Marantz® VP-11S1

1080p DLP Projector

Greg Rogers

1080p Native With Gennum Processing

The Marantz VP-11S1 is the first production-version 1080p DLP™ front projector that I have received for review. It utilizes Texas Instruments' new 0.95-inch, 1080p DarkChip3™ DLP technology, a faster 6x-speed 7-segment color wheel, and custom Konica-Minolta optics.

The VP-11S1 ($19,999) includes Gennum's newest VXP™ video processor, which provides 10-bit video processing, 1080i film-mode (inverse-telecine) deinterlacing, and motion-adaptive deinterlacing with directional interpolation for 1080i broadcast video.

Appearance

The VP-11S1 uses the same case as previous Marantz 720p DLP projectors. The unit that I received had a cream-colored finish, but it's also available with a black finish. A darker gray bezel surrounds the larger-than-normal lens assembly, which is slightly offset from the center of the projector. Warm air is exhausted through the front bezel. A manual lens shift dial is located on top of the case, along with a set of operating controls. All inputs are on the recessed rear panel. There was no light leakage from the projector body, but I covered the blue power indicator on top of the case with a small piece of black electrical tape.

"Marantz has produced an outstanding 1080p DLP projector using Texas Instruments' new 1920 x 1080 pixel DarkChip3 technology."

Set Up

With a 100-inch diagonal (87 3/16-inch x 49-inch) 16:9 screen, the 1.45x zoom lens provides a lens-to-screen throw distance between 10.6 and 15.4 feet. This is an exceptionally wide zoom range, but the projector will also be available later this year with an even longer throw lens. The long throw version ($21,999) will provide a throw distance of 15.4 to 23.2 feet for a 100-inch diagonal screen.

The VP-11S1 has manual focus and zoom adjustments. The focus adjustment is silky smooth and can be set very precisely for optimum focus. It's more convenient to adjust focus using a remote control, but few remote-controlled lenses have as much adjustment precision. There is also a manually adjusted optical lens shift that permits the projector to be ceiling-mounted above the top of the screen. The preferred ceiling mounting position is no higher than the top of the screen, but lens shift provides sufficient offset to mount the projector up to 32.5 percent of the screen height above the top of the screen. The projector includes a built-in focus pattern that changes color from white to green to indicate that the vertical offset is outside of the preferred lens shift, but performance is barely affected by the higher mounting position. The wide-range vertical lens shift should avoid having to use the electronic keystone correction, which is always detrimental to picture quality, but it is particularly poor on this projector.

Connections

The rear panel has seven video inputs—one composite (RCA connector), one S-video (4-pin mini-DIN), two YPbPr (RCA connectors), one RGB (15-pin D-sub), and two HDMI inputs.

The YPbPr and RGB analog inputs are compatible with 480i/p, 540p, 576i/p, 720p, 1035i, 1080i, and 1080p. These inputs are compatible with 720p and 1080p signals at 24, 25, 30, 50, and 60 FPS (frames per second), and 1080psf (segmented frame) at 24, 25, and 30 FPS. The analog RGB input is also compatible with a variety of PC formats up to 1024 x 768 at 85 Hz, and 1600 x 1200 at 60 Hz. The RGB input accepts signals with positive or negative HV sync, or sync on green. The projector is fairly slow when changing input signal formats (480i, 720p, etc.) taking about four or five seconds to identify and sync to a new signal.

The rear panel includes an RS-232C

SPECIFICATIONS

Chipset: Texas Instruments Digital Light Processing™ Technology 1920 x 1080 pixel 0.95" DarkChip3™ DMD™
Lamp: SHP 200W DC
Zoom Lens: f: 30.7 to 44.5 mm / F: 3.0 - F:6.0
Contrast Ratio: 6500:1
Light Output: 600/700 ANSI LUMEN Typical

Features
Video Processing: Gennum VXP™
Color Temperature: 5 steps
Preset Gamma: 8
Lamp Life: 2000 hrs (average)

Video Inputs
Composite Video: 1 (RCA)
Y/C: 1 (S-Video)
Component: 2 NTSC/ATSC (2x 3 RCA)
RGB/HD: 1 (VGA D-Sub 15)
HDMI 1.1: 2

In/Outputs
RS-232C: 1 (D-Sub 9)
RC-5: 2 (3.5 mm mini)
DC Trigger: 2 (3.5 mm mini)

General
Power Requirement: AC 100-120 V / 220-240 V, 50/60 Hz
Power Consumption: < 350 W
Dimensions (WHD In Inches) 15 15/16 x 6 1/8 x 18 15/16
Net Weight (In Pounds): 29
Warranty: 3 years
Price: $19,999

Manufactured In Japan By:
Marantz America, Inc.
1100 Maplewood Dr
Itasca, IL 60143
Phone: 630 741 0300
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control port and Remote Control In and Out jacks for connection to other Marantz components. There are also two 12V Trigger output terminals. One is active whenever the projector is turned on, and the user can specify which aspect ratios enable the other 12V output to control screen masks. The rear panel also includes a standard three-prong power cable socket and a switch that illuminates the rear panel (even in Standby mode) for changing cables in a dark room.

HDMI/DVI Compatibility

The HDMI (DVI) inputs accept 480i/p, 576i/p, 720p (24/48/50/60 Hz), 1035i 60 Hz, 1080i (50/60 Hz), and 1080p (24/25/30/48/50/60 Hz). The HDMI input also accepts DVI PC formats up to 1024 x 768 at 75 Hz.

The HDMI inputs can be set to Auto mode or manually configured to accept digital RGB, 4:4:4 YCbCr, or 4:2:2 YCbCr signals. The YCbCr modes can also be manually set to perform standard (ITU Rec. 601) or high-definition (ITU Rec. 709) color decoding. In the Auto mode, the signal type and the correct color decoding should be selected automatically between an HDMI source and the projector. However, there have been numerous problems with sources (and some displays) not getting this right, so it is extremely valuable that Marantz permits each of these modes to also be selected manually. Having expressed due credit to Marantz for providing these adjustments, they should also get the labeling correct. The HD digital color-decoding mode is called YPbPr when it should be YCbCr (digital component color-difference signals should always be labeled YCbCr, and only analog component color-difference signals should be labeled YPbPr).

You can select the Normal (Black Level) mode for signals with RGB-Video levels (black at digital code 16 and reference white at 235), or the Expand mode for RGB-PC levels (black at 0 and reference white at 255). The Black Level selection shifts the black level but doesn't change the signal gain, so the Contrast control must be readjusted when changing from RGB-video signals to RGB-PC signals.

YCbCr signals would normally use the same Black Level mode as RGB-video signals, but instead the Expand mode has been factory calibrated for YCbCr signals. Although that creates some initial confusion, I suspect it was done that way because the Normal mode clips signals below black (digital code 16).

Controls

The slender two-inch wide remote control is sensibly laid out with an assortment of button sizes and shapes. All 45 buttons are brightly backlit when activated by a slide switch on the side of the remote, and each button includes descriptive nomenclature on its surface. I really liked this remote because of its lighting and its many dedicated buttons. In addition to the on-screen menu navigation buttons, there are dedicated buttons to select each input—the iris mode, the lamp power, color temperature, specific gamma curves, user modes, deinterlacing mode, individual blanking modes, picture mute, and several aspect ratios.

The IR signal is not powerful enough to reliably bounce off the screen, but there are remote control sensors on the front and back of the projector that solve that problem, unless you sit directly under the projector.

The top of the projector includes an alternate set of buttons for on-screen menu navigation, input selection, the focus pattern, and Power On/Standby. There are also Warning/Lamp, Power, and Standby indicators.

On-Screen Menus

The on-screen menu window includes Picture Mode, Picture Adjust, Fine Menu 1, Fine Menu 2, Input Signal, RGB/HD Adjust, Display, OSD/Blanking, and Configuration submenus. When a variable item is selected, the menu window disappears and is replaced by a single bar graph and numerical value near the bottom of the screen. That makes it easier to perform adjustments without covering a substantial part of the picture. When the adjustment is completed the menu window reappears.

The Picture Adjust submenu provides Gamma, Contrast, Brightness, Color (Saturation), Tint (Hue), Color Temperature, Lamp mode (Normal/Economy), Iris (F6.0/F3.0), and Aspect (ratio). The Color saturation control is available for all inputs. The Tint control is only available for 480i composite and S-video signals.

Fine Menu 1 includes Sharpness, Noise Reduction, and RGB Gain and Bias controls for adjusting color temperature and grayscale tracking. Fine Menu 2 includes Cinema (Auto/Off), VCR mode (On/Off), Black Level, FRC (Frame Rate Conversion) (Auto/On), CEC (Chroma Error Correction), Picture Shift V (Zoom Aspect Ratio only), Luminance Gain, and Chroma Delay. The Auto Cinema mode enables inverse-telecine deinterlacing for standard-definition and high-definition film sources. Black Level selects a 0 or 7.5 IRE black level for analog input signals, and digital video or PC levels for HDMI/DVI signals. Chroma Delay adjusts the Y/C delay and only affects 480i/576i analog signals. The CEC mode enables CUE (Chroma Upsampling Error) correction for 1080i signals only.

The Input Signal menu can be used to select the signal format for each input. In most cases you can simply use the Auto mode, but you can also lock inputs to a specific format, such as 1080i for the component or HDMI inputs, or NTSC, PAL, or SECAM for the composite or S-video input. You can also select the color space decoding for the HDMI inputs.

The RGB/HD Adjust menu includes Mode (Auto/Memory1-3), Readjust, Resolution (Size) H, Resolution (Size) V, Position H, Position V, Phase, Clamp Position, and Clamp Width. The Clamp adjustments are useful for analog RGB signals that have non-standard timing.

The Display submenu includes Keystone, Scale, Width, Position H, Position V, Overscan (Enable/Disable), and Installation. Scale reduces the vertical and horizontal image size proportionally to about 70 percent of the original size. Width reduces only the horizontal width to about 75 percent of the original size. The Position H,V controls can be used to reposition the incoming video signal if the Scale and Width controls are used. Installation sets the projector orientation—front/rear for ceiling or table mounting.

The OSD/Blanking menu includes menu position (nine screen positions), Language (six languages), Status Info (Enable/Disable), Power-Off Confirmation (Enable/Disable), Blanking Memory (Off/1/2/3), and Blanking —Top, Bottom, Left, Right. The latter sets the amount of blanking independently for each edge.

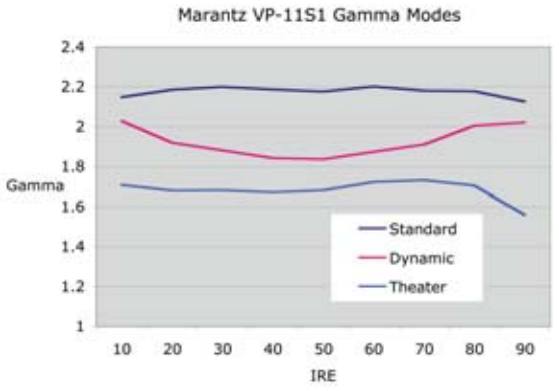
The Configuration submenu includes Auto Power Off, Trigger 2 (Full, Normal, Zoom, and Through), Remote Control (Wired/Wireless), Reset Lamp Life, and Reset All. The Trigger 2 items select the Aspect Ratios that enable the 12V Trigger 2 output terminal.

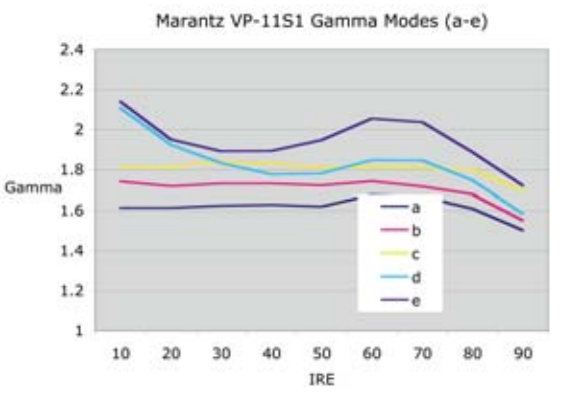
Projection Lamp

The projector utilizes a 200-watt SHP (Super High Pressure) projection lamp that is DC-powered to eliminate flicker, which has been a problem on some competing projectors.

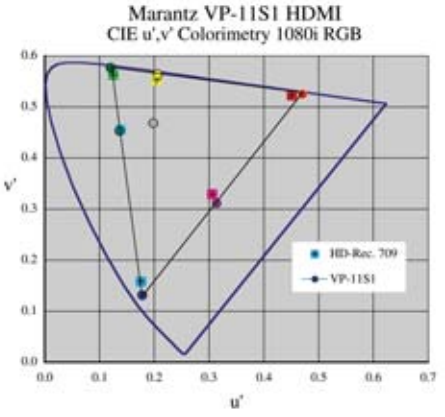
The maximum lamp life is 2,000 hours, but the manual suggests that the lamp may "rarely break down" when running longer than 1,000 hours. For that reason it suggests replacing the lamp after 1,000 hours. But unless the lamp dims excessively, I doubt many owners will want to replace it that often. The lamp is user-replaceable and priced at about $500.

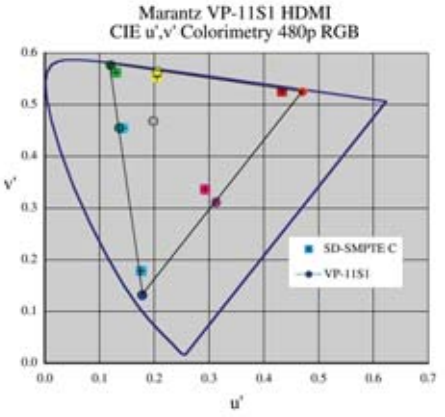
GAMMA





PERFORMANCE





Lamp Mode

The Lamp mode selects the projection lamp brightness. In the Normal mode, the fan noise measured 52 dB, C-weighted at 12 inches from the front (exhaust side) of the projector. In the Economy mode, the brightness dropped by about 20 percent, and the noise level was 50-dB.

Picture Modes

There are four Picture modes: Theater, Standard, Dynamic, and User. The Theater, Standard, and Dynamic modes have a preset Default setting and three additional index (1/2/3) settings. The Theater, Standard, and Dynamic modes have preset gamma curves, but the Picture Adjust and Fine Menu 1 settings can be changed for index 1/2/3. The User mode has nine additional index settings. Any of eight gamma curves can be selected for each of the User index settings, in addition to the Picture Adjust and Fine Menu 1 settings. The Picture Modes are global settings that can be used with any input. When an input is switched, the Picture mode and index last used with that input are restored.

Gamma

There are eight preset gamma curves (A-E, Theater, Standard, and Dynamic). The gamma curves are plotted in the accompanying charts.

The Standard gamma curve provides a nearly constant 2.2 gamma value, and it produces the most realistic-looking images on this projector. I would have liked the option to experiment with higher gamma values (2.3 to 2.5), which are similar to CRT projectors, but the Standard value was quite satisfying and well matched to the black level and contrast performance of the projector.

The Dynamic curve may be some viewers' first choice because it adds more "punch" to the picture, but I believe it will appear increasingly unnatural with extended viewing. Many of the other curves are similar to the unusually low gamma values included on previous Marantz projectors. I don't see the purpose of those gamma curves, which excessively brighten near-black image content.

Aspect Ratios

There are five Aspect (ratio) Modes—Full, Normal, Zoom, V-Stretch, and Through. The Full mode is used to display 16:9 sources. The Normal mode displays full-frame 4:3 pictures in the center of a 16:9 screen with black sidebars. The Zoom mode displays 4:3 letterboxed frames by expanding the image proportionally in the vertical and horizontal directions to fill the width of the screen. The Through mode displays any format with less than 1080 lines in its native resolution without scaling the image. The V-Stretch mode is intended for use with an external anamorphic lens, but the firmware for that feature hadn't been implemented yet for high-definition signals.

Lens Quality

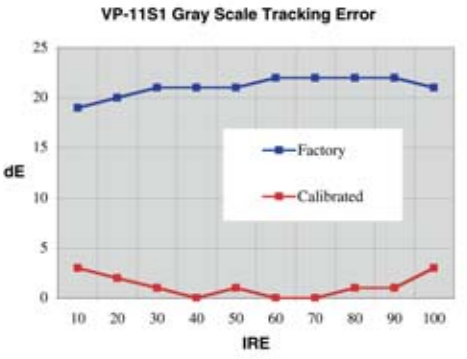
The Konica-Minolta lens is superb. There was virtually no visible chromatic aberration (color fringing) on horizontal or vertical lines anywhere on screen. The edges of individual pixels were sharply defined across the entire pixel grid, and single-pixel black-and-white lines were reproduced with full resolution and contrast. There was very little difference when the optical lens shift was maximized. The individual 1080p pixels were still extremely well defined, with just slightly less sharpness along the top of the screen.

Gray Scale

An AccuPel HDG-3000 Calibration generator (www.accupel.com) was used to generate test patterns for measuring light output, contrast ratio, gray scale and color accuracy.

The factory-adjusted Color Temperatures (1-5) measured 5800K, 6360K, 7080K, 7860K, and 9220K at 70 IRE. I re-calibrated the Color Temperature 3 gray scale to produce D65 (x = 0.3127, y = 0.329, dE = 0) at 70 IRE, with a maximum dE deviation of three at 10 IRE and 100 IRE. A dE of three is generally not noticeable under normal viewing conditions.

Marantz VP-11S1				
Gray Scale Tracking				
	HDMI	HDMI	HDMI	HDMI
	Factory	Calibrated	Factory	Calibrated
IRE	°K	°K	dE	dE
10	7278	6312	19	3
20	6993	6370	20	2
30	6912	6499	21	1
40	6973	6492	21	0
50	6973	6547	21	1
60	7024	6492	22	0
70	7076	6492	22	0
80	7024	6437	22	1
90	7024	6430	22	1
100	6973	6649	21	3



Black Level And Contrast Ratio

Light output and contrast measurements were made using the HDMI input with the gray scale calibrated to D65 as above. With the Normal lamp power and F6.0 (high-contrast) iris aperture, the VP-11S1 produced 416 lumens, which is equivalent to 19.0 foot-Lamberts (fL) from my 1.3 gain, 85.3-inch wide, 16:9 Stewart® Studiotek screen. The Economy lamp power reduced the light output to 330 lumens, which is equivalent to 15.1 fL from my screen, which is still substantially more than the 12 fL SMPTE recommendation for digital cinema. The full-field contrast ratio measured an excellent 4020:1.

With the high-brightness F3.0 iris aperture in the Normal lamp mode, the projector produced 608 lumens, which is equivalent to 27.8 fL from my screen, with a full-field contrast ratio of 2360:1.

The above measurements were made at my usual 12-foot lens-to-screen throw distance, but the contrast ratio differences weren't measurably significant at the minimum and maximum throw distances. Brightness increased by about three percent at the minimum throw distance, and decreased by about six percent at the maximum throw distance.

If additional brightness is desired for non-critical viewing in a dimly lit room, the High Bright (HB) mode can be enabled. The HB factory setting increased the brightness about 24 percent, but the dE deviation from D65 increased to 29.

The full-field contrast ratio is crucial because it determines the absolute blackest level in dark scenes when a projection system produces the desired peak-white brightness in bright scenes. A small increase in the absolute black-level reduces shadow detail discrimination in predominantly dark images.

Another important performance parameter is intra-image contrast, which describes the ability to see contrast differences when there are bright objects near darker objects. The intra-image contrast ratio is much lower than the full-field contrast ratio because light from bright objects will be scattered over the image obscuring darker objects. The light scattering occurs within the lens and the optical system of the projector, but it may also occur within your theatre as light reflects around the room and back onto the screen.

My modified "ANSI" contrast ratio is a figure-of-merit to characterize intra-image contrast performance. It is designed to minimize the influence of room reflections and other variables that would affect measurement accuracy. The modified "ANSI" contrast ratio of the VP-11S1 measured a superb 530:1.

White Field Uniformity

Brightness uniformity on a white-field test pattern was exceptional. There was only three percent or less variation in brightness at the sides of the screen, and seven percent variation from top to bottom in the F6.0 iris mode. The color uniformity varied by only 2 dE. In the F3.0 mode, the top-to-bottom brightness uniformity was seven percent or less, and just five percent or less from side-to-side.

Color Accuracy

The CIE diagrams show the HDMI RGB color accuracy compared to the Rec. 709 (HDTV) and Rec. 601 (SDTV) colorimetry using u',v' coordinates, which provide a more perceptually uniform presentation of the color space than CIE x,y coordinates. The projector primaries are only slightly more saturated than the Rec. 709 primaries, and they are balanced so that the position of the yellow, cyan, and magenta complementary colors are extremely close to the standard hues. That makes flesh tones and all other hues within the color gamut exceptionally accurate. The standard-definition Line of Purples from red to blue are somewhat more saturated than the Rec. 601 (SMPTE-C) standard, but the hues remain accurate.

HDMI YCbCr high-definition and standard-definition signals produced virtually the same CIE diagrams (not shown), which indicate the Rec. 709 and Rec. 601 color decoding matrices match the applicable standards. The complementary color coordinates in the analog high-definition and standard-definition YPbPr CIE diagrams (not shown) vary by no more than 0.002 (x,y), which indicates excellent matching of the analog signal paths and correct hue accuracy.

The Chroma Delay control, which is only available for analog 480i and 576i signals, was incorrect at its default value. The chroma and luma signals were properly aligned when the control was set to -1.

1080i/p Pixel Perfection

The VP-11S1 produced spatially "pixel perfect" images from 1080p HDMI/DVI signals. No pixels were blanked and each incoming pixel was precisely mapped to a single projector pixel without scaling. The projector's internal deinterlacer also converted 1080i static test patterns to "pixel perfect" 1080p images, except that one line at the top of the frame was blanked. The blanked line could be moved to the top or bottom of the frame with the vertical position control, but it could not be eliminated. However, all other pixels were correctly deinterlaced and mapped without scaling, and single pixel lines in an AccuPel multi-burst pattern were rendered as single pixel lines with full amplitude. Analog 1080i YPbPr signals were reproduced with no missing lines or pixels, but there was a slight smear on the edge of vertical lines due to limited analog bandwidth.

Scaling And Overscan

Scaling was excellent with only one to two (1080p) pixels of extremely faint outlining around 720p horizontal and vertical lines, and two to three pixels of outlining around 480i or 480p digital signals. There was one missing horizontal line of pixels at the bottom of the frame for 720p digital signals, and a single missing vertical line of pixels on the right side of the frame for 720p analog YPbPr signals. With the Overscan mode enabled (only available for standard-definition formats), there was 1.5 to three percent overscan at each edge of the frame. With Overscan disabled, there was about 0.5 percent of overscan on the left side of digital 480i signals, and about

0.2 percent or less overscan on the left side of other 480i and 480p signals.

The Sharpness control is best left at its minimum setting for most sources. It sharpens both horizontal and vertical edges to a varying degree, depending on the signal format, but it also brightens or increases edge outlining. The projector also provides Chroma Upsampling Error (CUE) compensation, called CEC, but it's only available for 1080i signals. CEC is a vertical chroma filter, so it slightly reduces color resolution.

Video Deinterlacing

The VP-11S1 uses a Gennum GF9351 VXP™ Image Processor for deinterlacing, scaling, noise reduction, detail enhancement, and frame rate conversion. The 10-bit video processor provides film-mode (inverse-telecine) and per-pixel motion-adaptive deinterlacing for standard-definition and high-definition video.

As I've written many times, there is no perfect solution to convert 480i, 576i, or 1080i original interlaced video sources to progressive video. Unlike film-source video, there's no 3-2 field pulldown cadence, which allows inverse-telecine deinterlacing to reassemble film frames. Instead, each odd or even field of original interlaced video captures images at different instances in time. Most projectors and standalone scalers have traditionally converted 1080i video to 1080p using vertical interpolation to scale each individual 1080i field directly to a 1080p frame. The vertical resolution of the displayed image is then limited to the 540-line vertical resolution of each original interlaced field. Furthermore, vertical interpolation acts as a filter, which also reduces the vertical resolution and softens the image.

The Gennum VXP processor instead converts 1080i original video to 1080p using pixel-based motion-adaptive deinterlacing. It applies interpolation to image areas that are in motion, but merges information from odd and even fields in static image areas. Merging field information produces 1080 line vertical resolution in static image areas. The Gennum processor also includes its FineEdge™ adaptive edge-correction, which adds directional interpolation to reduce jaggies on diagonal lines and optimize the resolution of areas that are in motion.

The Gennum VXP processor was exceptional in eliminating 1080i jaggies and line twitter, while still producing excellent resolution. In addition there was very little resolution pumping (breathing), which is a highly annoying artifact that occurs if the image resolution suddenly and severely decreases with movement. The Silicon Optix Realta™ HQV™ image processor is the other latest-generation video-processing chip that I have evaluated in recent reviews. Both processors provide 1080i image clarity that far exceeds what I have seen from previous generation deinterlacing solutions. Unfortunately, I didn't have an external video processor with the Silicon Optix Realta to directly compare to the Gennum VXP processor on this projector. But based on previous testing, my initial impression is that the Realta 1080i motion-adaptive deinterlacing produced a slightly sharper picture, but the Gennum had slightly less resolution pumping. However, this is a tentative impression until I can do a direct A/B comparison on the same projector. Until then, I can't conclude which solution I prefer for 1080i broadcasts.

The Gennum VXP motion-adaptive deinterlacing is also a major improvement for 480i original video sources. Line twitter and jaggies are more difficult to eliminate in the lower resolution, standard-definition format where the spacing between the original video lines is greater. I evaluate the trade-offs between line twitter, jaggies, and a loss of picture resolution using the *Digital Video Essentials* "Montage Of Images" as a repeatable source of difficult-to-deinterlace original interlaced-video sequences.

The VXP algorithms produced a sharper picture with less line twitter than the previous generation of deinterlacing processors. There were no jaggies on the bobbing frozen branch, or the stripes of the rippling American flag, although there was a trace of color-bleed between the red and white stripes of the flag. The Realta HQV processor avoids the color-bleed, and it does a better job during the pan of the stadium seating. But the Gennum VXP processor was by far the best that I have seen during the difficult zoom out of the city. It produces less line twitter, while still maintaining detail and sharpness. Generally, the Gennum VXP was better at eliminating 480i line twitter, while the Silicon Optix Realta eliminated the 480i jaggies better.

Inverse-Telecine Deinterlacing

Inverse-telecine deinterlacing is an ideal, artifact-free process that converts interlaced video transferred from film to progressive video. The video processor must lock onto the 3-2 field pulldown cadence that results from transferring 24 frame-per-second film to 60 field-per-second interlaced video. It then merges the odd-and-even video fields that originated from the same film frames. That eliminates interlaced line twitter and avoids vertical interpolation that would soften the image. Inverse-telecine deinterlacing is particularly effective in reducing moiré patterns and eliminating line flicker during vertical movement of closely spaced horizontal lines.

The projector's Cinema mode must be set to Auto to use film-mode deinterlacing. It will then automatically switch between inverse-telecine deinterlacing for film sources, and motion-adaptive deinterlacing for original interlaced-video sources. The automatic switching worked seamlessly without any glitches or combing artifacts on the *Digital Video Essentials* "Montage Of Images," which cuts back and forth between segments transferred from film and original interlaced video.

The Gennum VXP processor performs inverse-telecine deinterlacing for 1080i and standard-definition film-source video. It doesn't include processing to detect other unusual cadence sequences that show up in some video material, particularly animation or animé. Without those additional complications, I expected the VXP processing to handle 3-2 field cadences exceptionally well.

I was disappointed that it would not lock onto the *AVIA Pro* 3-2 motion test pattern during the slowest vertical movement, although it worked fine for diagonal and circular movement. Predictably, it then failed to consistently lock during the slowly scrolling yellow text at the beginning of *Star Wars: Episode IV—A New Hope*. The text characters exhibited considerable line twitter and moving jaggies along their edges. I have seen similar problems on the *AVIA Pro* test, and line twitter on the *Star Wars* example, with products using the Realta HQV processor. But Silicon Optix fixed its algorithms at my request for the Yamaha DPX-1300 720p DLP projector. I hope Gennum will quickly fix its problem. The older generation Silicon Image SiI-504 processor, which is used in numerous projectors and standalone processors, deinterlaces the *AVIA Pro* test pattern correctly and only produces very minor line twitter on the *Star Wars* example.

I was pleasantly surprised when the Gennum VXP processor worked flawlessly while deinterlacing 1080i film-sources. I didn't see a single problem while viewing 1080i D-VHS® D-Theater™ movies. For instance, there was no line twitter during vertical camera movement over the horizontal slats of a park bench on my *X-Men* test case. Vertical detail on the 1080i movies was sharp and exceptionally well defined during slow movement.

Frame Rate Conversion

When Frame Rate Conversion (FRC) is on, all input frame rates are converted to 60 Hz. But if FRC is set to Auto, then 48 Hz video signal formats are displayed at their native rate. I tested 720p48 and 1080p48 signals, and they were displayed without judder. That allows DVD movies to be displayed without judder if they are upconverted to 1080p48 by an external video processor using inverse-telecine deinterlacing.

A firmware update is promised that will convert 1080p24 input signals to 1080p48. That is an extremely important feature to provide judderless display of high-definition movies from future HD DVD or Blu-ray Disc players that have a 1080p24 output.

DVD Viewing

Although the transition to high-definition DVDs has finally begun, it will be years before all of the titles we want become available in a 1080p format. So it's still extremely important to know how well new projectors handle our existing standard-definition DVD libraries.

It was no surprise that standard-definition DVDs look better on an excellent 1080p projector than they do on an excellent 720p projector. The higher 1080p pixel density allows the scaler to create shorter edge transitions, which produces a slightly sharper picture, but the images also look significantly smoother because the pixel steps are smaller along diagonal edges. There is also a complete absence of screen door effect (pixel grid visibility) from any reasonable viewing distance. The VP-11S1 provides those important advantages and more.

The Gennum scaling didn't add any noticeable edge enhancement, nor did it emphasize existing noise or MPEG artifacts. Film grain looked natural, and the detail and clarity of the best DVD transfers were extremely impressive. The projector's superb resolution along with its exceptional intra-field contrast produced superior image depth.

Additionally, I was elated to have a 1080p projector that was able to display video at 48 Hz without motion judder. That is a key feature of CRT front projectors that I have greatly missed with fixed-pixel projectors. I used a Lumagen VisionHDQ™ video processor (or a DVDO iScan™ VP30 can be used) to upconvert DVDs to smooth, judderless 1080p48 video for the VP-11S1. Although I only intended to watch selected chapters of about a dozen DVDs, instead I spent several days watching some of my favorite films from start to finish. Although the keen interest in this projector is focused on its 1920 x 1080 spatial resolution, its ability to accurately render the temporal dimension (motion) of film is equally important to my enthusiasm for its picture quality.

The VP-11S1's native primary colors are slightly more saturated than the SMPTE-C standard, but less so than many fixed-pixel projectors. Although colors are a little deeper than intended, the hues are accurate. *The Thomas Crown Affair* (1999), which is a vividly saturated film transfer, looked especially brilliant, and its flesh tones weren't pushed toward red. The paintings in the film were particularly striking. More chromatically subtle films, such as *Mulholland Dr.*, looked great without upsetting their delicate color design. The gregarious color palette of *Austin Powers: The Spy Who Shagged Me* was dazzling, but flesh tones remained natural, and there was excellent delineation between colors of similar hue.

The excellent full-field contrast ratio eliminated haze in the majority of dark film scenes. The very dark street scenes in *Manhattan* were clear with virtually no haze obscuring the image, and even *Dark City* was pleasing to watch. The latter's high-contrast dark scenes looked exceptional, but there was some slight veiling in the lowest contrast scenes. There was good shadow detail discrimination within the dark interior of the Jawa Sandcrawler in *Stars Wars Episode IV—A New Hope*, but a lower black level would improve its star fields. A full-field contrast ratio of 8,000:1 or more would provide that lower black level. But the only current way to achieve that performance is a dynamic iris. However, a dynamic iris inherently produces brightness compression artifacts, so we end up trading one problem for arguably a more serious one. Now that we have 1080p DLP and LCoS projectors, the manufacturer's next major goal should be to double the current full-field contrast ratios without introducing objectionable artifacts.

The VP-11S1 includes 12-bit gamma processing and a 6x-speed color wheel that virtually eliminate dithering noise and contouring in dark scenes. There was no noticeable contouring (discrete brightness steps) around the swinging overhead light or wall lamps in *Dark City*. Dithering noise in dark scenes was invisible from a normal viewing distance and was the best I have seen for a DLP projector. Even standing inches from the screen, dithering noise on the 1-10 IRE, 10-step luma pattern from an AccuPel generator was barely discernable. There was also negligible spurious pixelization and minimal dithering in bright scenes, even with image movement.

I'm not overly sensitive to the rainbow color separation artifacts produced by a sequential color system, but I occasionally see rainbows while reviewing some DLP projectors with a 5x-speed color wheel. With the VP-11S1's 6x-speed color wheel, I never saw any rainbows while viewing the screen.

High-Definition Viewing

Lens quality is a key differentiating factor for 1080p projectors. I've written about the importance of superior optics in some 720p projector reviews, but lens performance is even more significant for 1080p projectors. To fully resolve the finer detail and sharper edges permitted by 1080i/p sources, a 1080p projection lens must have a better MTF (modulation transfer function) and less chromatic aberration (color fringing) than a typical 720p projector lens. To put it more succinctly, what might have been adequate for 720p won't cut it for 1080p.

This projector's Konica-Minolta lens is superior to the built-in lenses I have seen on previous 1080p projectors. The sharpness of various projectors' on-screen menus provide a simple indicator of relative lens quality, but the real proof of performance occurs when you watch high-definition video.

The D-Theater transfer of *The Haunting* has become my favorite high-definition reference for revealing a projector's ability to render detail and resolution. The intricate designs on the floors and walls of the mansion include extraordinary detail and textures. This single-chip DLP projector significantly surpassed the image definition that I've seen from 1080p projectors using three-panel LCoS technology. Lens quality is one crucial factor that affects picture definition, but the difficulty of precisely aligning three 1080p LCoS panels is another factor. For that same reason, I also don't expect three-chip 1080p DLP projectors to provide as much image definition as the best single-chip 1080p DLP projectors.

U-571 is another D-Theater transfer with exceptional definition, and it looked amazing on the VP-11S1. I didn't fully appreciate how good the transfer was until I saw it on a 1080p projector with superb optics. The projector's excellent full-field and exceptional intra-field contrast, combined with its superior definition, produced marvelous three-dimensionality within the often-dark confines of the submarine's interior. There was little, if any, haze in the darkest scenes, and shadow detail was excellent.

The Haunting not only has superlative definition, but its warm and luscious color was very vibrant even in dark scenes. *K-PAX* has a much wider chromatic range from the cool color palette of the planetarium to the warmer, but brilliant colors of the picnic. In each case, the projector's hue accuracy

was near perfect. The bright reds at the picnic were not quite as saturated as they appear on a projector with a red primary that lies farther outside the Rec. 709 standard, but they were more realistic. The ketchup bottle on the picnic table is a perfect example, as we all know the correct color from our own experience. My favorite scene from *K-PAX* takes place within the planetarium when Prot illustrates the orbit of his home planet. It requires excellent full-field and intra-field contrast ratios, exceptional image definition, and accurate color accuracy across a wide brightness range. The VP-11S1 rendered it superbly.

As usual, the late night talk shows provided the best examples of 1080i broadcast quality, and they were incredibly impressive on this projector. NBC's *Tonight Show with Jay Leno*, NBC's *Late Night with Conan O'Brien*, and the CBS *Late Show with David Letterman* were often dazzling with the brilliant color and stunning clarity that high-definition studio cameras can produce under optimum lighting. The Gennum VXP processor did an outstanding job of converting the 1080i broadcast video to 1080p. Its motion-adaptive deinterlacing with directional interpolation was extraordinary at vanquishing jaggies from diagonal edges and the text on mugs. In addition, there was virtually no line twitter during vertical camera movement across horizontal edges. There was only slight flicker as the camera panned across the closely spaced vertical lines and edges in the cityscape backdrop behind Leno. The image detail and clarity was extremely impressive, and there was very little resolution pumping with movement.

Summary

Marantz has produced an outstanding 1080p DLP projector using Texas Instruments' new 1920 x 1080 pixel, DarkChip3 technology, and a faster 6x-speed color wheel. The VP-11S1 includes a custom Konica-Minolta projection lens that produces superlative 1080p image definition. It also includes Gennum's newest 10-bit VXP video processing, which deinterlaces 1080i broadcast video and 1080i film-source video exceptionally well. The projector will also display 1080p signals directly from an HD DVD or Blu-ray Disc player. Movie enthusiasts will also want to take advantage of the projector's ability to display 1080p48 signals without motion judder, by upconverting DVD movies to that format with an external video processor.

The Marantz VP-11S1 ($19,999) is the first 1080p DLP projector to begin shipping to customers. It won't be the least expensive 1080p DLP projector, but its exceptional picture quality sets a high standard for future DLP and LCoS projectors.

The Blu-ray Disc Debut

The Samsung BD-P1000 Blu-ray Disc™ player arrived a few days before the Marantz VP-11S1, along with about a half dozen Blu-ray Disc movies. I was really excited that one of Sony Pictures Home Entertainment's first Blu-ray Disc titles was *The Fifth Element*, which is one of my favorite DVDs for reviewing equipment. I connected the Blu-ray Disc player to the VP-11S1 using a 1080p HDMI connection. I expected that *The Fifth Element* would be one of the primary showpieces for the Blu-ray Disc launch. When I played the disc, I could hardly believe my eyes. Many scenes had only modestly better detail than the standard-definition Superbit™ DVD. Some scenes were substantially better than the DVD, but overall the disc was a huge disappointment for what should have been one of Sony Pictures Home Entertainment's top-priority Blu-ray Disc releases.

Next I played *Basic Instinct 2*. I must confess that the original *Basic Instinct* is one of my favorite guilty pleasure movies, but like most of the population I ignored the cinema release of *Basic Instinct 2*. So this was a chance to see the film in high-definition video. I was shocked by *Basic Instinct 2*. Not by the film's content, but by the image quality of this Blu-ray Disc title. The picture was so soft I wondered if the cinematographer had deliberately defocused the lens. So I tried another Blu-ray Disc title—then another, and then another. *Hitch*, *The Terminator*, and *Terminator 2*: *Judgment Day*—none of these Blu-ray Disc titles came close to my expectations for picture definition. I doubt whether the average person walking into my theatre would have identified any of them as something other than a standard-definition DVD. What on earth was wrong?

From the test patterns I had viewed while calibrating the projector, I knew its performance was far beyond what I saw from these Blu-ray Disc releases. But just to be sure I popped in the 1080i D-Theater™ versions of *The Haunting* and *U-571*, which were rendered with exceptional high-definition resolution and detail. The Marantz VP-11S1 was absolved of playing any part in the Blu-ray Disc title's softness.

Eventually I was told by sources that the cause of the image softness was the setting of a noise filter in the Samsung player. Samsung later confirmed that they were going to change the filter setting in future player production, and that they would work on a firmware revision for current players. This preliminary information was released shortly before the deadline for this review. It remains to be seen (literally) whether a noise filter is totally responsible for the disappointing image definition of the first Blu-ray Discs. I'm skeptical that Samsung will find a noise filter setting that will fully correct softness that sometimes varies from scene to scene. We may have to wait for the Pioneer or Sony Blu-ray Disc players to see if the problem is caused by player design or disc encoding.