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VTG 400

PROGRAMMABLE VIDEO & AUDIO TEST GENERATOR

- 96 video output rates including high resolution computer-video, HDTV, and NTSC/PAL
- 34 video test patterns
- Seven audio test signals
- SDI & HDSDI outputs (VTG 400D only)
- Quick Select memory presets
- Scope-Trigger™ output
- Broadcast quality video encoder
- Programmable and upgradeable
- RS-232 control

Professional Audio and Video Test Reference



Extron Electronics

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VTG 400 – Video & Audio Test Generator

High Performance A/V Test Reference

The Extron **VTG 400** and **VTG 400D** are advanced, programmable, and upgradeable video and audio test generators that deliver accurate, wide bandwidth video signals and high performance audio test signals. These test generators are professional quality reference tools for set-up, performance evaluation, calibration, and troubleshooting audio and video systems.



The VTG 400 is ideal for critical set-up and calibration of A/V systems

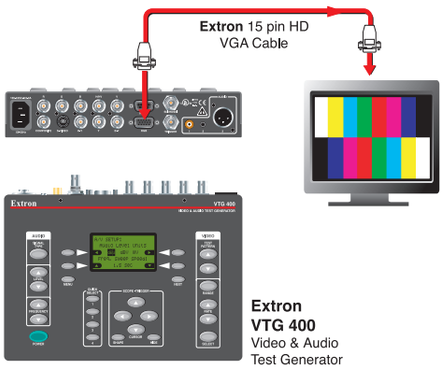
The VTG 400 offers a comprehensive array of video test patterns, as well as a suite of audio reference signals. Video is output simultaneously as RGB, component video, S-video, and composite video, while stereo audio output is both balanced and unbalanced. An SDI and HDSDI output is included with the VTG 400D.

The VTG 400 is designed to provide a wide variety of reference signal types. A total of 96 output scan rates are available for high resolution computer-video, as well as HDTV, NTSC, and PAL. Up to 180 additional rates can be programmed into the VTG 400. The audio test generator is fully compatible with professional and consumer audio equipment, and delivers accuracy at microphone level.

Operation of the VTG 400 is intuitive and convenient, with an easy-to-read LCD screen on the main panel, direct access buttons, and memory presets for quick saving and recall of user settings. The VTG 400 can be programmed and upgraded using RS-232 and Extron control software, including new test patterns and custom scan rates.

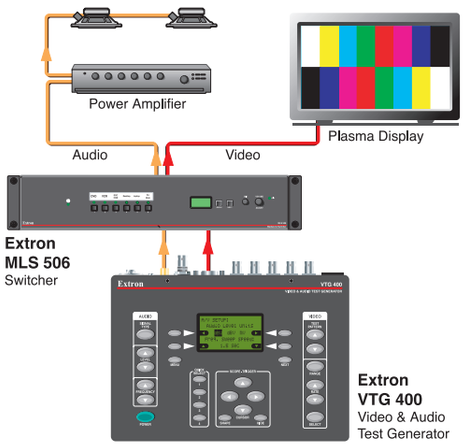
A powerful and innovative feature is Scope-Trigger™ output (Patent Pending), which enables analysis of a selected area within the video image using an oscilloscope. Scope-Trigger greatly simplifies and speeds up oscilloscope set-up for video signals by using a specially generated trigger signal, precisely timed to a user-defined target location on the image.

Housed in a rugged, lightweight metal enclosure, the VTG 400 is ideal for both field and permanent A/V applications.



The VTG 400 delivers professional quality audio and video test signals.





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VTG 400 & VTG 400D

Simultaneous RGB outputs
High resolution RGB video is simultaneously output on BNC and 15-pin HD connectors.

RS-232
An RS-232 serial port is provided for custom scan rate programming, firmware upgrades, and control with Extron Simple Instruction Set (SIS™)

SDI/HDSDI output
The VTG 400D provides SDI/HDSDI output for compatibility with systems using SDI or HDSDI digital video.



Multiple video outputs
Video test patterns are simultaneously output as RGB, component video, S-video, and composite video.

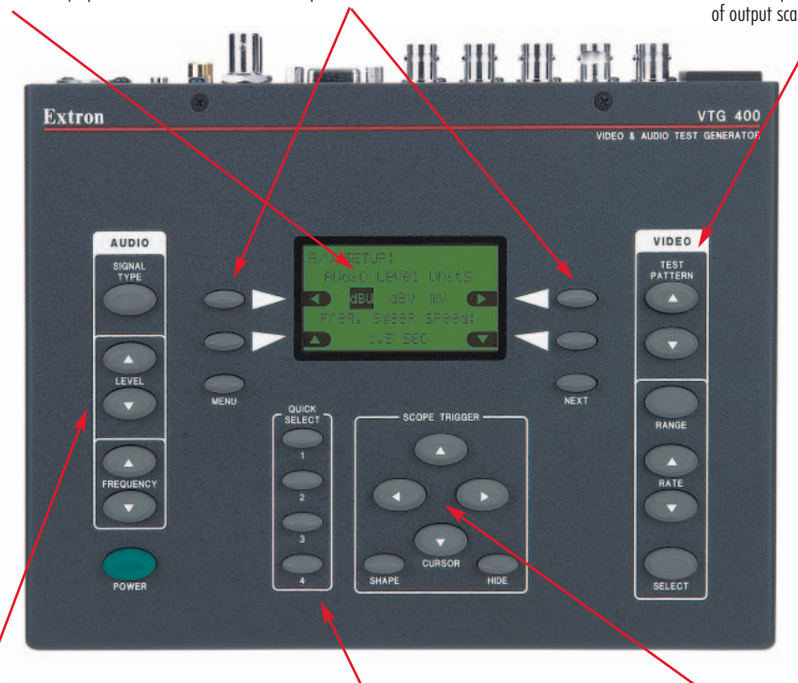
Scope-Trigger™ output
The VTG 400 outputs a dedicated trigger signal to an oscilloscope that is precisely timed to a user-defined location within the image.

Multiple audio outputs
Audio test signals are simultaneously output as balanced or unbalanced on a 3-pin XLR connector, and unbalanced audio on an RCA connector and a 3.5 mm mini stereo audio jack.

LCD interface
The easy-to-read LCD display facilitates user-friendly operation.

Navigation & selection
These buttons provide intuitive menu navigation, as well as parameter or function selection.

Video test pattern selection
Dedicated buttons enable direct access to video test patterns, as well as selection of output scan rate.



Audio test signal selection
Dedicated buttons enable direct access to audio test signals, as well as specification of output level and frequency.

Quick select
User settings including output scan rates and test signal selections can be saved to and recalled from memory presets via these buttons.

Scope-Trigger™
This set of buttons provides direct access to Scope-Trigger adjustments, including navigation buttons to precisely define the Scope-Trigger location within the image.

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WHAT'S INSIDE *the VTG 400*

Features

Output scan rates

The VTG 400 provides 96 factory scan rates for high resolution computer-video, HDTV, and 16:9 high resolution as well as standard definition NTSC and PAL video. The maximum output scan rate for computer-video is QXGA (2048 x 1536). To ensure compatibility with any new, current, or legacy display, the VTG 400 accommodates up to 180 additional user-programmable scan rates.

Video test patterns

The VTG 400 offers 34 video test patterns including multiple crosshatch patterns, color bars (SMPTE, EBU, and 8-color split), PLUGE, crop patterns, geometry, multiburst, grayscale, ramp, H patterns, bounce, a focus pattern, and a series of alternating pixel patterns. Several of these are exclusive to the VTG 400. Some patterns feature adjustable output levels ranging between 0 and 100% (0 and 100 IRE) in 1% (1 IRE) steps. Select test patterns are reversible.

Audio test signals

The high performance, professional quality audio test generator delivers sine waves, square waves, pink noise, white noise, polarity, frequency sweeps, and sine wave bursts, with selectable frequencies (between 20 Hz and up to 20 kHz in 1/12 octave increments) and output levels. Additional adjustments are available for frequency sweeps and sine wave bursts.

Scope-Trigger™ output

Using the innovative Extron Scope-Trigger output feature (Patent Pending), a specific area within the test pattern image can be quickly and easily targeted for analysis using an oscilloscope. This feature is particularly beneficial in troubleshooting signal and display issues.

Quick Select memory presets

User settings including output scan rates and test signal selections can be saved to and recalled from four memory presets via direct access buttons on the main panel.



The VTG 400 with included soft nylon carry case.

Broadcast quality video encoder

The VTG 400 features a broadcast quality video encoder to ensure compliance with SMPTE and NTSC/PAL standards for accurate video performance.

Video outputs

Video test patterns are output as RGB on BNC and 15-pin HD connectors, component video and composite video on BNC connectors, and S-video on a 4-pin mini DIN connector.

Digital video output

The VTG 400D provides SDI and HDSDI output signals on a BNC connector.

Audio outputs

Audio test signals are output as balanced or unbalanced audio on a 3-pin XLR connector, and unbalanced audio on an RCA connector and a 3.5 mm mini stereo audio jack.

Auto sequence mode

Specific test patterns can be selected for a repeating sequence with selectable time intervals.

Selectable RGB color output

Each color channel (Red, Green, or Blue) can be enabled or disabled via the set-up menu.

Auto-memory recall

Settings are saved when the VTG 400 is turned off and automatically recalled when subsequently powered.

Screen saver mode

An adjustable timer can be set to engage the VTG 400 in Screen Saver mode, with either the video output muted or as a repeating sequence of test patterns.

RS-232 control

Using RS-232, updated firmware, including new test patterns and custom output scan rates, can be incorporated into the VTG 400. Extron Simple Instruction Set (SIS™) is provided for RS-232 control via the included Extron Windows®-based control program or third-party control.

Control software

The Windows control software facilitates remote set-up, programming, and operation of the VTG 400. All functions from the main panel are duplicated, and the graphical interface expedites and enhances user interaction.

Rugged metal enclosure

The VTG 400 features a compact, rugged enclosure that is appropriate for field testing, but can also be placed on a desktop or mounted in a rack. For added protection and portability, a soft nylon carrying case is included.

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Scope-Trigger™

Oscilloscope Video Signal Analysis

Scope-Trigger

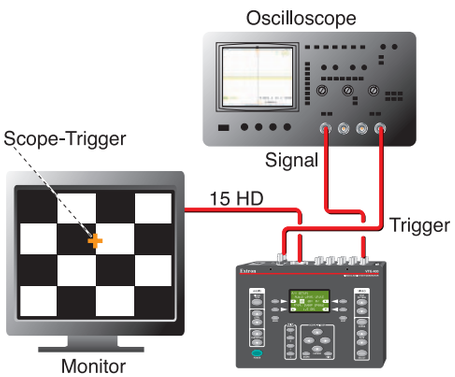
Have you ever wanted to analyze a video signal on an oscilloscope, only to find yourself constantly fumbling with the scope controls in an attempt to achieve a useable, stable display? Have you ever been frustrated trying to pinpoint specific locations within a video signal that correlate with what you see on a display?

Scope-Trigger (Patent Pending) is a new, innovative, and powerful feature of the VTG 400 that solves these problems, delivering quick and easy oscilloscope display with minimal effort. With simple, user-friendly controls, any desired location (pixel) within a video image can be targeted and then simultaneously examined on an oscilloscope, via a precisely timed trigger signal from the VTG 400.

Video signal analysis using an oscilloscope and the VTG 400 is accomplished in three easy steps:

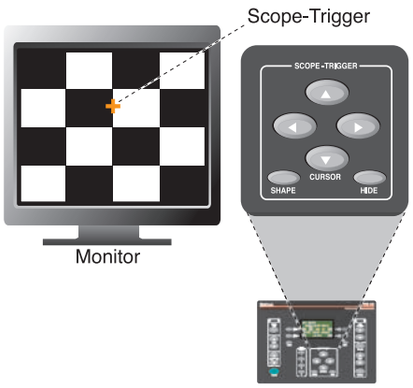
Step 1: Set-up

Set up the system as illustrated below. A duplicate of one of the RGB video signals for the display is input to the oscilloscope. Be sure to connect the Scope-Trigger output of the VTG 400 and the external trigger input of the oscilloscope. Also, be sure that you have selected the desired video test pattern.



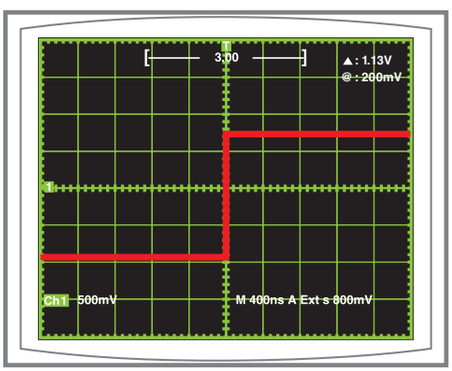
Step 2: Position the cursor

Engage Scope-Trigger by pressing any of the dedicated buttons on the main panel. An orange crosshatch cursor appears on screen, which you can also change to a single pixel cursor. Using the directional buttons, position this cursor at any desired location (pixel) on the screen. (The cursor can also be positioned beyond the screen for analyzing video interval sync signals.)



Step 3: Oscilloscope display

Now, look at the oscilloscope. The trace that is displayed is centered precisely at the location of the Scope-Trigger cursor. Scope control adjustments or counting video lines are no longer necessary.

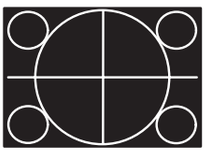


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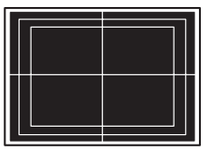
WHAT'S INSIDE *The VTG 400*

Video Test Patterns

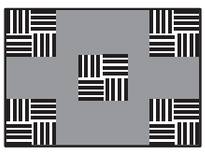
The VTG 400 video test generator includes 34 test patterns for calibrating, testing, and troubleshooting any type of A/V system, including digital projectors and flat panel monitors, HDTVs and legacy CRT projectors and direct view displays. Several of the patterns are reversible, and some are variable in video output level. The Extreme Grayscale, Contrast Transfer Function, Multipulse, and other patterns were exclusively created for the VTG 400. Additional test patterns may be added to the VTG 400 in the future as part of firmware updates via the Windows® control software.



Circles
Using the circles as a guide, this pattern is used to evaluate and adjust the geometry of the display device. The center crosshatch aids in proper centering.



Safe Area (5%/10%)
This pattern is used to indicate the safe area of display and inner safe area for titling within NTSC and PAL applications. For graphics displays, this pattern serves as a guide for symmetrical alignment of borders and text.



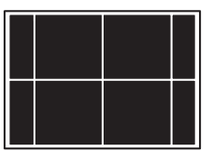
Focus Pattern
This pattern can be used to check display focus and resolution.



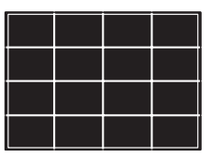
16:9 Crop
When the border of this pattern is properly aligned at the edges of a 4:3 screen, the two horizontal lines define proper centering and shape of a superimposed 16:9 image.



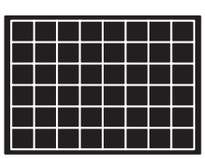
4:3 Crop
When the border of this pattern is properly aligned at the edges of a 16:9 screen, the two vertical lines define proper centering and shape of a superimposed 4:3 image.



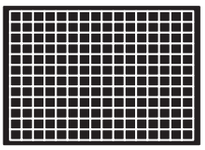
Rectangle/Square Crosshairs
This pattern can be used to properly center the image and set geometry. For CRT-based projectors, this pattern is used to check and adjust gross linearity and static convergence.



4x4 Crosshatch
This pattern can be used to set up a scaler or video processor for 2x or 4x zoom, or 1/4 or 1/16 downsizing. An application of this crosshatch is setting up videowall displays.



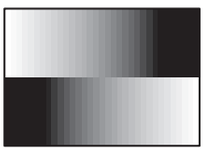
Coarse Crosshatch
This crosshatch pattern can be used to set projector focus and geometry. For CRT projectors, this crosshatch pattern is for examining and adjusting both static and dynamic convergence.



Fine Crosshatch
This pattern has twice the number of horizontal and vertical lines as the Large Crosshatch. It is useful for critical convergence adjustments with CRT projectors and evaluating optical qualities of projector lenses, such as chromatic aberration.



PLUGE
The vertical bars are used to set the black level (brightness), while the horizontal bars aid in setting the contrast level for the display.



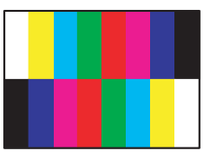
32-level Split Grayscale
With two opposing rows of 32 stepped bars of gray between the lowest and highest levels, this pattern is used for setting and assessing grayscale tracking, and evaluating contrast linearity on displays.



Extreme Grayscale
This pattern features shallow grayscale ramps that allow for evaluation of display performance with subtle (very small) grayscale level gradations.



Ramp
This pattern is used to evaluate the performance of a display or video processor on the basis of its pixel bit depth capability. The pattern should appear to be smooth, with no contouring or stepping.



Color Bars (8-color split)
This pattern is used for testing all of the video color channels and setting video drive levels. It is also used to check low frequency crosstalk between the red, green, and blue color channels.



SMPTE Color Bars (with PLUGE pattern)
For NTSC video equipment, the SMPTE color bars are used to set up tint and color, while the PLUGE video pattern is for adjusting brightness and contrast.



EBU Color Bars (8-color full bars)
The EBU color bars are primarily used to set up color for PAL video equipment.

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WHAT'S INSIDE The VTG 400

Video Test Patterns



80% Window
A window at 80% (80 IRE) video level, surrounded by black, is used in fine tuning the color balance (or grayscale) of a display with the aid of a color analyzer. The gain (or drive) setting is fine tuned for each of the RGB color adjustments.



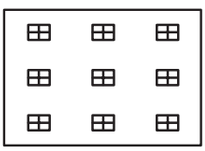
20% Window
A window at 20% (20 IRE) video level, surrounded by black, is used in fine tuning the color balance (or grayscale) of a display with the aid of a color analyzer. The bias (or offset) setting is fine tuned for each of the RGB color adjustments.



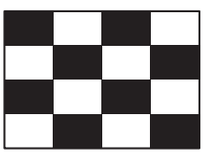
Window (variable level)
The video level of the window can be adjusted between 0% (0 IRE) and 100% (100 IRE) in 1% (1 IRE) steps. This pattern is useful in fine tuning and evaluating grayscale performance of a display.



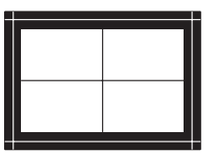
Flat Field
This pattern is used to evaluate white field uniformity. For RGB signals, each color channel can be selectively enabled to assess color uniformity. The video level is variable between 100% (100 IRE) and 0% (0 IRE) in 1% (1 IRE) steps.



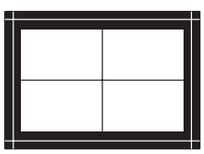
Flat Field with Targets
This pattern is similar to Flat Field, but only at 100% video level and with targets added to support the ANSI measurement method for determining projector brightness.



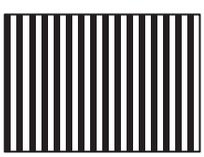
Checkerboard (variable level)
This is the ANSI contrast ratio test pattern, for measuring contrast ratio as well as adjusting and assessing CRT display performance. This reversible pattern is variable in level between 100% (100 IRE) and 0% (0 IRE) in 1% (1 IRE) steps.



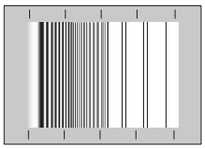
Bounce (automatic)
The center window alternates between 90% and 10% average picture level at 0.5 second intervals. This pattern is used for checking high voltage regulation on CRT displays, as well as black level stability.



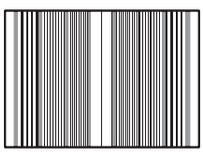
Bounce (manual)
This is similar to the automatic Bounce pattern, but allows the user to manually toggle between 90% and 10% average picture level.



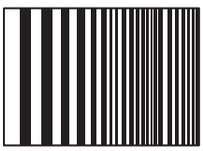
Alternating Pixels
This one pixel "on," one pixel "off" pattern is used for assessing the performance of high resolution monitors and projectors, EMI testing for worst case radiation, and pixel clocking and pixel phasing adjustments on a digital display.



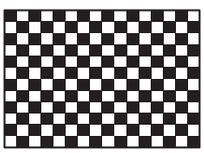
Frequency Sweep
These alternating "on" and "off" vertical bars are used to evaluate the frequency response of an NTSC or PAL video system.



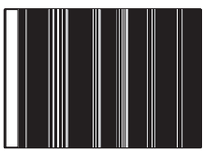
Graphics Multiburst
This pattern of grouped alternating bars at the highest ("on") and lowest ("off") video levels is used to test display resolution capability, for computer-video and HDTV.



Multiburst
This pattern of grouped alternating bars at the highest ("on") and lowest ("off") video levels with increasing frequency is used to test bandwidth performance for NTSC and PAL video.



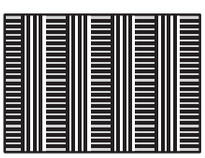
Alternating Pixels (2-dimensional)
This offset, one pixel "on," one pixel "off" pattern is used for fine-tuning pixel clocking and pixel phasing adjustments for high resolution digital displays.



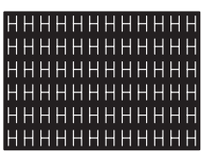
Multipulse
This pattern is used to measure the frequency response and group delay of the NTSC/PAL transmission channel.



Transient Response
The high and low levels bars against the gray background are used for evaluation of transient response of the video signal.



Contrast Transfer Function (CTF)
This pattern is for evaluation of total video system response. The VTG 400 LCD display provides an indication of contrast transfer percentage when the user has matched the brightness of the horizontal lines to that of the vertical lines.



H Pattern
This pattern is used to check or evaluate video clamping stability, focus for projectors, and video pulse response, as well as to simulate text. The user can toggle between white-on-black and black-on-white.



Hum Bar Test (variable level)
This pattern is used to reveal the presence of any hum bars which indicate interference attributable to the video signal or the equipment. The test pattern level is adjustable from 1% to 100%.

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WHAT'S INSIDE *The VTG 400*

Output Rates

The VTG 400 is designed for compatibility with any video display, including the very latest technologies available The 96 factory-loaded scan rates accommodate high resolution computer-video, SGI, and Sun® workstations, Stereographics, 16:9 high resolution (for plasma and direct view LCD displays), HDTV, and standard definition video. For legacy computer-video monitors, a suite of rates are available for uploading to the VTG 400 via the Windows® control software. For any other rate required but not available, the VTG 400 supports up to 180 user-programmed scan rates.

COMPUTER SCAN RATES				
Rate Name	**Resolution**	**H (kHz)**	**V (Hz)**	**Format**
VGA	640 x 480	31.5	60	RGB
VESA2 (VGA)	640 x 480	37.9	72	RGB
VESA1 (SVGA)	800 x 600	35.2	56	RGB
VESA5 (SVGA)	800 x 600	37.9	60	RGB
VESA6 (SVGA)	800 x 600	48.1	72	RGB
VESA3 (XGA)	1024 x 768	48.4	60	RGB
VESA4 (XGA)	1024 x 768	56.4	70	RGB
XGA5	1024 x 768	57	70	RGB
VESA8 (XGA)	1024 x 768	60	75	RGB
VESA9 (XGA)	1024 x 768	68.7	85	RGB
VESA10 (XGA+)	1152 x 864	67.5	75	RGB
1280 x 960	1280 x 960	60	60	RGB
1280 x 960	1280 x 960	70	70	RGB
1280 x 960	1280 x 960	75	75	RGB
VESA11 (SXGA)	1280 x 1024	64	60	RGB
VESA12 (SXGA)	1280 x 1024	91.1	85	RGB
SXGA+	1400 x 1050	63.9	60	RGB
VESA13 (UXGA)	1600 x 1200	75	60	RGB
VESA14 (UXGA)	1600 x 1200	87.5	70	RGB
VESA15 (UXGA)	1600 x 1200	106.3	85	RGB
QXGA	2048 x 1536	115	71.8	RGB
LCoS1	1360 x 1024	80	75.1	RGB
LCoS2	1365 x 1024	65.2	60	RGB
WORKSTATION RATES				
SGI	640 x 480	31.5	60	RGB
SGI	640 x 512	32.22	60	RGB
SGI	800 x 600	37.8	60	RGB
SGI	960 x 680	42.84	60	RGB
SGI	960 x 620	39.06	60	RGB
SGI	1024 x 768	48.36	60	RGB
SGI	1024 x 768	40.3	50	RGB
SGI	1200 x 900	68.04	72	RGB
SGI	1280 x 1024	53.25	50	RGB
SGI	1280 x 1024	63.9	60	RGB
SGI	1280 x 1024	76.68	72	RGB
SGI	1500 x 1200	75.6	60	RGB
SGI	1600 x 1024	63.38	60	RGB
SGI	1600 x 1200	75	60	RGB
SGI	1760 x 1100	71.04	60	RGB
SGI	1920 x 1035	33.75	60/30	RGB
SGI	1920 x 1080	33.72	60/30	RGB
SGI	1920 x 1080	70.31	60	RGB
SGI	1920 x 1080	84.37	72	RGB
SGI	1920 x 1200	77.52	60	RGB
SGI	1920 x 1200	85.27	66	RGB
SGI	2048 x 1120	83.45	72	RGB
SUN	1152 x 900	61.8	66	RGB
SUN	1152 x 900	71.7	76	RGB
SUN	1280 x 1024	81	76	RGB
SUN	1600 x 1280	89.3	67	RGB
SUN	1920 x 1080	84.4	72	RGB
SUN	1920 x 1200	87.2	70	RGB
SUN	1920 x 1200	93.6	75	RGB

STEREOGRAPHICS RATES				
Rate Name	**Resolution**	**H (kHz)**	**V (Hz)**	**Format**
Stereographics VGA	640 x 222	31.5	120	RGB
SGI Stereo	640 x 480	60.84	120	RGB
SGI Stereo	640 x 512	65.28	120	RGB
SGI Stereo	1024 x 768	96.84	120	RGB
SGI Stereo	1024 x 768	77.47	96	RGB
SGI Stereo	1120 x 840	84.38	96	RGB
SGI Stereo	1280 x 1024	124.6	114	RGB
SGI Stereo	1280 x 1024	131.16	120	RGB
SGI Stereo	1280 x 492	63.96	120	RGB
SUPER HIGH RES RATES				
Cornerstone	1600 x 1800	105	76	RGB
Extron	1280 x 1024	92	86.8	RGB
Extron	1600 x 1280	95	70.9	RGB
Extron	1800 x 1440	105	70	RGB
16:9 HIGH RES RATES				
16:9 HR	848 x 480	31.02	60	RGB
16:9 HR	852 x 480	31.8	60	RGB
16:9 HR	960 x 540	33.78	60	RGB
16:9 HR	1024 x 576	44.04	60	RGB
16:9 HR	1024 x 576	52.85	72	RGB
16:9 HR	1280 x 768	45.11	56.25	RGB
16:9 HR	1360 x 765	47.7	60	RGB
16:9 HR	1280 x 768	48.36	60	RGB
16:9 HR	1366 x 768	47.8	60	RGB
16:9 HR	1365 x 768	47.7	60	RGB
HDTV RATES				
480P	644 x 483	31.47	59.94	Y, R-Y, B-Y, RGB
576P	768 x 576	31.25	50	Y, R-Y, B-Y, RGB
720P	1280 x 720	44.96	59.94	Y, R-Y, B-Y, RGB, HDSDI*
720P	1280 x 720	45	60	Y, R-Y, B-Y, RGB, HDSDI*
1080I	1920 x 1080	33.72	29.97	Y, R-Y, B-Y, RGB, HDSDI*
1080I	1920 x 1080	33.75	30	Y, R-Y, B-Y, RGB, HDSDI*
1080I	1920 x 1080	28.13	25	Y, R-Y, B-Y, RGB, HDSDI*
1080P	1920 x 1080	67.5	60	Y, R-Y, B-Y, RGB
1080P	1920 x 1080	33.75	30	Y, R-Y, B-Y, RGB, HDSDI*
1080P	1920 x 1080	33.72	29.97	Y, R-Y, B-Y, RGB, HDSDI*
1080P	1920 x 1080	56.25	50	Y, R-Y, B-Y, RGB
1080P	1920 x 1080	28.13	25	Y, R-Y, B-Y, RGB, HDSDI*
1080P	1920 x 1080	27	24	Y, R-Y, B-Y, RGB, HDSDI*
1080P(sf)	1920 x 1080	27	24	Y, R-Y, B-Y, RGB, HDSDI*
1080P(sf)	1920 x 1080	26.97	23.98	Y, R-Y, B-Y, RGB, HDSDI*
1035I	1920 x 1035	33.75	30	Y, R-Y, B-Y, RGB, HDSDI*
1035I	1920 x 1035	33.72	29.97	Y, R-Y, B-Y, RGB, HDSDI*
VIDEO RATES				
NTSC	720 x 480	15.7	60/30	VID, Y/C, Y, R-Y, B-Y, RGB, SDI*
NTSC 0 IRE (JPN)	720 x 480	15.7	60/30	VID, Y/C, Y, R-Y, B-Y, RGB, SDI*
PAL - I	720 x 576	15.6	50/25	VID, Y/C, Y, R-Y, B-Y, RGB, SDI*
PAL - B,G,H	720 x 576	15.6	50/25	VID, Y/C, Y, R-Y, B-Y, RGB, SDI*
PAL - N	720 x 576	15.6	50/25	VID, Y/C, Y, R-Y, B-Y, RGB, SDI*

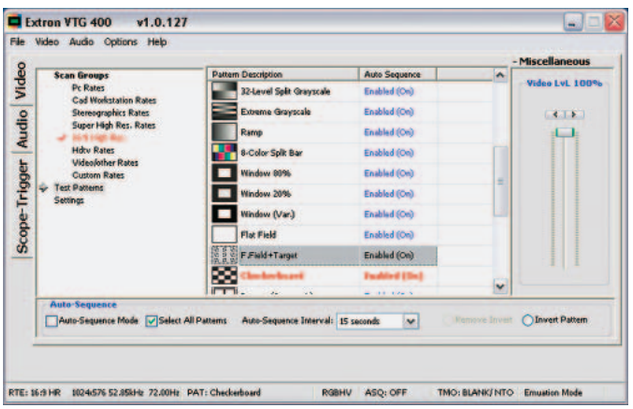
***Available on VTG 400D only**

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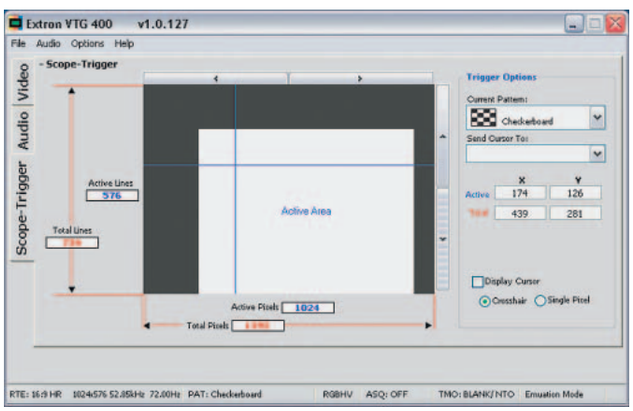
WHAT'S INSIDE The VTG 400

Setup, Programming, and Operation

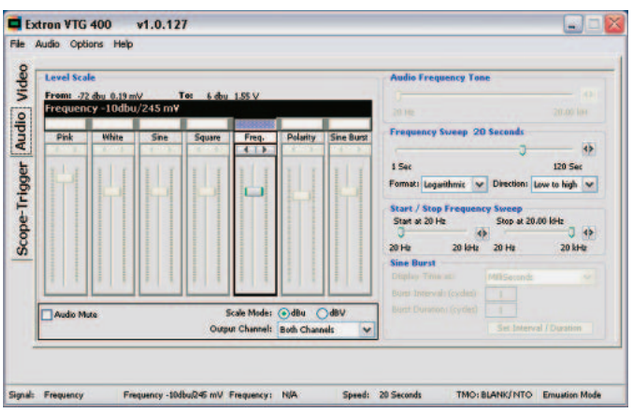
Included with the VTG 400 is convenient, user-friendly Windows® software that enhances and expedites set-up, programming, and operation of the VTG 400. All functions and features of the VTG 400 are easily accessible, including video and audio test signal selection, programming custom scan rates, Quick Select memory presets, and Scope-Trigger. This software is also essential for implementing firmware upgrades. User settings for the software can be saved to a file.



Video Setup Application



Scope-Trigger Application



Audio Setup Application

Video

Scan rates are activated by simply viewing a list of available rates, and then double clicking with a mouse. The user can obtain comprehensive data relevant to any rate, including horizontal and vertical frequencies, active picture resolution, total picture resolution, horizontal and vertical sync pulse width, and much more. Up to 180 additional custom scan rates can be created by entering new data into the software, copying and then editing existing rates, or importing from a file. Any rate can be exported to a file.

Any test pattern is activated by selecting from a list with icons depicting the patterns. Depending on the test pattern, the video level is adjustable, and the pattern invertible. Other software controls duplicate the VTG 400 main panel functions such as selective RGB color channel output, and the Auto Sequence and Screen Saver modes.

Scope-Trigger

The software takes Scope-Trigger functionality to a new level of ease and convenience. All of the user controls from the VTG 400 main panel are duplicated, but the software adds the convenience of positioning the Scope-Trigger cursor anywhere within the video image by pointing and clicking. By clicking outside of the active (visible) video area portions of the signal, such as one vertical sync interval can be examined on the oscilloscope.

Audio

Any of the seven available audio test signals are selectable with just the click of a mouse. Output levels for each signal are independently adjustable and simultaneously displayed. The appropriate custom parameters are automatically highlighted for the active signal. Output level units are displayed in dBu or dBV, as well as mV (and V). All other audio functions including muting and selective channel output are easily within access.

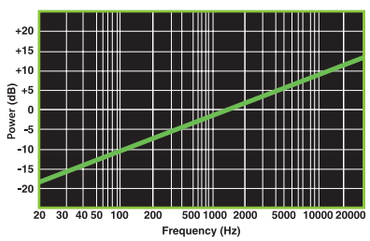
WHAT'S INSIDE *The VTG 400*

Audio Test Signals

The VTG 400 features a comprehensive and intuitive professional-grade audio test generator. Seven reference test signals are available that are fully programmable including frequency, amplitude (output level), and additional parameters. Ideal for use with testing, calibrating, and commissioning high performance audio products and systems, the VTG 400 delivers less than 0.008% THD + noise (at +6 dBu) for a clean, crisp audio signal reference with no interference from the internal power supply and video test generator. The VTG 400 also delivers frequency response from 20 Hz to 20 kHz, and outputs test signals between -72 dBu and +6 dBu, for full compatibility with professional and consumer audio equipment, and accurate signal generation at microphone level.

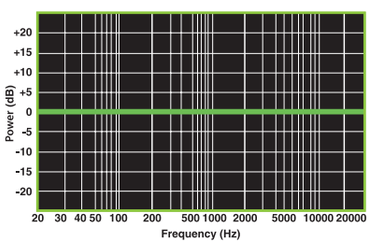
VTG 400 AUDIO LEVELS			
Signal Format	**Range (dBu)**	**Range (dBV)**	**Range (mV)**
Pink Noise	-72 dBu to -4 dBu	-74 dBV to -6 dBV	0.20 mV to 500 mV
Polarity Test	-72 dBu to -14 dBu	-74 dBV to -16 dBV	0.20 mV to 158 mV
All other signal types	-72 dBu to +6 dBu	-74 dBV to +4 dBV	0.20 mV to 1.6 V

Audio level units are specified in dBu and dBV, as well as mV. For all test signals, the level is adjustable in 1 dBu or 1 dBV increments. The VTG 400 outputs balanced audio on an XLR connector, and unbalanced audio on RCA and 3.5 mm mini jack connectors. The audio is delivered as mono to either or both of the left and right channels. User-friendly menus and dedicated audio buttons facilitate quick setup and access to test signals and their parameters.



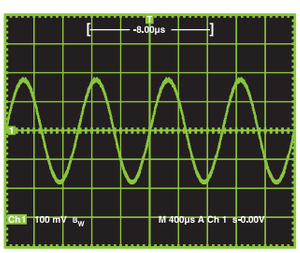
White Noise

- White noise is a randomly generated audio signal (noise) with equal energy at every frequency.
- This test signal spans between 20 Hz and 20 kHz. The output level is variable from -72 dBu to +6 dBu (-74 dBV to +4 dBV).
- White noise is used in audio level measurement and equipment calibration.



Pink Noise

- Pink noise is a variant of white noise with equal energy at every octave. It is the result of passing white noise through a 3 dB per octave low pass filter.
- This test signal spans between 20 Hz and 20 kHz. The output level is variable from -72 dBu to -4 dBu (-74 dBV to -6 dBV).
- Pink noise is used in testing and calibrating loudspeakers and sound systems, as well as analyzing and equalizing the acoustical characteristics of room environments.



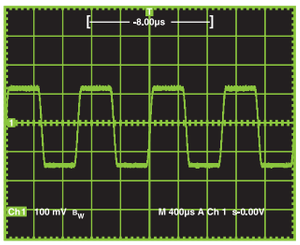
Sine Wave

- Sine waves are periodic, oscillating waveforms represented as sine curves and are elementary components of sound.
- The VTG 400 generates sine waves with programmable amplitude between -72 dBu and +6 dBu (-74 dBV to +4 dBV), and frequency specified between 20 Hz and 20 kHz in 1/12 octave steps.
- Sine wave signals are used in testing and measuring the frequency response and distortion of audio products, as well as crosstalk between the left and right channels.

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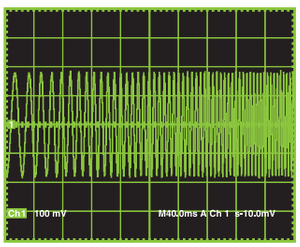
WHAT'S INSIDE The VTG 400

Audio Test Signals



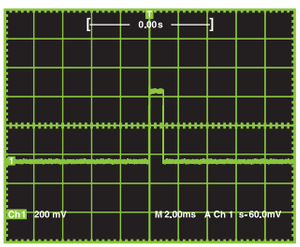
Square Wave

- Square waves are waveforms with a 50% duty cycle and no DC offset, and are characterized as rectangular-shaped waveforms.
- The frequency can be generated from 20 Hz to 5 kHz in 1/12 octave steps. The output level is variable from -72 dBu to +6 dBu (-74 dBV to +4 dBV). Because square waves can damage equipment if played at high levels, the VTG 400 can be set to automatically attenuate the output level to -40 dBu whenever square wave output is selected.
- Square waves are usually for testing DC response stability in audio electronics.



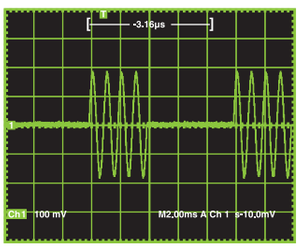
Swept Sine Wave

- A swept sine wave test signal is a continuous sine wave frequency progression that sweeps between two values.
- The VTG 400 offers considerable flexibility in programming swept sine waves. The starting and ending frequencies can be any value between 20 Hz and 20 kHz in 1/12 octave steps. The sweep can progress from the lower to the higher frequency value, or vice versa, with a logarithmic or linear progression. Furthermore, the duration of the sweep is selectable among 15 time intervals between 1 and 120 seconds. The output level is adjustable from -72 dBu to +6 dBu (-74 dBV to +4 dBV).
- Swept sine waves are used when testing loudspeaker and crossover defects as well as mechanical vibration sources in the room. They are also effective in measuring and testing room acoustics.



Polarity Test

- A polarity test signal is a positive phased pulse with duration of 1 ms and 0.1% duty cycle (1 s intervals between pulses).
- The output level is limited between -72 dBu and -14 dBu (-74 dBV and -16 dBV).
- The polarity test signal is useful in determining proper polarity in wiring connections for audio electronics and loudspeakers.



Sine Wave Burst

- The Sine Wave Burst generates a sine wave of a specified frequency that is gated on and off for fixed intervals.
- The VTG 400 allows for adjustment of the burst interval (the total number of cycles in each repeating period) and the burst on duration (the number of cycles in the interval when the sine wave is turned on). The output level is adjustable from -72 dBu to +6 dBu (-74 dBV to +4 dBV).
- Sine wave bursts are used in testing the transient response of audio systems.

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Specifications

VTG 400 & VTG 400D

VIDEO SIGNAL CHARACTERISTICS

Dot clock	200 MHz (max.)
Pixel clock accuracy	100 ppm
Horizontal frequency range (factory defaults)	15 kHz to 131 kHz
Vertical frequency range (factory defaults)	30 Hz to 120 Hz
Rise/fall time	<4 ns

VIDEO OUTPUT

Number/signal type	1 RGBHV, RGBS, RGsB, component video, HDSDI (SMPTE 295M, SMPTE 296M, optional), SDI digital component video (SMPTE 259M/270 Mbps, optional), S-video, composite video (NTSC/PAL)
Connectors	1 x 5 female BNC (RGB) 1 female 15-pin HD (RGB) 1 x 3 female BNC (component video) 1 female 4-pin mini DIN (S-video) 1 female BNC (composite video) 1 female BNC (optional SDI/HDSDI)
Nominal level	1 Vp-p for Y of component video and S-video, and for composite video, and also R-Y and B-Y of component video (tri-level sync) 0.7 Vp-p for RGB and for R-Y and B-Y of component video (bi-level sync) 0.286 Vp-p (burst) for C of NTSC S-video, 0.300 Vp-p (burst) for C of PAL S-video
Minimum/maximum levels	0.0 V to 1.0 Vp-p
Impedance	75 ohms
Resolutions	Computer (VGA–QXGA), video (NTSC, PAL), HDTV, 16:9 high resolutions, and custom resolutions (user-defined)
Return loss	-30 dB @ 5 MHz
DC offset	±5 mV with input at 0 offset for RGB and component video, ±5 mV with input at 0 offset for S-video and composite video

SYNC

Output type	RGBHV, RGBS, RGsB, RsGsBs (for RGB signals) Tri-level on Y, R-Y, B-Y channels (component video 720p, 1080i, 1080p) Bi-level on Y channel (for all other component video rates)
Standards	NTSC, PAL, SMPTE 170M, SMPTE 274M, SMPTE 293M, SMPTE 295M, SMPTE 296M, SMPTE 259M
Output level	0.3 Vp-p for RGsB, RsGsBs, component video (bi-level sync) 0.6 Vp-p for RsGsBs, component video (tri-level sync) TTL: 5.0 Vp-p, unterminated for RGBHV, RGBS
Output impedance	75 ohms
Max. rise/fall time	5 ns (TTL sync)
Polarity	Positive or negative (scan rate/signal dependent)
Scope trigger connectors	1 BNC female (Scope-Trigger™)

AUDIO

THD + Noise	<0.008% typical @ +6 dBu (1.55 V), 1 kHz 0.18% @ -36 dBu (9.75 mV), 20 Hz to 20 kHz
Flatness	±0.05 dB @ 20 Hz to 20 kHz
Accuracy	±0.4 dB

NOTE: 0 dBu = 0.775 Vrms, 0 dBV = 1 Vrms, 0 dBV ≈ 2 dBu

AUDIO OUTPUT

Number/signal type	1 mono, balanced; 2 mono, unbal.
Connectors	(1) 3.5 mm mini stereo jack (unbal. mono left and right, tip-ring-sleeve) 1 female RCA jack (unbalanced, tip-ring) 1 male 3-pin XLR (balanced) (pin 1 = GND, pin 2 = +, pin 3 = -)
Impedance	50 ohms unbalanced, 100 ohms balanced
Waveforms	Pink noise, white noise, sine wave (fixed/swept/burst), square wave, polarity test
Level ranges	Pink noise: -72 dBu to -4 dBu (-74 dBV to -6 dBV) (0.20 mV to 500 mVrms) Polarity test: -72 dBu to -14 dBu (-74 dBV to -16 dBV) (0.20 mV to 158 mVrms) All other signal types: -72 dBu to +6 dBu (-74 dBV to +4 dBV) (0.20 mVrms to 1.58 Vrms)
Maximum level (Hi-Z)	>+6 dBu, balanced or unbalanced at 1%THD+N
Maximum level (600 ohm)	>+4.66 dBu, balanced or unbalanced at 1%THD+N
Crest factor (pink noise)	3.25 (10.24 dB)
Crest factor (white noise)	1.98 (5.95 dB)
Rise time (square wave)	1.5 ms at 20 Hz to 7 µs at 5 kHz
Rise time (polarity test)	5 µs

CONTROL/REMOTE — TEST GENERATOR

Serial control port	RS-232, 9-pin female D connector
Baud rate and protocol	9600 baud, 8 data bits, 1 stop bit, no parity
Serial control pin configurations	2 = TX, 3 = RX, 5 = GND
Program control	Extron's control/configuration program for Windows® , Extron's Simple Instruction Set (SIS™)

GENERAL

Power	100VAC to 240VAC, 50/60 Hz, 15 watts, internal, autoswitchable
Rack mount	No
Enclosure type	Metal
Enclosure dimensions	6.75" H x 9.0" W x 1.75" D 17.1 cm H x 22.9 cm W x 4.4 cm D (7.5" [19.1 cm] H including connectors.)
Product weight	3.3 lbs (1.5 kg)
Shipping weight	7 lbs (4 kg)
Listings	UL, CUL
Compliances	CE, FCC Class A, VCCI, AS/NZS, ICES

MODEL	PART NUMBER
VTG 400	**60-564-01**
VTG 400D	**60-564-02**

Specifications are subject to change without notice.

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