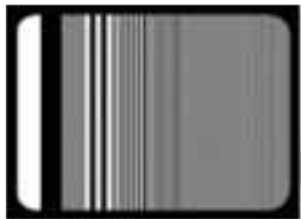
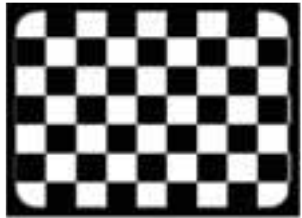


# TV & MONITOR PATTERN GENERATORS





	GV-998	GV-898+ / 798+	GV-698+	GV-198	GV-242	GV-241
<b>OUTPUTS</b>						
RGB	BNC/SCART	BNC/SCART	BNC/SCART	SCART	DVI	BNC/D25/D15/D9
S-VHS	✓	✓	✓	-	✓	-
SCART	✓	✓	✓	✓	-	-
YPbPr	BNC/SCART	BNC/SCART	BNC/SCART	-	DVI	-
Sync	BNC	BNC	BNC	✓	-	BNC/D15/D9
Blackburst	BNC	BNC	-	-	-	-
TS MPEG-2 SPI	D25	-	-	-	-	-
TS MPEG-2 ASI	BNC	-	-	-	-	-
HDTV	-	-	-	-	✓	-
Composite Video	✓	✓	✓	✓	✓	✓
Computer Monitors	-	-	-	-	-	✓
<b>REFERENCE PATTERNS</b>						
4:3	✓	✓	✓	✓	✓	-
16:9	✓	✓	✓	✓	-	-
Patterns	37	37	23	9	20	8
<b>TV SYSTEMS</b>						
PAL	✓	✓	✓	✓	✓	-
NTSC	✓	✓	✓	✓	✓	-
SECAM	✓	✓	✓	✓	-	-
<b>RF SOUND</b>	Mono, dual/stereo (Zweiton or NICAM)	Mono, dual/stereo (Zweiton or NICAM)	Mono, dual/stereo (Zweiton or NICAM)	Mono	Mono, stereo Baseband Sound	-
<b>RF OUTPUT</b>	VSB	VSB (GV-898+) DSB (GV-798+)	DSB	DSB	-	-
<b>LOGOS</b>	✓	✓	✓	-	-	-
<b>TELETEXT</b>	✓	✓	✓	-	-	-

### Interconnection elements description



DVI connector (*Digital Video Interface*)



SPI connector (*Synchronous Parallel Interface*), D25



ASI connector (*Asynchronous Serial Interface*), BNC



D15 connector, 15 pin



D9 connector, 9 pin

### Signals description



VSB signal (*Vestigial Side Band*)



DSB signal (*Double Side Band*)

## Breakthrough generators: an instrument for every budget

### TV GENERATORS

GV-998 .....	4
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GV-198 .....	10

### GENERATORS FOR MONITORS & MULTIMEDIA

GV-242 .....	12
GV-241 .....	14

With more than 40 years of experience in the instrumentation field, leading the design and distribution of television test systems, **PROMAX** introduces this new catalogue of signal generators for TV sets and monitors.

In this catalogue you will find a wide range of easy to use instruments, which fit every budget while meeting most of your technical requirements; they support all types of monitors and TV sets, including flat, big screen units, projectors, etc.

All instruments are multi-standard and multi-system; they can be used for lab applications, production lines, field service or training centres.



Training centres



Production lines



Hi-Fi & Home-Cinema

## Analogue and Digital TV Generator



- ▶ Test Signal generation in MPEG-2, SPI or ASI format
- ▶ The Test Signal contains valid audio and video programs
- ▶ External analogue and digital audio / video inputs
- ▶ Moving MPEG-2 video pattern generation
- ▶ MPEG logos
- ▶ RS-232 remote operation
- ▶ Multi-standard and multi-system analogue TV signals

The **GV-998** is an **analogue** and **digital TV signal generator**. In analogue mode, it's a very flexible multi-standard, multi-system instrument with the same performance as the **GV-898+**. In digital mode, thanks to its **TS outputs** (Transport Stream) in **MPEG-2** format, is perfect for manufacturing, verifying and maintaining all kinds of digital TV receivers.

The instrument's output signal meets the DVB (**DVB-PI**) specifications and can be applied to **QAM**, **QPSK** and **COFDM** digital modulators.

The system has **external audio / video analogue inputs**. These are converted to CCIR 656 and I2S format and multiplexed with standard patterns; they are then applied to the MPEG-2 encoder to generate the TS output. The instrument is microprocessor controlled, handling both the user interface and internal circuitry. Among other features, it's capable of altering the transmitted data stream format and can be controlled with a personal computer.

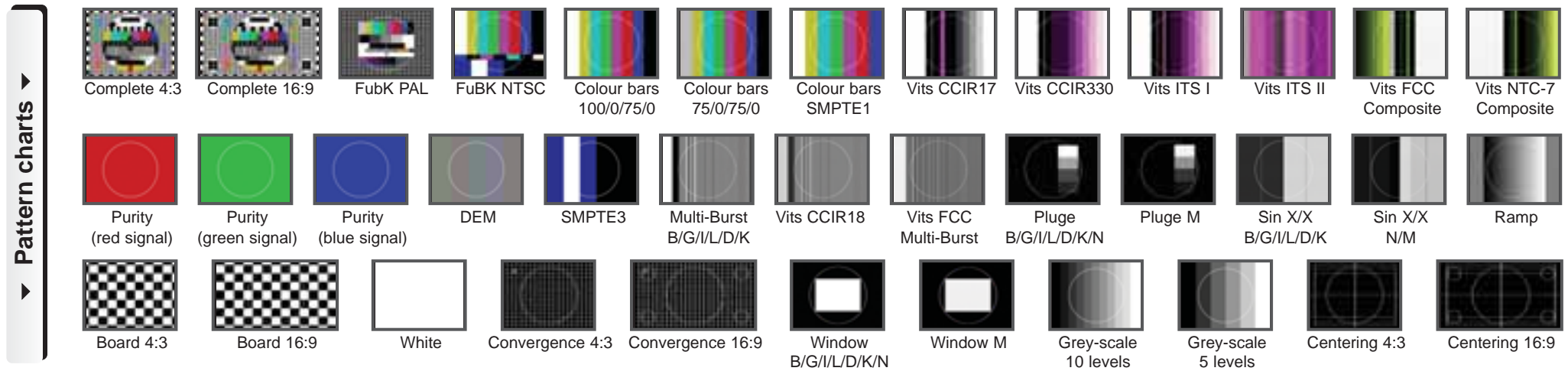
### ▼ 37 Charts ▼

Programmable  
TS bitrate  
4:3 and 16:9 formats  
Electronic circle  
for all patterns  
MPEG-2 logos

### ▼ Outputs ▼

RF  
YPbPr  
TS MPEG-2  
RGB  
S-VHS  
SCART  
Sync  
Blackburst  
Composite video

## With MPEG-2 TS Output



SPECIFICATIONS	GV - 998	Teletext	Index page and 4 data pages in 4 different languages									
<b>System &amp; Standard</b>	PAL B/G/D/K/I/M/N, SECAM B/G/D/K/L, NTSC M	<b>Colour Logotypes</b>	2 independent, positionable logos; analogical & MPEG									
<b>Video Carrier</b> Resolution Tuning	50 kHz By channels or by frequency (CCIR, STDL, OIRT, FCC)	<b>Audio</b> Mono Dual-Stereo Zweiton Dual-Stereo NICAM	AM-FM-NICAM modulation B, G, D, K, M systems B, G, L, I, D, K systems									
<b>Pattern charts</b>	37	<b>Inputs</b>	Video & Audio									
<b>Front panel outputs</b> <b>RF</b> Output level Frequency range	80 dB $\mu$ V, attenuation up to 60 dB in 1 dB steps 35 to 900 MHz VSB modulated	<b>PDC (Program Delivery Control)</b> Systems Content	PAL B/G/I/D/K, ON/OFF selectable Selectable START, STOP and PAUSE; time, country									
<b>MPEG-2</b> Outputs Bitrate Video Audio	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">SPI</th> <th style="width: 50%;">ASI</th> </tr> </thead> <tbody> <tr> <td>TS parallel</td> <td>TS serial ASI</td> </tr> <tr> <td colspan="2" style="text-align: center;">VBR for MPEG; CBR for TS</td> </tr> <tr> <td>ISO/IEC 13818-2 MP@ML</td> <td rowspan="2">DVB-ASI EN/ISO/IEC 13818-1</td> </tr> <tr> <td>ISO/IEC 11172-3 (MPEG audio) Layer 1/2 - 44.1 kHz</td> </tr> </tbody> </table>	SPI	ASI	TS parallel	TS serial ASI	VBR for MPEG; CBR for TS		ISO/IEC 13818-2 MP@ML	DVB-ASI EN/ISO/IEC 13818-1	ISO/IEC 11172-3 (MPEG audio) Layer 1/2 - 44.1 kHz	<b>VPS</b> Systems Content	PAL B/G/D/K selectable ON/OFF Selectable START, STOP and PAUSE; time, country
SPI	ASI											
TS parallel	TS serial ASI											
VBR for MPEG; CBR for TS												
ISO/IEC 13818-2 MP@ML	DVB-ASI EN/ISO/IEC 13818-1											
ISO/IEC 11172-3 (MPEG audio) Layer 1/2 - 44.1 kHz												
<b>Composite video</b>	BNC connector, 1 Vpp voltage, 75 $\Omega$ impedance	<b>WSS (Wide Screen Signaling)</b> Systems Country	PAL B/G/I/D/K Eight combinations for 4:3,14:9 and 16:9 formats									
<b>Rear panel outputs</b> Blackburst RGB YPbPr S-VHS Synchronisms SCART	75 $\Omega$ , negative polarity, BNC connector 75 $\Omega$ , 0.7 Vpp amplitude, BNC connector 0.7 Vpp amplitude, BNC connector 75 $\Omega$ , 1 Vpp amplitude (lum.) - 0.3 Vpp (chrom.) CS, horizontal pulse, vertical pulse	<b>Power supply</b> Mains voltage Consumption	110-125-220-230/240 V AC $\pm$ 10%, 50-60 Hz 40 W									
		<b>Mechanical features</b> Dimensions Weight	W. 288 x H. 102 x D. 307 mm 5.8 kg.									

## TV Generators



- ▶ Vestigial Double Side Band Modulation - VSB (GV-898+ only)
- ▶ YPbPr outputs
- ▶ External audio / video inputs
- ▶ 4:3, 16:9 & 14:9 formats (WWS signals)
- ▶ NICAM / Zweiton sound
- ▶ VPS & PDC control signals
- ▶ RS-232 remote operation
- ▶ Multi-standard and multi-system analogue TV signals
- ▶ Test signals (VITS)

The **GV-898+** and **GV-798+** are analogue TV generators capable of up to **37 different test patterns** which enable exhaustive diagnostic tests of any TV receiver, video or *Home Theater* system.

In addition to conventional RGB, SCART or S-VHS outputs, **YPbPr** are becoming increasingly popular for large format TFT screens, plasma and TV projectors.

They have **32 memories** to store operating configurations that you want to access quickly.

The only difference between **GV-798+** and **GV-898+** models is the RF modulator. The **GV-798+** uses a double sideband (**DSB**) type while **GV-898+** uses a vestigial sideband (**VSB**) approach, similar to the ones used for TV signals broadcast.

### ▼ 37 Charts ▼

4:3 & 16:9 formats

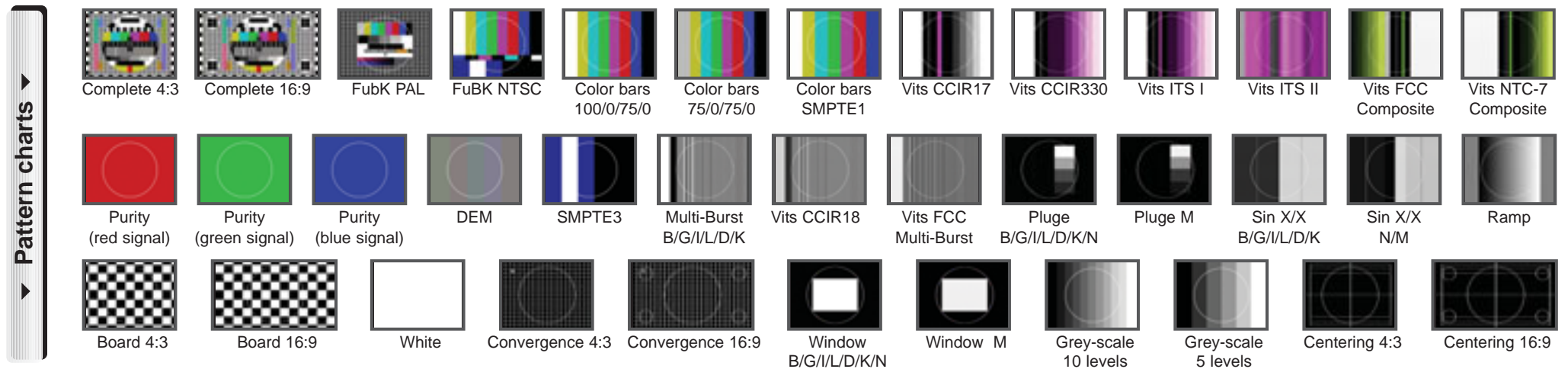
Electronic circle  
in all charts

Insertion and  
positioning of 2 logos

### ▼ Outputs ▼

RF  
YPbPr  
RGB  
S-VHS  
SCART  
Synchronisms  
Blackburst  
Composit video

## High range



SPECIFICATIONS	GV - 898+ / GV - 798+	Colour Logotypes	2 independent, positionable logos
<b>System &amp; Standard</b>	PAL B/G/D/K/I/M/N, SECAM B/G/D/K/L, NTSC M	<b>Teletext</b>	Index page and 4 data pages in 4 different languages
<b>Video carrier</b> Resolution Tuning	50 kHz By channels or by frequency (CCIR, STDL, OIRT, FCC)	<b>Audio</b> Mono Dual-Stereo Zweiton Dual-Stereo NICAM	AM-FM-NICAM modulation B, G, D, K, M systems B, G, L, I, D, K systems
<b>Pattern charts</b>	37	<b>PDC (Program Delivery Control)</b> Systems Content	PAL B/G/I/D/K, ON/OFF selectable Selectable START, STOP and PAUSE; date, time, country
<b>Modulation</b>	Double sideband DSB (GV-798+) Vestigial sideband VSB (GV-898+)	<b>VPS</b> Systems Content	PAL B/G/D/K seleccionable ON/OFF Selectable START, STOP and PAUSE; date, time, country
<b>Front panel outputs</b> <b>RF</b> Output level Frequency range  Impedance <b>Composite video</b>	80 / 90 dB $\mu$ V (GV-898+ / GV-798+), attenuation up to 60 dB in 1 dB steps 37 - 865 MHz (GV-798+) 35 - 900 MHz (GV-898+) 75 $\Omega$ 75 $\Omega$ , 1 Vpp, positive polarity, DC coupling	<b>WSS (Wide Screen Signaling)</b> Systems Content	PAL B/G/I/D/K Eight combinations for 4:3, 14:9 and 16:9 formats
<b>Rear panel outputs</b> Blackburst RGB YPbPr S-VHS Synchronisms SCART	75 $\Omega$ , negative polarity, BNC connector 75 $\Omega$ , 0.7 Vpp amplitude, BNC connector 0.7 Vpp amplitude, BNC connector 75 $\Omega$ , 1.3 Vpp (lum.) amplitude - 0.3 Vpp (crom.) CS, horizontal pulse, vertical pulse	<b>Power supply</b> Mains voltage Consumption  <b>Mechanical features</b> Dimensions Weight	110-125-220-230/240 V AC $\pm$ 10%, 50-60 Hz 40 W  W. 288 x H. 102 x D. 307 mm 5.6 kg. (GV-798+) / 5.8 kg. (GV-898+)

## TV Generator



- ▶ 4:3 and 16:9 format patterns
- ▶ Compatible with PAL, SECAM and NTSC systems
- ▶ NICAM and Zweiton Sound
- ▶ Addition of an electronic circle on all patterns (except colour bars)
- ▶ Two logotypes
- ▶ VPS / PDC control signals
- ▶ Multi-standard and multi-system analogue TV signals
- ▶ RS-232 remote control

The **GV-698+** is a TV pattern generator with excellent price / performance ratio which is specially suitable for service of all kinds of TV receivers.

This pattern generator has the features usually found only in professional units, such the **NICAM** sound or **teletext**, while keeping a very attractive price tag.

There are **32 memories** available to store your most common test configurations. It is also possible to turn ON or OFF the colour burst, the sound subcarrier, the colour subcarrier, etc...

The **GV-698+** also has a DSB modulated RF output, with level adjustable in 10 dB steps.

### ▼ 23 Patterns ▼

4:3 & 16:9 formats

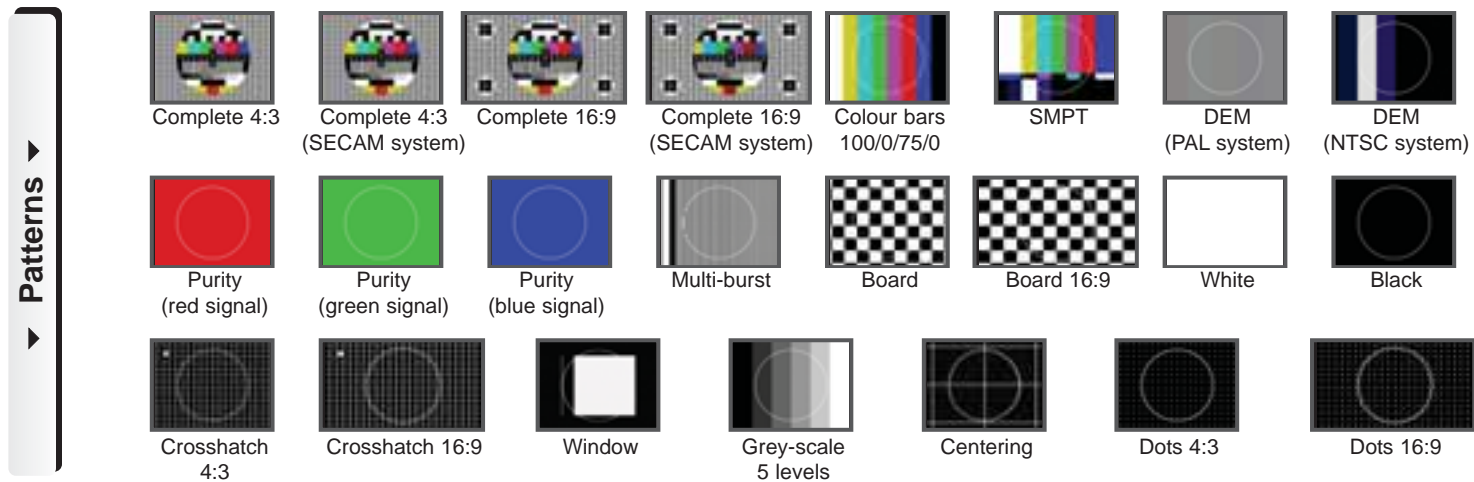
Electronic circle

Pattern icons  
on the front panel

### ▼ Outputs ▼

RF  
YPbPr  
RGB  
S-VHS  
SCART  
Synchronisms  
Blackburst  
Composite video

## Medium range



SPECIFICATIONS	GV - 698+	RF output	
<b>System &amp; Standard</b>	PAL B/G/D/K/I/M/N, SECAM B/G/D/K/L, NTSC M	Output amplitude	90 dB $\mu$ V $\pm$ 3 dB, attenuation up to 50 dB in steps of 10 dB
<b>Video Carrier</b>		Frequency range	37 to 865 MHz
Resolution	Synthesized, 34 - 865 MHz	Impedance	75 $\Omega$
Tuning	By channels or by frequency (CCIR, STDL, OIRT, FCC)	<b>Modulation</b>	Double side band
<b>Patterns</b>	23	<b>Logotypes</b>	One or two position-independent logotypes
<b>PAL(B,G,H,D,I) colour subcarrier</b>		<b>Audio</b>	
Frequency	4.43361875 MHz $\leq$ $\pm$ 30 ppm (10°C - 40°C)	Mono	AM-FM-NICAM modulation
Burst duration	2.4 $\mu$ s (10 $\pm$ 1 period of Fsc)	Dual-Stereo Zweiton	B, G, D, K, M systems
Amplitude / phase error	$\pm$ 5 % / $\pm$ 3 %	Dual-Stereo NICAM	B, G, L, I, D, K systems
<b>NTSC (M) colour subcarrier</b>		<b>Rear panel outputs</b>	
Frequency	3.579545 MHz $\leq$ $\pm$ 30 ppm (10°C - 40°C)	Video	75 $\Omega$ , positive polarity, BNC connector and SCART
Burst duration	2.38 $\mu$ s (10 $\pm$ 1 period of Fsc)	RGB - YPbPr	75 $\Omega$ , 0.7 Vpp amplitude, BNC connector and SCART
Amplitude error	$\pm$ 5 %	S-VHS	75 $\Omega$ , 0.7 amplitude Vpp (lum.) - 0.3 Vpp (crom.)
Phase error	$\pm$ 3 %	Synchronisms	Negative polarity, BNC connector
<b>SECAM (B, G, H, D, K, K1, L) colour subcarrier</b>		SCART	-
Subcarrier frequency	For = 4.406250 MHz $\pm$ 2 kHz	<b>Teletext</b>	
(sync f <sub>sc</sub> )	Fob = 4.25000 MHz $\pm$ 2 kHz	Transmission mode	NRZ (not return to zero)
Dual-Stereo NICAM	5.850 - 6.552 MHz, 4QPSK modulation	Content	8 different pages (two languages sent consecutively)
<b>Inputs</b>		<b>Power supply</b>	
Video/Audio	75 $\Omega$ (V), 10 k $\Omega$ (A) direct coupling, SCART	Mains voltage / consumption	110-125-220-230/240 V AC $\pm$ 10%, 50-60 Hz / 20 W
		<b>Mechanical features</b>	
		Dimensions and weight	W. 288 x H. 102 x D. 247 mm / 3 kg.

## TV Generator



- ▶ Direct access keys for nine different charts
- ▶ 4:3 & 16:9 formats
- ▶ Addition of an electronic circle
- ▶ Economy range
- ▶ Double side band modulation
- ▶ Tuning by frequency or CCIR / OIRT / FCC channel tables
- ▶ Multi-standard and multi-system
- ▶ Up to 10 available memories

The **GV-198** video generator is one of the most affordable PAL/SECAM/NTSC units on the market. It has nine different reference patterns that can be accessed with a keystroke; these allow performing the basic adjustments of any receiver as well as detecting malfunctions by visually checking the picture. Patterns can be in **4:3** and **16:9** format.

The synthesized RF modulator covers the **37-865 MHz range**; tuning can be handled by CCIR, OIRT or FCC channels or directly by frequency, in 50 KHz steps. An electronic attenuator allows a maximum attenuation of 50 dB in 10 dB steps.

The **GV-198** has 10 memories for storing 10 different, direct-access test configurations

### ▼ 9 Charts ▼

4:3 and 16:9 formats

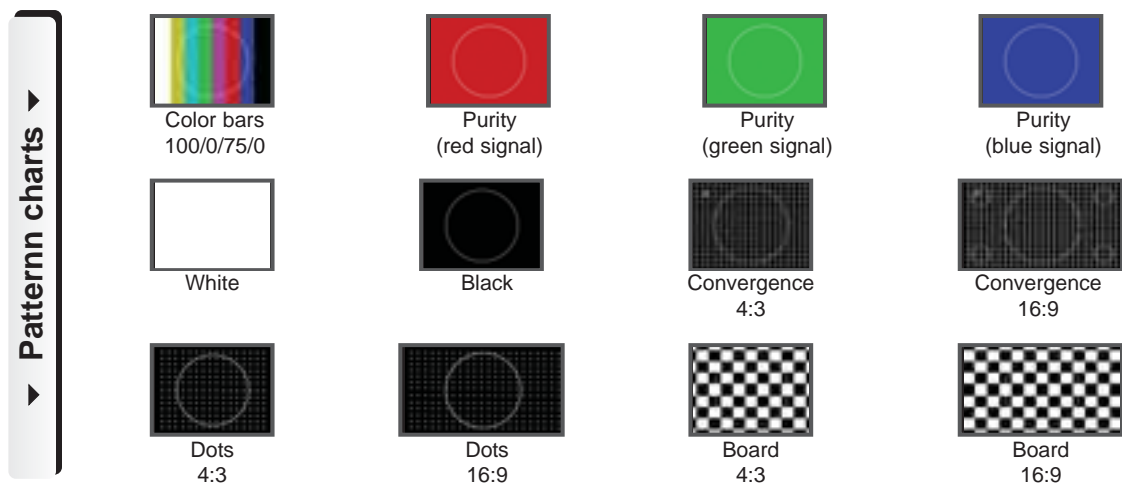
Electronic circle

Pattern icons  
on the front panel

### ▼ Outputs ▼

RF  
RGB  
S-VHS  
SCART  
Synchronisms  
Composite video

## Economy range



SPECIFICATIONS	GV - 198	Composite video output	
<b>System &amp; Standard</b>	PAL B/G/D/K/I/M/N, SECAM B/G/D/K/L, NTSC M	Amplitude	1 Vpp, negative polarity
<b>Video modulation</b>	AM double side band	Connector	BNC and SCART, 75 Ω impedance
<b>Sound modulation</b>		<b>RGB output (SCART)</b>	
Type	Mono multistandard	Amplitude	0.7 Vpp
Carrier	Seleccionable ON/OFF	Connector	SCART, 75 Ω impedance
Carrier frequency	From 4.5 to 6.5 MHz	<b>Composite sync. output</b>	
Modulation type	FM / AM (1 kHz)	Signal	Vertical + Horizontal
<b>PAL color subcarrier</b>		Amplitude	2.5 Vpp
Frequency	3.5756118 to 4.43361875 MHz $\leq \pm 30$ ppm	Connector	BNC, 1 kΩ impedance
Burst duration	2.4 μs (10 $\pm 1$ Fsc period)	<b>Low frequency output (SCART)</b>	
Burst position	5.6 μs + 100 ns from the line previous synchronism flank	Frequency	1 kHz, amplitude 500 mVpp
Amplitude error	$\pm 5\%$	Connector	SCART, 10 kΩ impedance
<b>NTSC</b>		<b>RF output</b>	
Frequency	3.579545 MHz $\leq \pm 30$ ppm	Range	De 37 a 865 MHz (sinthesized)
Burst duration	2.38 μs (10 $\pm 1$ Fsc period)	Output amplitude	85 dBμV $\pm 3$ dB
Burst position	5,56 μs + 100 ns from the line previous synchronism flank	<b>Power supply</b>	
Amplitude error	$\pm 5\%$	Mains supply	110-125-220-230/240 V AC $\pm 10\%$ , 50-60 Hz
<b>SECAM</b>		Consumption	15 W
Subcarrier frequency	4.250000 to 4.406250 MHz $\pm 2$ kHz	<b>Mechanical features</b>	
Chroma signal amplitude	D'r -1.5 to -1.9	Dimensions	W. 212 x H. 102 x D. 241 mm
Chroma pre-correction	Bell filter	Weight	1.78 kg.

## Multimedia signal generator



- ▶ DVI Output
- ▶ Available tests for PAL, NTSC and HDTV systems
- ▶ Computer monitors VESA test
- ▶ Customized video formats
- ▶ Automatic detection of monitor supported formats
- ▶ Customized test sequences
- ▶ Electronic circle for geometry adjustments
- ▶ PC software included

The **GV-242** multimedia signal generator is an accurate, handy instrument; it provides signals, reference patterns and sound to support the verification of all kinds of computer monitors, video projectors, TV sets, flat screens (TFT & plasma) or multimedia monitors.

Its many features, like small size and battery operation, turn it into a very convenient instrument for both lab use and travelling service technicians. The **GV-242** is a portable, handy unit.

It features advanced characteristics, like self-calibration, colour sensors compatibility and customized test sequences; it also supports the design of customized video formats using *Video Generator Manager*, a PC application for MS Windows based computers .

Includes an RS-232 port, supporting PC-controlled operation and firmware updates.

### ▼ 20 Charts ▼

4:3 and 16:9 formats

Electronic circle

For TV sets  
and monitors

Customized formats

### ▼ Outputs ▼

YPbPr

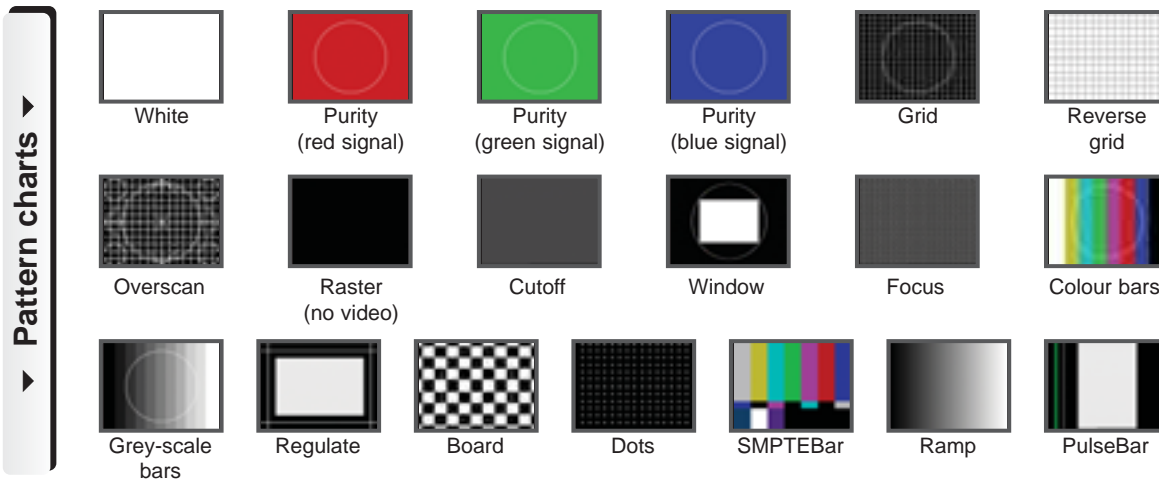
RGB

S-VHS

DVI

VESA

## Supports high definition formats



Using an optional accessory (colour sensor), the **GV-242** can measure chromaticity (expressed as x,y coordinates according to the CIE standard) and screen brightness, that can be expressed in "fL" or "nits".

SPECIFICATIONS	GV - 242	User Interface	
<b>Formats</b> Storage Built-in Edit method	126 total VESA, DVI, PAL/NTSC, HDTV/SDTV-RGB, HDTV/SDTV-YPbPr MS Windows based <i>Video Generator Manager</i>	<b>Display Controls</b> Intuitive drill-down menus	20 x 4 character LCD with backlight Intuitive drill-down menus
<b>Images</b> Standard	White, Purity (red, green, blue), Grid, Reverse grid, Overscan, Raster, Cutoff, Focus, Colour bars, Grey-scale bars, Regulate, Checker, Dots, SMPTEBar, Ramp, Pulse Bar	<b>Computer Port</b> Type Purpose	RS-232C, 9 pin Copy formats and firmware updates from PC
<b>Test sequence</b> Storage Edit method Parameters	100 steps Using <i>Video Generator Manager</i> Format, image, duration (0.1 seg to 24 hours)	<b>Color sensor support</b> Description	Display data from a color sensor for white balance adjustment
<b>Horizontal Timing</b> Frequency Total pixels Active range	1.5 kHz - 250 kHz 32 to 4095 16 to 4294 pixels	<b>DDC (Display Data Channel)</b> Description Version	Read a monitor's EDID data and display the manufacturer's supported formats DDC-2B (read only)
<b>Vertical Timing</b> Frequency Active lines Sync types Scan types	1 Hz - 1 kHz 1 - 4095 Separate, digital/analogue composite Progressive, Interlace, HDTV	<b>Sound</b> Output Signal	Stereo connector, 3.5 mm Tone 1 kHz (left), Tone 2 kHz (right)
		<b>Power supply</b> DC Battery life AC Charge time Frequency Voltage	6 AA NiMh batteries included 8 hours between charges with NiMh Charger / generator power supply 8 hours 50 to 50 Hz 100 - 250 VAC (auto-select)
		<b>Mechanical features</b> Dimensions Weight	W. 210 x H. 152 x D. 41 mm. 700 g

## Test generator for monitors



### ▼ 8 pattern charts ▼

- Colour bars
- Purity (Red, Green, Blue)
- Gray-scale bars
- Crosshatch
- Multiburst
- White 100%

### ▼ Outputs ▼

- 2 x D9
- D15
- RGB
- Composite sync.
- Horizontal sync.
- Vertical sync.
- Video without sync.

SPECIFICATIONS	GV - 241		
<b>RGB outputs</b> Output	<b>R</b>	<b>B</b>	<b>G</b>
	Red signals	Blue signals	Green signals with/without sync.
	0.7 Vpp		
Amplitude	75 Ω, BNC connector		
Impedance			
<b>CVS Output</b> Output	Video signal		
Amplitude	0.7 Vpp		
Impedance	75 Ω, BNC connector		
<b>Synchronism Output</b> Output	<b>HS</b>	<b>VS</b>	<b>CS</b>
	Horizontal Sync.	Vertical Sync.	Sync. Composite
	TTL, BNC connector		
Señal			
<b>C1-C2-C3 Outputs</b>	Connectors D9, D15 miniature and D15 respectively. Direct connection to the monitor. The outputs of the D9 connector are all TTL. When the "Color bars" or "Gray-scale bars" are selected, a B/W picture will appear. When used with a Hercules monitor, the R, G and B charts will be black.		
<b>CVS Output</b> Output	Video signal		
Impedance	75 Ω, BNC connector		
<b>Power supply</b> Mains supply	AC 110-125-220-230-240 V ± 10%, 50-60 Hz		
Consumption	9 W		
<b>Mechanical features</b> Dimensions	W. 212 x H. 102 x D. 241 mm		
Weight	2.4 kg.		

The wide range of different models in the computer monitor field drives demand for versatile instruments like the **GV-241**, a universal generator for checking monitors that greatly simplifies their adjustment, verification and repair.

The **GV-241** provides up to 29 possible graphic systems; signals are highly reliable in regard to sync, line and field timing. It supports three monitor connector types, as well as RGB, CVS outputs; horizontal, vertical and composite sync are through BNC connectors.

# Supports a wide range of monitors

## First group (P)

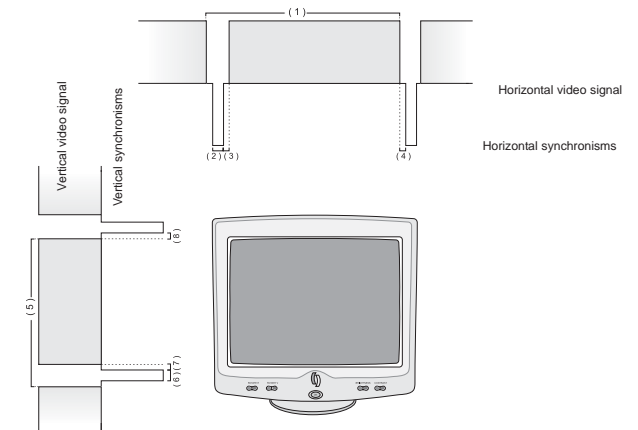
System	Pixels	Frequency		PAH (4) (ms)	SH (2) (ms)	PPH (3) (ms)	PAV (8) (ms)	SV (6) (ms)	PPV (7) (ms)	Polarity		Interlace
		Horiz (kHz)	Vert (Hz)							H	V	
		(1) <sup>-1</sup>	(5) <sup>-1</sup>									
VGA	640x480	31.469	59.94	0.636	3.813	1.907	0.318	0.064	1.048	-	-	NO
VESA	800x600	37.879	60.317	1	3.2	2.2	0.026	0.106	0.607	+	+	NO
VESA	1024x768	48.363	60.004	0.369	2.092	2.462	0.062	0.124	0.6	-	-	NO
ATT	1280X1024	63.953	59.938	0.727	1.018	2.255	0.016	0.078	0.579	-	-	NO
Sun	1600X1280	89.2	66.9	0.001	2.03	1.4	0.011	0.112	0.471	+	+	NO

TOLERANCE		
Horizontal frequency shift		± 1 %
Vertical frequency shift		± 1,5 %

## Second group (S)

System	Pixels	Frequency		PAH (4) (ms)	SH (2) (ms)	PPH (3) (ms)	PAV (8) (ms)	SV (6) (ms)	PPV (7) (ms)	Polarity		Interlace
		Horiz (kHz)	Vert (Hz)							H	V	
		(1) <sup>-1</sup>	(5) <sup>-1</sup>									
CGA, EGA	640x200	15.81	61.5	6.6	4.2	7.2	1.58	0.19	2.15	+	+	NO
MDA, Hercules	720X350	18.42	49.91	0.6	8.25	1.45	0.001	0.9	0.2	+	-	NO
EGA Hi	640X350	21.86	59.72	0.001	4.9	1.6	0.001	0.6	0.08	+	+	NO
VGA	640X350	31.469	70.09	0.636	3.813	1.907	1.176	0.064	1.902	+	-	NO
VGA	640X400	31.469	70.09	0.636	3.813	1.907	0.318	0.064	1.112	-	+	NO
VGA Text	720X400	31.48	70.11	0.635	3.812	1.906	0.304	0.063	1.111	-	+	NO
VESA	720X400	37.736	90.044	0.75	1.25	4.5	0.239	0.08	0.981	-	+	NO
MAC II	840X480	35	66.67	2.116	2.116	3.175	0.084	0.086	1.114	+	+	NO
VESA	800X600	35.156	56.25	0.667	2	3.556	0.028	0.057	0.626	+/-	+/-	
VESA	640X480	37.86	72.809	0.762	1.27	4.603	0.238	0.079	0.74	-	-	
8514	1024X768	35.522	86.96	0.178	3.92	1.247	0.014	0.112	0.563	+	-	YES
SVGA 72Kc	800X600	48.09	72.01	1.121	2.399	1.279	0.479	0.124	0.774	+	+	
1025x768	1025X768	48.3	60	0.369	2.092	2.462	0.062	0.124	0.6	-	-	NO
SONY Std1	1024X768	48.78	60	1	1.5	2	0.061	0.061	0.799	+	+	NO
DEC	1024X864	54	60	0.16	1.85	1.68	0.001	0.056	0.629	+	+	
XGA	1024X768	56.5	70	0.32	1.813	1.92	0.053	0.106	0.513	-	-	NO
57K/72H	1024X768	57.09	72	0.32	1.77	1.87	0.054	0.103	0.5	+	+	
Radius	1152X882	66	72	0.138	1.28	2.42	0.001	0.2	0.38	+	+	
MAC II TP	1152X870	68.681	75.06	0.32	1.28	1.44	0.043	0.043	0.567	-	-	NO
Samsung	1006X1048	62.8	59.8	0.15	1.88	1.58	0.001	0.127	0.542	+	+	
SONY Std 2	1280X1024	63.337	59.98	0.407	1.701	1.849	0.047	0.047	0.41	+	+	NO
DEC	1280X1024	70.7	66.5	0.267	1.33	1.87	0.042	0.042	0.467	+	+	
Arts. Graf	1280X1024	78	73	0.228	0.915	1.907	0.038	0.038	0.488	+	+	

- PAH (4) Horizontal front porch time
- SH (2) Horizontal synchronism
- PPH (3) Horizontal back porch time
- PAV(8) Vertical front porch time
- SV (6) Vertical synchronism
- PPV (7) Vertical back porch time



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