

((Titelbild wie beim alten Datenblatt))

## 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

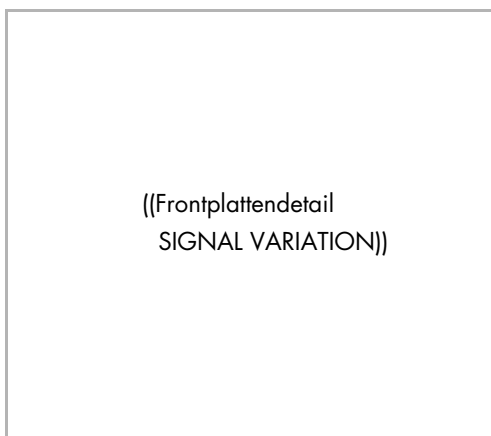
The TV Generators SAF and SFF are two multi-standard instruments suitable for all applications in the field of television. They provide signals according to the BG/PAL and M/NTSC standards which are used worldwide and also generate signals to M/PAL and N/PAL standards.

The CCVS + Component Generator SAF supplies test signals in CCVS,  $YCbCr$ , 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  $YCbCr$  can be varied continuously
- The RGB channels can be switched off individually; a sync pulse can be added to each of these components



The different setting menus can be called up with a keystroke

### 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  $\pm 5\%$
- 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

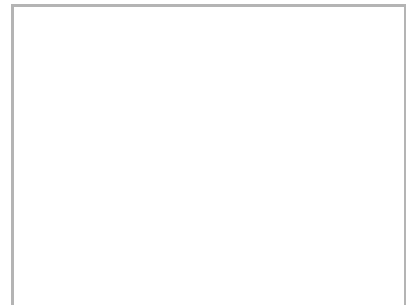
### SIGNAL EDIT

- 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

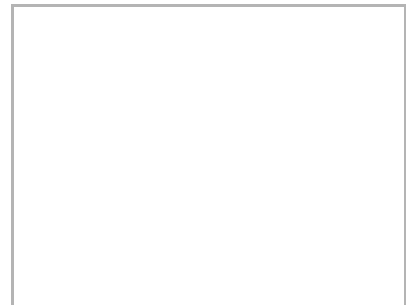


The large-size EL display and softkeys make complex signal variations, eg of amplitude, easy...



...and enable time-related settings like phase and reference clock ...

...or burst and sync pulse



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.

## 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  $Y C_B C_R$  components. The digital CCVS in the SAF and SFF is determined from the  $Y C_B C_R$  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  $Y C_B C_R$  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

((Frontplattendetail  
SIGNAL GROUP))

**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<sup>2</sup> 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  $k_x, k_{x^2}, k_{xy}, k_y, k_{y^2}$ ; coefficients  $k_\phi, k_t, k_{t^2}$  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

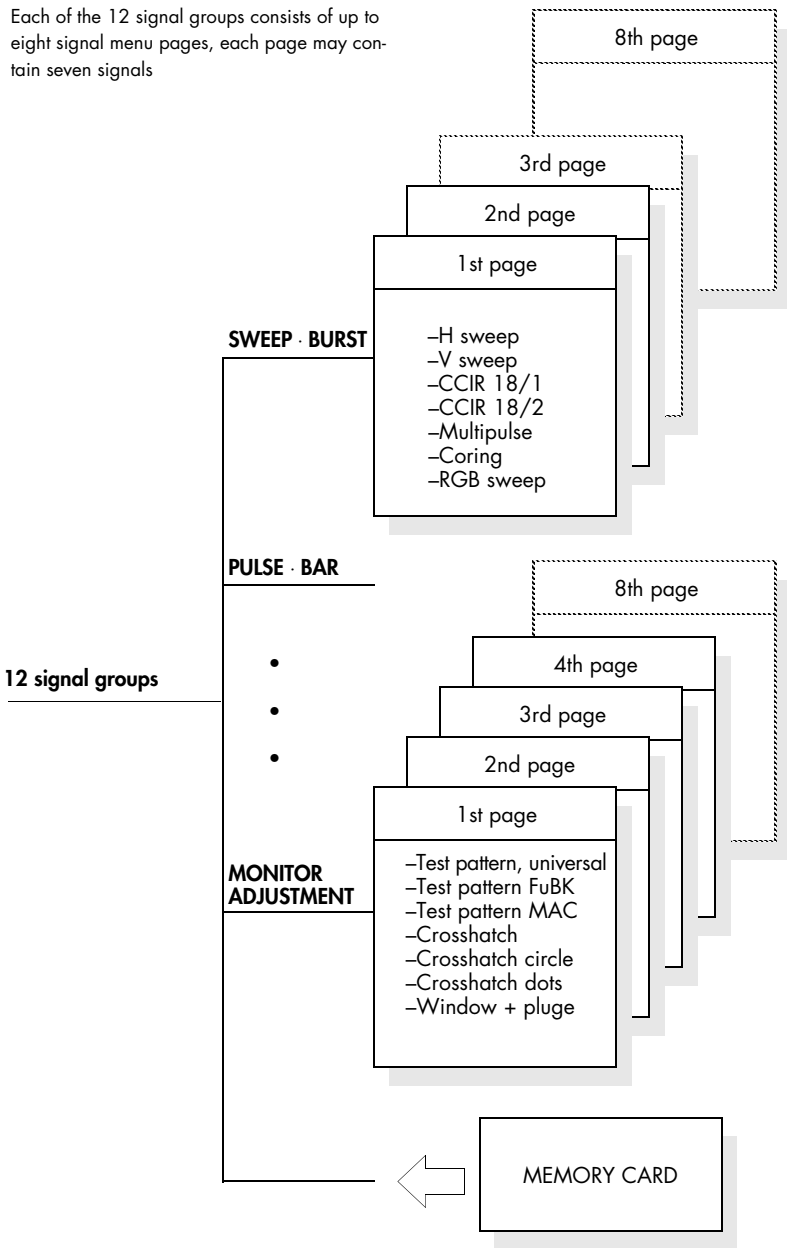
**USER SIGNALS**

All signals stored in RAM

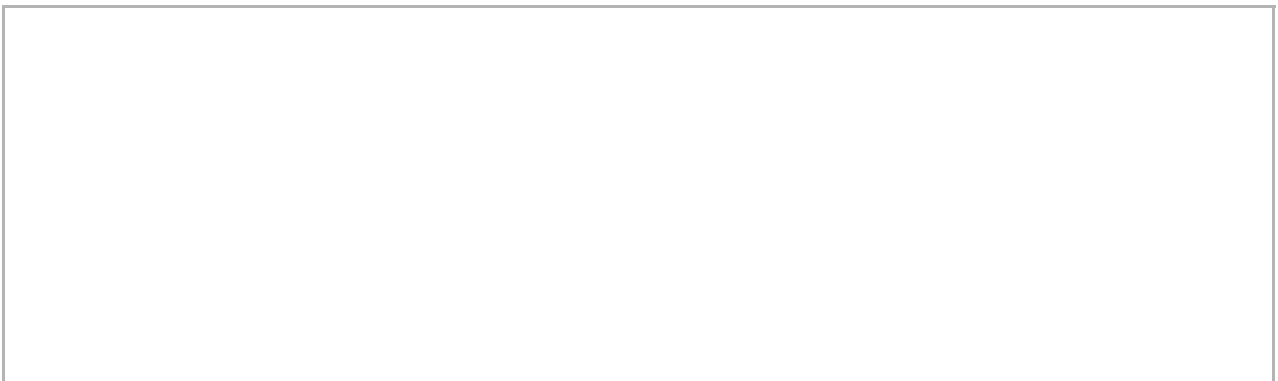
**USER SET**

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



Rear view of SAF



## Specifications

|   |  |
|---|--|
| <b>Inputs/outputs</b>   | 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 <sub>pp</sub> into 75 Ω  |
| Bounce trigger (input)  | TTL levels, Z <sub>in</sub> approx. 10 kΩ, for external triggering of bounce function  |
| Bypass  | 0 V/5 V for controlling the bypass circuit in a junction panel, Z <sub>out</sub> 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<br>– clamping to negative signal peak (EXT2 only)<br>– AC-coupled signal (EXT2 only)<br>– anywhere<br>– in active picture range   |
| Superposition (EXT2 only)                                     |  |
| <b>Amplitude adjustment</b>                                   | via front panel or IEC/IEEE bus, variable in the range 0 to 140% <sup>1)</sup> are the signal components CCVS, CVS, chroma, sync pulse, burst, setup and components Y, C <sub>B</sub> , C <sub>R</sub> |
| <b>Phase/time adjustment</b>                                  |  |
| H <sub>INT</sub> – H <sub>EXT</sub>                           | ±9 μs  |
| SC <sub>INT</sub> – SC <sub>EXT</sub>                         | 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  |
| <b>Program path (Genlock)</b>                                 |  |
| 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<br>– CAL (normal mode)<br>– setting of CVS up to V <sub>pp</sub> = 1.2 V, for testing automatic gain control circuits, video analyzers, etc.                                  |
| <b>Teletext signals</b>                                       |  |
| Amplitude V <sub>pp</sub>                                     | 462 ± 5 mV   |
| Eye height  | ≥96%   |
| Clock   | 6.9375 MHz   |
| <b>Data lines</b>   |  |
| Amplitude V <sub>pp</sub>                                     | 500 ± 5 mV   |
| Coding  | biphase coding   |
| Clock   | 5 MHz  |
| <b>Remote-control interface</b>                               | to IEC 625-2 (IEEE 488), for controlling all generator functions   |

## CCVS

|   |               |  |  |
|---|---------------|--|--|
| <b>Level tolerances</b>   |               | <b>BG/PAL, N/PAL</b>                                       | <b>M/NTSC, M/PAL</b>                         |
| <b>Standard</b>   |               |  |  |
| 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                               |
| <b>Amplitude-frequency response</b>   |               |  |  |
| Multipulse, multiburst, sweep signals   | up to 5.5 MHz | ±0.1 dB  |  |
|   | 5.5 to 6 MHz  | ±0.15 dB   |  |
| <b>Group delay</b>  |               |  |  |
| 10T and 20T pulses (modulated with frequencies ≤5 MHz)  |               | ≤5 ns  |  |
| <b>Rise times (10 to 90%) and half-amplitude duration</b>   |               |  |  |
| (also for YC <sub>B</sub> C <sub>R</sub> 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                                       |  |
| <b>Line-time nonlinearity</b>   |               |  |  |
| 5-step staircase  |               | ≤0.8%  |  |
| <b>Chrominance phase</b>  |               |  |  |
| Phase between R-Y and B-Y axes  |               | 90° ± 1°   |  |
| Maximum departure of chrominance phase from nominal   |               | ±2°  |  |
| <b>S/N ratio</b>  |               |  |  |
| rms, weighted, 0.2 to 5 MHz   |               | ≥78 dB   |  |
| Measured on all-black picture   |               | ≥70 dB   |  |
| Measured on sawtooth signal   |               |  |  |
| <b>Sync frame</b>   |               | <b>PAL</b>   | <b>NTSC</b>                                  |
|   |               | 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 |  |
| <b>Component signals</b>  |               |  |  |
| <b>YC<sub>B</sub>C<sub>R</sub></b>  |               | <b>Y signal</b>  | <b>C<sub>B</sub>, C<sub>R</sub> signal</b>   |
| (for 525/625 lines, not in SFF)   |               | nominal ± 4 mV   | nominal ± 7 mV                               |
| Squarewave, staircase signals   |               | nominal ± 7 mV   | nominal ± 7 mV                               |
| Sawtooth signals  |               | nominal ± 7 mV   | –  |
| 2 to 20T pulses   |               | –  | nominal ± 7 mV                               |
| 3 to 20T pulses   |               |  |  |
| Sweep, multiburst signals   |               | nominal ± 7 mV   | nominal ± 7 mV                               |
| 0 to 5.5 MHz  |               | nominal ± 10 mV  | nominal ± 10 mV                              |
| 5.5 to 6 MHz  |               |  |  |
| <b>RGB</b>  |               |  |  |
| Each component can be disabled separately; the rise times are determined by those of the YC <sub>B</sub> C <sub>R</sub> signals |               |  |  |
| Amplitude error   |               | same as YC <sub>B</sub> C <sub>R</sub> 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   |  |

<sup>1)</sup> The CCVS must not exceed 1.6 V<sub>pp</sub>

### Option CCIR 601

|           |   |
|-----------|---|
| Standards | 625 lines/50 Hz, 525 lines/60 Hz<br>CCIR Rec. 601/656 (4:2:2)   |
| Systems   | SMPTÉ 125M/259M<br>– to CCIR Rec. 801 with 10-bit resolution  |
| Signals   | – pathological signals for testing the serial digital interface with 10-bit resolution<br>– digital shallow ramps with 10-bit resolution<br>– 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 <sub>B</sub> and C <sub>R</sub> 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 <sub>pp</sub> ±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,<br>0.5 g from 55 to 150 Hz,<br>to IEC 68-2-6, IEC 1010-1,<br>MIL-T-28800 D class 5 |
| Random vibration              | 10 to 300 Hz, 1.2 g <sub>rms</sub>   |
| Shock                         | 40 g shock spectrum, to MIL-STD 810 C<br>and MIL-T-28800 D classes 3 and 5   |
| Climatic resistance           | +25/+40 °C cyclic at 95% rel.<br>humidity, to IEC 68-2-30  |
| Electromagnetic compatibility | to EMC directive of EU<br>(89/336/EEC) and<br>German EMC law   |
| Electrical safety             | to EN 61010-1  |
| Power supply                  | 100/120/230/240 V +10/–15%,<br>47 to 63 Hz, 100 VA (SAF),<br>80 VA (SFF)   |
| Dimensions (W x H x D)        | 435 mm x 147 mm x 460 mm   |
| Weight                        | SAF: 16.5 kg<br>SFF: 15.5 kg   |

### Ordering information

|                            |     |              |
|----------------------------|-----|--------------|
| <b>Order designation</b>   |     |              |
| 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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