at 100 IRE amplitude whereas the horizontal lines are all white lines at 100 IRE amplitude.
In the centre of square on 2T pulse per field is located.

Applications:
This signal permits convergence errors and geometrical distortion of 16 : 9 TV receivers and monitors to be assessed.
In case of convergence errors, the lines are no longer white but run into the three primary colours RGB. If geometrical distortion is present, the squares do not have the same size over the whole screen and are not quadratic.



MONITOR ADJUSTMENT 31
CROSS HATCH CIRCLE 16 : 9

Description:
The signal comprises 24 vertical lines with a 2.08 µs spacing plus 14 horizontal lines.This is composing an aspect ratio of 16 : 9. The vertical lines are produced by 2T pulses at 100 IRE amplitude whereas the horizontal lines are all white lines at 100 IRE amplitude.
Centered to the middle of the cross hatch a circle in 16 : 9 ratio is overlayed at 100 IRE white.

Applications:
This signal permits convergence errors and geometrical distortion of 16 : 9 TV receivers and monitors to be assessed.
In case of convergence errors, the lines are no longer white but run into the three primary colours RGB. If geometrical distortion is present, the squares do not have the same size over the whole screen and are not quadratic. Also the circle is a precise 16 : 9 indicator for geometrical distortion.

MONITOR ADJUSTMENT 32
TEST PATTERN UNIVERSAL 16 : 9

Description:
See MONITOR ADJUSTMENT 1

Applications:
See MONITOR ADJUSTMENT 1, but for aspect ratio 16 : 9

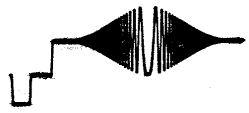
8. Signal Group ZONE PLATE

8.1 List of Signals

ZONE PLATE			
1	H LINEAR	4	HYPERBOLIC DIAGONAL
2	V LINEAR	5	HYPERBOLIC VERTICAL
3	CIRCULAR	6	VARIABLE ZONE PLATE

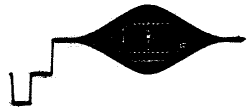
8.2 Signal Description

ZONE PLATE 1
H LINEAR

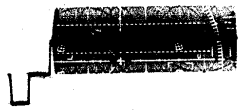


The figures show the zone plates :
H LINEAR (ZONE PLATE 1),

CIRCULAR (ZONE PLATE 3),



HYPERBOLIC DIAGONAL (ZONE PLATE 4) and



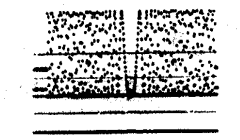
HYPERBOLIC VERTICAL (ZONE PLATE 5)
through a 231 ns Thomson low pass filter. It is easy to see that all three signals provide the same information about the amplitude vs frequency response within one line.

The HYPERBOLIC VERTICAL zone plate however appears to be inaccessable to analysis in H frequent display on the oscilloscope. TheHYPERBOLIC VERTICAL zone plate is similar to the V SWEEP and therefore to be measured in a V frequent display.

Description:
Signal like H SWEEP 5.5 MHz - 0 - 5.5 MHZ (ITS 8, 9, 10, 11)
generated using the equation:
$A(x,y,t) = \text{const.} + \sin (k_0 + k_x x + k_{x^2} x^2 + k_t t + k_{t^2} t^2)$
Applications:
See Annex 2 ZONE PLATE SIGNALS.

ZONE PLATE 2

V LINEAR



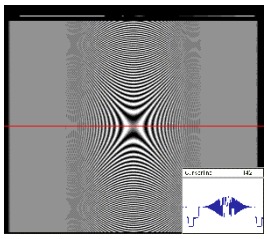
V LINEAR

Description:
Field repetitive signal which starts with a high vertical frequency at the top of the screen goes through a vertical frequency minimum at the centre of the screen and at the bottom of the screen again rises to a high vertical frequency.
This signal obeys the following equation:

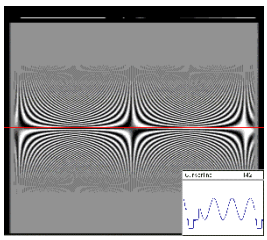
$A(x,y,t) = \text{const.} + \sin (k_0 + k_y y + k_{y^2} y^2 + k_t t + k_{t^2} t^2)$

Applications:
See Annex 2 ZONE PLATE SIGNALS.

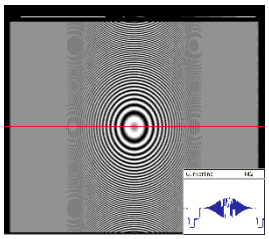
ZONE PLATE 3, 4, 5, 6



CIRCULAR



HYPERBOLIC DIAGONAL



VERTICAL

VARIABLE

Description / Applications:
See Annex 2 ZONE PLATE SIGNALS.

9. Signal Group CCIR 601 (Option)

9.1 List of Signals

CCIR 601	
1 GREY LEVEL	21 PATHOL.SIGNAL Y=088h C=100h
2 ALTERNATING BLACK/WHITE	22 PATHOL.SIGNAL Y=044h C=080h
3 EOL PULSE	23 PATHOL.SIGNAL Y=022h C=040h
4 BLACK/WHITE	24 PATHOL.SIGNAL Y=011h C=020h
5 RAMP YELLOW/GREY	25 PATHOL.SIGNAL Y=008h C=210h
6 RAMP GREY BLUE	26 PATHOL.SIGNAL Y=198h C=108h
7 RAMP CYAN GREY	27 PATHOL.SIGNAL Y=004h C=300h
8 RAMP GREY RED	28 PATHOL.SIGNAL Y=0CCh C=180h
9 RAMP CB Y CR Y	29 PATHOL.SIGNAL Y=066h C=0C0h
10 EOL BAR WHITE	30 PATHOL.SIGNAL Y=033h C=060h
11 EOL BAR BLUE	31 PATHOL.SIGNAL Y=019h C=230h
12 EOL BAR RED	32 PATHOL.SIGNAL Y=00Ch C=318h
13 EOL BAR YELLOW	33 PATHOL.SIGNAL Y=006h C=18Ch
14 EOL BAR CYAN	34 DIG.COL.BARS 100/0/100/0
15 SEQUENCE 1010	35 DIG.COL.BARS 100/0/75/0
16 SEQUENCE 11001100	36 RAMP Y
17 SEQUENCE 111000111000	37 RAMP Y CB CR
18 SDI CHECK FIELD	38 RAMP CB
19 PATHOL.SIGNAL Y=198h C=300h	39 RAMP CR
20 PATHOL.SIGNAL Y=110h C=200h	

When the CCIR 601 option is used **all** generator signals are output via the parallel and the serial (270 Mbit/s) data interface. These signals include all modifications which can be set from the "signal variation " panel on the instrument and which influence the Y, Cb and Cr components.
Test sequences according to CCIR Rep. 1212, pathalogical signals for cable equalizers and PLLs used in the serial interface and special ramp signals listed above are also output in the analogue CCVS, Y Cb Cr and RGB formats.

9.2 Signal Description

See Annex 1: ITU-R BT. 801 Section 3. Examples of 4:2:2 test signals and
Annex 2: Pathological Signals