CCVS + Component Generator SAF
CCVS Generator SFF

Multi-standard generators for all TV applications

- Several hundred test signals to suit every application
- Easy definition of additional signals via front panel, storage in built-in RAM or on memory card

- Setting of amplitude, H/V and colour subcarrier frequency as well as of other signal parameters
- Genlock operation: selection of phase between input signal and generator signal

- Insertion of internally generated test, data and teletext lines as well as of signals from a maximum of two external sources
- System compatibility thanks to IEC 625/IEEE 488 bus

ROHDE & SCHWARZ

Characteristics

The TV Generators SAF and SFF are two multi-standard instruments suitable for all applications in the field of television. They provide signals according to the BG/PAL and M/NTSC standards which are used worldwide and also generate signals to M/PAL and N/PAL standards.

The CCVS + Component Generator SAF supplies test signals in CCVS, YC_BC_R, RGB and S-VHS formats, for test patterns an aspect ratio of 4:3 or 16:9 being selectable for the adjustment of monitors. Where the CCVS format is required only, the attractively priced CCVS Generator SFF can be used. In both generators the digital signal format to CCIR 601 can optionally be implemented in parallel and serial form.

Both generators allow complex signal variations via menus:

AMPLITUDE

- CCVS, CVS, chroma, sync, burst, setup and YC_BC_R can be varied continuously
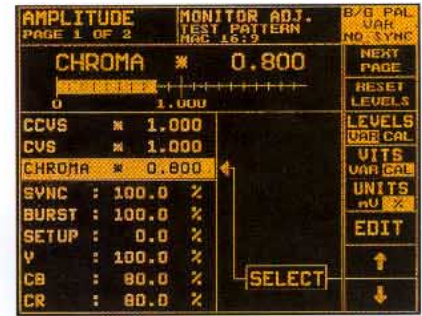- The RGB channels can be switched off individually; a sync pulse can be added to each of these components

PHASE/TIME

- Setting the SC/H phase
- The synchronized mode enables the user to select the timing of the generator signal with respect to the program signal as well as the phase of the generator colour subcarrier relative to the program colour subcarrier
- Varying the horizontal frequency by ±5%
- Free setting of colour subcarrier frequency in range 100 Hz to 6 MHz
- Selection of burst duration, position and rise time as well as of sync duration and rise time
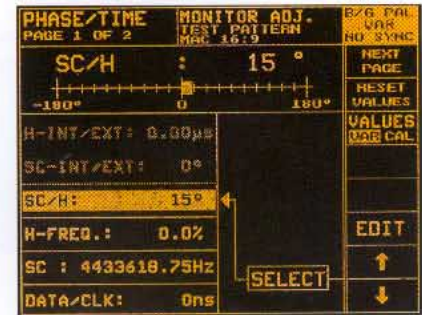
SIGNAL EDIT

- Definition of signals via front panel and storage in built-in, battery-backed RAM or externally on memory card

A signal line is described as a list of signal elements using a simple language. All parameters of the signal elements can be varied separately by means of the spinwheel or the keyboard. The generator output signal reflects the variation of parameters. For instance, it is thus possible to change the amplitude of the luminance bar to test amplitude control circuits, white-level limiters or video analyzers over the whole range of the device under test. The frequencies of individual sine-wave burst elements, phase, timing and rise times can also be varied easily and rapidly.

The full field (pattern) is defined similarly by listing line commands. This can be done using user-defined or factory-stored test lines.

Another way of editing signals is by forming sequences of predefined patterns. Test signals made up of moving elements can thus be defined.
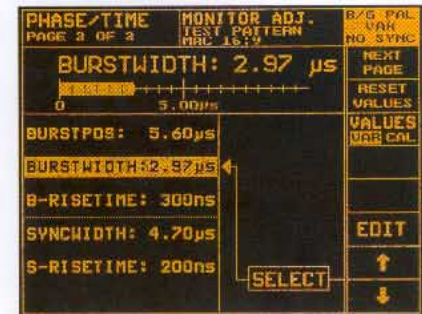

The large-size EL display and softkeys make complex signal variations, eg of amplitude, easy...

...and enable time-related settings like phase and reference clock ...
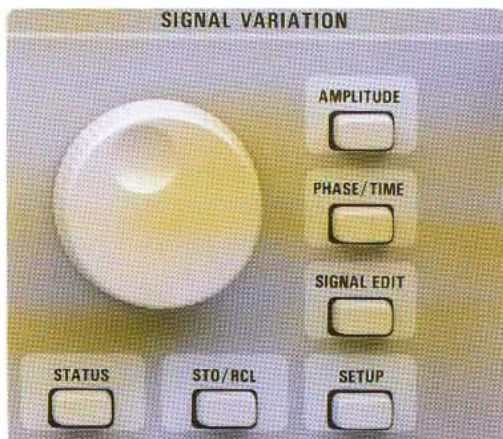
...or burst and sync pulse

The different setting menus can be called up with a keystroke

SETUP

- Switchover between BG/PAL, M/NTSC, M/PAL and N/PAL standards
- Free programming of test-line coding and monitoring
- Teletext and data line insertion
- Dataline coder
- Superimposed hum (frequency, amplitude and waveform selectable)
- Superposition of external signal
- Entry of customer-specific texts as source identification or scrolling text
- Program monitoring + substitution pattern
- General device setups

STO/RCL

- Storage of device setups and signals in built-in, battery-backed RAM or externally on memory card
- Recall of device setups or signals from built-in RAM or memory card
- Copying from and to RAM and memory card

STATUS

- Indication of current device setup
- Four keys with definable functions for fast callup of frequently used functions

Use in digital TV studios

The optional digital video interface to CCIR 601 makes SAF and SFF suitable for use in digital TV studios. In addition to the analog video signals, a parallel and two serial digital video signals are thus simultaneously available. The generators furthermore produce all test signals to CCIR Rec. 801, a variety of common pathological test signals as well as shallow ramps with 10-bit resolution. The timing of the reference clock at the parallel digital output can be shifted relative to the video data. All amplitude variations (except sync and burst) also influence the data contents of the digital video signals.

Description

The generator section of TV Generators SAF and SFF is of digital design. A transputer – a high-speed RISC processor – calculates the three components Y, C_B and C_R of all test signals which in CCVS + Component Generator SAF are applied to three D/A converters. An analog matrix converts the three components into the RGB format. Therefore the RGB signals are always made available simultaneously with the YC_BC_R components. The digital CCVS in the SAF and SFF is determined from the YC_BC_R components in realtime with the aid of two LSI gate arrays.

The first array ensures accurate digital coupling of line and colour subcarrier frequency, while the second array acts as a digital colour subcarrier modulator. Strict compliance with the SC/H phase for the BG/PAL, M/NTSC, M/PAL and N/PAL standards is thus always ensured.

For the S-VHS format, the Y component of the CCVS is digitally switched off. The resulting chroma signal yields together with the Y component of the YC_BC_R signal the S-VHS format.

The test signals defined in accordance with CCIR and FCC/NTSC as well as all other test signals including user-defined signals can be inserted into the blanking intervals of the internal generator signal or of any program signal.

Synchronization of the generator signal with the program signal takes account of the correct allocation of the 8(4)-field sequence in BG/PAL (M/NTSC). If the program signal is not to standard, it is thus always ensured that the generator signal complies with the standard.

12 signal groups can be selected via the front-panel keys:

ITS

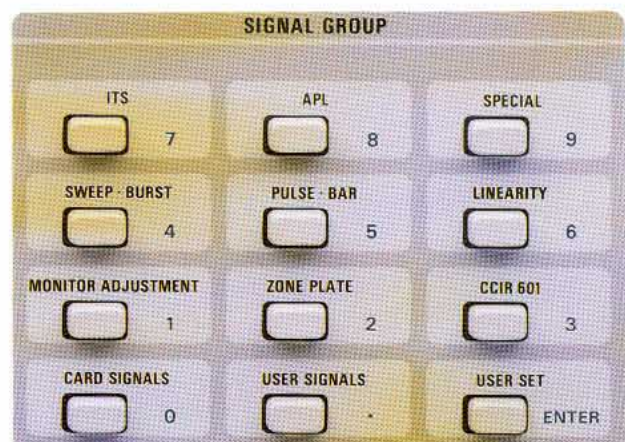All test signals to CCIR, FCC or national standards

APL

Average picture level: 3/4 lines monochrome, one selectable signal line; bounce

SPECIAL

Split level, coring, sin x/x, bowtie and many other special signals, optional PALplus test pattern

12 different signal groups can be called up via the front panel

SWEEP·BURST

H and V sweep, multiburst, V sweep with adjustable marker, sinewave signal with selectable frequency (line-coupled phase)

PULSE·BAR

Squarewave and $\cos^2$ pulses

LINEARITY

Sawtooth and staircase signals

MONITOR ADJUSTMENT

Test patterns 4:3 and 16:9, colour bars, pluge, crosshatch

ZONE PLATE

Linear, circular and hyperbolic zone plates, variable zone plate signal with freely selectable coefficients k_x, k_{x2}, k_{xy}, k_y, k_{y2}; coefficients k_Φ, k_t, k_{t2} freely adjustable for every zone plate

CCIR 601 (option)

Signals to CCIR Rec. 801, pathological signals, digital shallow ramps

CARD SIGNALS

All signals stored on plugged-in memory card

USER SIGNALS

All signals stored in RAM

USER SET

The last seven signals selected; this set can be "frozen" at any time

Each of the 12 signal groups consists of up to eight signal menu pages, each page may contain seven signals

12 signal groups

SWEEP · BURST

8th page
3rd page
2nd page
1st page

–H sweep
–V sweep
–CCIR 18/1
–CCIR 18/2
–Multipulse
–Coring
–RGB sweep

PULSE · BAR

MONITOR ADJUSTMENT

8th page
4th page
3rd page
2nd page
1st page

–Test pattern, universal
–Test pattern FuBK
–Test pattern MAC
–Crosshatch
–Crosshatch circle
–Crosshatch dots
–Window + pluge

MEMORY CARD
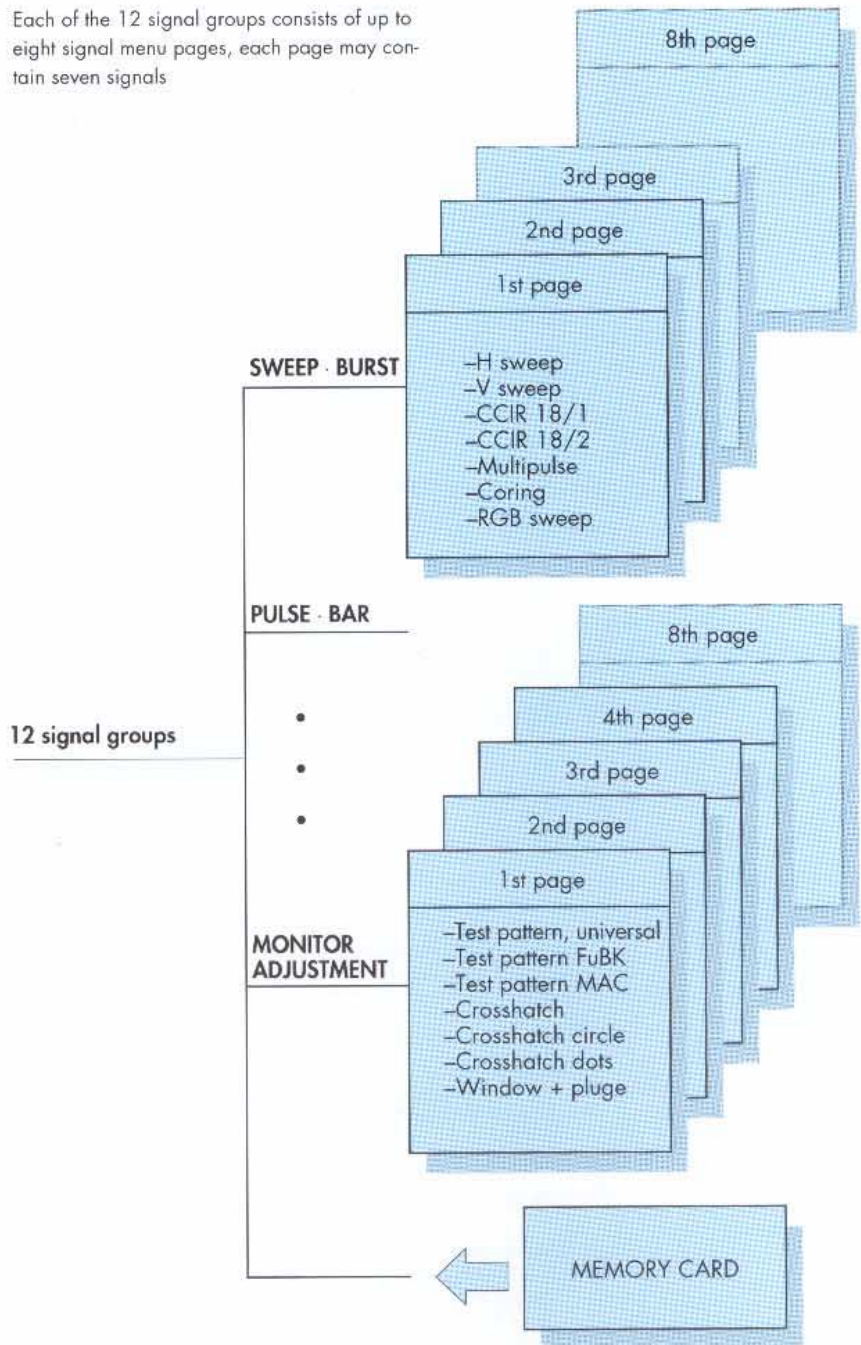
Rear view of SAF
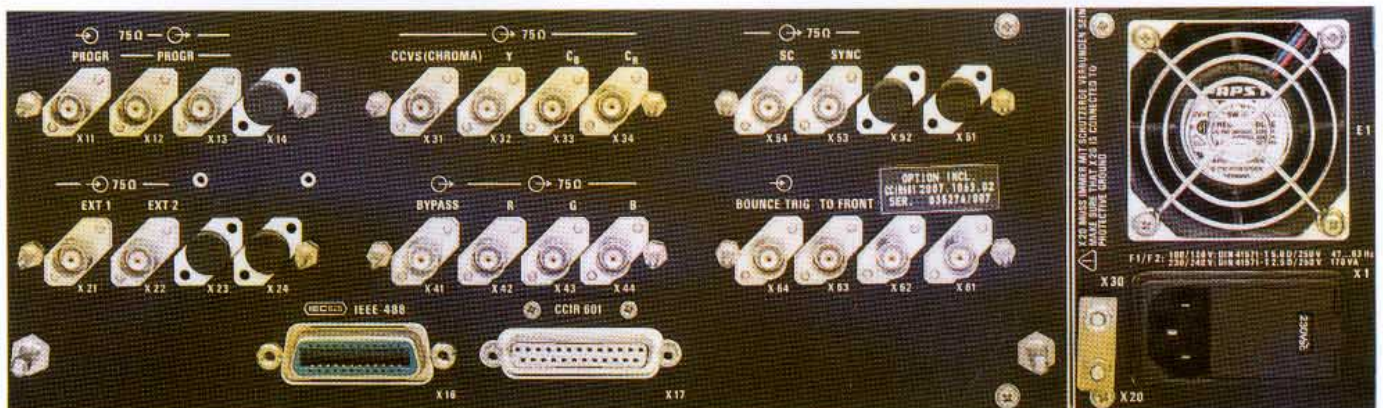
Specifications

Inputs/outputs

	BNC female connectors, 75 Ω
Return loss	≥34 dB (up to 6 MHz)
Sync output	2 V into 75 Ω
SC (colour subcarrier)	2 V_{pp} into 75 Ω
Bounce trigger (input)	TTL levels, Z_{in} approx. 10 kΩ, for external triggering of bounce function
Bypass	0 V/5 V for controlling the bypass circuit in a junction panel, Z_{out} approximately 20 Ω
EXT inputs	2 inputs for inserting external signals into test line range or superimposing an external signal on the generator signals
Connector	BNC, 75 Ω
Gain	0 ± 0.1 dB
Differential gain	≤0.3%
Differential phase	≤0.3°
Clamping modes	– gated clamping to back porch – clamping to negative signal peak (EXT2 only) – AC-coupled signal (EXT2 only)
Superposition (EXT2 only)	– anywhere – in active picture range

Amplitude adjustment

via front panel or IEC/IEEE bus, variable in the range 0 to 140%[1] are the signal components CCVS, CVS, chroma, sync pulse, burst, setup and components Y, C_B, C_R

Phase/time adjustment

$H_{INT} - H_{EXT}$	±9 μs
$SC_{INT} - SC_{EXT}$	0 to 360°
SC/H phase	−180° to +180°
Horizontal frequency	±5% (burst switched off from +1.5%)
Colour subcarrier frequency	100 Hz to 6 MHz
Burst position, duration, rise time, sync duration, rise time	setting range of a parameter always depending on settings of other parameters

Program path (Genlock)

Input/output	BNC, 75 Ω
Amplitude-frequency response	±0.1 dB (up to 6 MHz)
Group-delay error	≤5 ns (up to 5.5 MHz)
Differential gain	≤0.2%
Differential phase	≤0.2°
S/N ratio (rms, weighted, 0.2 to 5 MHz)	≥78 dB
Test signal insertion Level	same as generator signal – CAL (normal mode) – setting of CVS up to V_{pp} = 1.2 V, for testing automatic gain control circuits, video analyzers, etc.

Insertion range		BG/PAL, N/PAL	M/NTSC	M/PAL
	in 1st field	lines 6 to 22	10 to 22	10 to 22
	in 2nd field	319 to 335	10 to 21	273 to 284

Teletext signals

	5 pages and teletext meas. line	eye test pattern and teletext meas. line
Amplitude V_{pp}	462 ± 5 mV	500 ± 5 mV
Eye height	≥96%	≥96%
Clock	6.9375 MHz	5.72727 MHz

Data lines

4 sequences programmable via front panel and IEC/IEEE bus

Amplitude V_{pp}	500 ± 5 mV
Coding	biphase coding
Clock	5 MHz

Remote-control interface

to IEC 625-2 (IEEE 488), for controlling all generator functions

CCVS

Level tolerances

Standard	BG/PAL, N/PAL	M/NTSC, M/PAL
Nominal luminance level (cal.)	700 ± 4 mV	714 ± 4 mV
Nominal chrominance level (cal.)	700 ± 7 mV	714 ± 7 mV
Departure		
at nominal 500 to 700 mV	±1%	±1%
at nominal <500 mV	±5 mV	±5 mV
Squarewave pulses, staircase and sawtooth signals	nominal ± 4 mV	nominal ± 4 mV
2T pulse	nominal ± 5 mV	nominal ± 5 mV
10T and 20T pulses	nominal ± 7 mV	nominal ± 7 mV
12.5T pulses	–	nominal ± 7 mV

Amplitude-frequency response

Multipulse, multiburst, sweep signals	up to 5.5 MHz	±0.1 dB
	5.5 to 6 MHz	±0.15 dB

Group delay

10T and 20T pulses (modulated with frequencies ≤5 MHz)	≤5 ns

Rise times (10 to 90%) and half-amplitude duration

(also for YC_BC_R signals)

Sync rise time		200 ± 5 ns (PAL, 625 lines) 140 ± 5 ns (NTSC, 525 lines)
Luminance	rise times	125 to 2000 ns
	tolerances	125 to 249 ± 5 ns 250 to 999 ± 10 ns 1000 to 2000 ± 30 ns
Chrominance	rise times	150 to 2000 ns
	tolerances	150 to 299 ± 5 ns 300 to 999 ± 10 ns 1000 to 2000 ± 30 ns

Line-time nonlinearity

5-step staircase	≤0.8%

Chrominance phase

Phase between R-Y and B-Y axes	90° ± 1°
Maximum departure of chrominance phase from nominal	±2°

S/N ratio

rms, weighted, 0.2 to 5 MHz

Measured on all-black picture	≥78 dB
Measured on sawtooth signal	≥70 dB

Sync frame

	PAL	NTSC
	sync frame and burst phase to CCIR Rec. 624-3	coupled with stable SC/H phase (to RS-170 A)
SC/H phase (calibrated)	0 ± 5°	0 ± 5°
V component	can be disabled for special measurements	

The tolerances in S-VHS format correspond to those of CCVS

Component signals

YC_BC_R
(for 525/625 lines, not in SFF)

	Y signal	C_B, C_R signal
Squarewave, staircase signals	nominal ± 4 mV	nominal ± 7 mV
Sawtooth signals	nominal ± 7 mV	nominal ± 7 mV
2 to 20T pulses	nominal ± 7 mV	–
3 to 20T pulses	–	nominal ± 7 mV
Sweep, multiburst signals		
0 to 5.5 MHz	nominal ± 7 mV	nominal ± 7 mV
5.5 to 6 MHz	nominal ± 10 mV	nominal ± 10 mV

RGB

Each component can be disabled separately; the rise times are determined by those of the YC_BC_R signals

Amplitude error	same as YC_BC_R signal components
Matrixing error	±1%
Matrixing frequency response	±0.2 dB (up to 6 MHz)
Sync pulse (can be added to or removed from each component)	300 ± 7 mV

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[1] The CCVS must not exceed 1.6 V_{pp}

Option CCIR 601

Standards	625 lines/50 Hz, 525 lines/60 Hz
Systems	CCIR Rec. 601/656 (4:2:2)
	SMPTE 125M/259M
Signals	– to CCIR Rec. 801 with 10-bit resolution
	– pathological signals for testing the serial digital interface with 10-bit resolution
	– digital shallow ramps with 10-bit resolution
	– all other SAF/SFF signals with 9-bit resolution; the 10th bit can be switched to 0, 1 or to alternating 0/1 operation for each Y, C_B and C_R component

Outputs

1 parallel output

	27 Msample/s
Amplitude	ECL level
Rise/fall time (20%/80%)	<5 ns
Clock pulse width	18.5 ns ±3 ns
Clock/data delay	18.5 ns ±3 ns
Clock/data setting range	±10 ns
Connector	25-contact Sub D (ISO 2110-1980)

2 serial outputs

	270 Mbit/s (D1 format)
Amplitude	800 mV$_{pp}$ ±10% into 75 Ω
Rise/fall time (20%/80%)	0.75 to 1.5 ns
Output impedance	75 Ω
Return loss	≥15 dB from 10 to 270 MHz
Connector	BNC

General data

Operating temperature range	+5 to +45 °C
Storage temperature range	–40 to +70 °C
Mechanical resistance	
Sinusoidal vibration	5 to 150 Hz, max. 2 g at 55 Hz, 0.5 g from 55 to 150 Hz, to IEC 68-2-6, IEC 1010-1, MIL-T-28800 D class 5
Random vibration	10 to 300 Hz, 1.2 g$_{rms}$
Shock	40 g shock spectrum, to MIL-STD 810 C and MIL-T-28800 D classes 3 and 5
Climatic resistance	+25/+40 °C cyclic at 95% rel. humidity, to IEC 68-2-30
Electromagnetic compatibility	to EMC directive of EU (89/336/EEC) and German EMC law
Electrical safety	to EN 61010-1
Power supply	100/120/230/240 V +10/–15%, 47 to 63 Hz, 100 VA (SAF), 80 VA (SFF)
Dimensions (W x H x D)	435 mm x 147 mm x 460 mm
Weight	SAF: 16.5 kg
	SFF: 15.5 kg

Ordering information

Order designation

CCVS + Component Generator	SAF	2007.1005.02
CCVS Generator	SFF	2007.1057.02

Options

Digital Video Interface	SAF-Z1	2007.1063.02
	SFF-Z1	2007.1063.03
PALplus Test Pattern	SAF-B20	2007.1011.02

Accessories supplied   power cable, fuses

Recommended extras

Memory Card 32 Kbyte	ZZM-32	2005.4394.02
Memory Card 512 Kbyte	ZZM-512	2005.4388.02
Service Kit (containing adapter boards, adapter cable and service manual)	SAF-Z	2007.1111.00
	SFF-Z	2007.1105.00
Handles and screws		0396.5153.00

Certified Quality System
ISO 9001
DQS REG. NO 1954-02

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