Zenith Pro 1200X CRT Projector

In the crush of new video technologies, from HDTV to plasma to other new light amplification systems, we've tended to overlook that old standby, the C(athode)R(ay) T(ube) projector; and yet it, like its hard-charging competition, has significantly improved. To this day, no front or rear projector on the market can achieve the picture quality of a CRT-based system. Some of the new technologies will produce a brighter picture, but none can produce an image that is as smooth and detailed as a CRT, and none is able to reproduce jet black. Living with Zenith's new Pro 1200X CRT front projector drove these points home.

Zenith, one of the oldest television companies in the US, has been through trying times recently, but now a division of LG Electronics, it is fiscally sound and possessed of a new sense of direction. De-emphasizing the low-end VCRs and color TVs it used to market almost exclusively, Zenith now aims to become the industry leader in digital-video technologies. For 2001 the Zenith product line includes a 60" 16:9 plasma HDTV, a DVD recorder/player with progressive scan, a line of flat-screen direct-view 4:3 HDTV monitors, a 22.1" 16:9 HDTV LCD monitor television, and a new line of HDTV-ready rear projectors.

Reviewing and evaluating a CRT front projector is a unique experience. Here's why. When I unpack a rear projector or direct-view television, it will produce a viewable, albeit uncalibrated, picture immediately. Next, with just the basic user controls and some test signals from a signal generator or a calibration DVD disc, *AVIA* and *Video Essentials*, I (or anyone else) can obtain a picture that is more accurate still—a picture, to quantify this subjectively, that achieves 50 to 90 percent of a set's design potential. CRT-based rear projectors are more toward the low end of this range, plasma sets at the high end, and direct views in the middle. Reaching a set's maximum potential (especially CRT-based rear projectors) may require electronic refocusing, optical refocusing, and correcting geometry. All CRT rear projectors require convergence correction, and I have yet to see any display device do a 6500-degree Kelvin gray scale without calibration. (These adjustments should be performed only by a properly equipped, qualified calibrationist, such as an ISF-certified technician. Without the proper tools and training, calibration cannot be done correctly and can expose the person attempting the calibration to potentially deadly high voltages.)

With that said, a CRT front projector produces an *unviewable* picture out of the box. Therefore, my usual before and after calibration evaluation is not being performed within this review. It can't be. A CRT front projector *must be* calibrated before it can even be watched.

The Pro 1200X sports 8-inch electromagnetically focused tubes. There are two types of projection CRTs—electromagnetically focused and electrostatically focused. All consumer[1] rear projectors use electrostatically focused CRTs in 7" or 9" sizes. They use permanent magnetic rings on the neck of the CRT to control the beam spot shape. The rounder the shape, the tighter the spot and the sharper the picture. Electromagnetically focused CRTs will also use coils placed on the neck of the CRT. When properly adjusted and focused (a procedure called "astigmation adjustment"), electromagnetically focused CRTs will produce a tighter beam spot and a sharper picture than its electostatically focused counterpart.

The Zenith is capable of scanning up to 75kHz, enough for line quadrupling or 1080p at 60Hz HDTV. It has additional key features that help the projector display a superior picture: contrast modulation and liquid-coupled lenses, and an auto-convergence system Zenith calls "Proverge."

Contrast modulation, unusual for a projector at this price, allows the calibrator to create a completely uniform white field, meaning the picture can be

1 There are professional units for over $30,000 that use front projectors in retro rear cabinets, but we are not including them in this discussion.

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virtually uniform in color and brightness from edge to edge. Without it, a CRT-projected image will be brighter in the middle of the picture than at the edges or corners. (Higher gain screens can also create uneven color and hot spots.) Contrast modulation compensates for this by increasing the drive on the tubes in the darker or off-color areas. With a color analyzer and luminance meter also at hand, the calibration whiz can greatly improve the Zenith's picture uniformity.

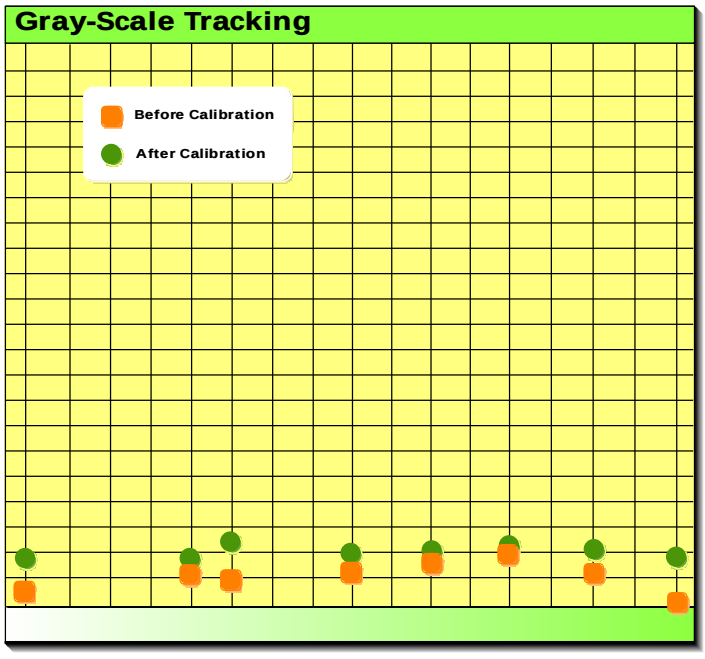
The Pro 1200X costs a hair under $30,000 with its liquid-coupled lenses. In comparison, the closest projector in the Vidikron line is the Vision Two at $34,990 (with auto-convergence option); Runco has the 992 Ultra at $32,995; and Madrigal's MP-8 is priced at $45,000; and none of these incorporates liquid-coupled lenses. (Only these companies' more expensive 9" CRT projectors include this feature.)

The Zenith features 32 memory banks for a variety of aspect ratios at different scan rates. The back-lit remote has direct buttons for all major functions such as brightness and contrast, as well as an on-screen control for other functions and control of other features. The Zenith also has inputs that accept composite, S-Video, RGB with separate or combined sync, and YPbPr component-video signals. (Many other CRT projectors still do not accept component video and require an external transcoder to convert component to RGB/HV.) If the projector should require servicing, all your set-up data can be downloaded into a laptop computer and then, after service, reloaded into the projector's memories. This is an excellent feature because the installer does not have to do a new "set-up" whenever the unit needs servicing. The Zenith comes with a two-year warranty covering parts, labor, and the CRTs.

Set-up, Calibration, and Performance

Anyone who purchases the 1200X should have a factory-trained professional install it. As noted, this is not a consumer job. But for an installer, the Zenith Pro 1200X is a dream. I have set up all the major-brand front projectors; this Zenith is one of the easiest to get right. When you first enter its installation mode, the projector puts up a distance calculator (screen size to distance). After using its built-in distance calculator, the projector gives step-by step "on screen" set-up instructions. Here is a quick synopsis of how a front projector is "set up." First comes placement. This is the most crucial step for a proper set-up. While I can always change mechanical and electronic adjustments inside the projector, moving a 148-pound component *after* it has been securely anchored to a ceiling is a different story. Every angle and distance to the screen is crucial for maximum performance. The projector must be mounted the right distance from the screen (how far depends on screen width). It also must also be exactly perpendicular to the screen surface and on-center within design tolerances (assuming ceiling mounting). I cannot overemphasize how important proper projector-mounting is for top performance.

Next, the scanned part of the CRTs is adjusted, an operation called "raster centering." An uncentered raster can cause tube failure, so this is another vital adjustment. Once this is completed, the mechanical adjustments are performed; these include optical focus and physically adjusting the CRTs' lenses to the proper angle for the screen size, and an adjustment called "Scheimpflug." This adjustment allows the movement of the lens "off angle" to the face of the CRT, permitting the calibrator to fine-tune the optical uniformity of focus—top and bottom and left and right. Once these mechanical adjustments are performed, the projector's cover is closed and all further adjustments are done



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with the 1200X's remote control. These items are electronic focus, astigmation, geometry, and convergence. I finish up with gray scale and picture uniformity via the contrast-modulation control. Sound easy? It takes training and experience and, depending on the number of aspect ratios required, about a full workday or even longer to complete (and this is *after* the proper mounting). The reward for a perfect set-up: an incredibly sharp and detailed picture.

The down side of a really sharp picture is that the sharper the picture, the more obvious the individual scan lines become. In the anamorphic 16:9 mode, the line multiplier I was using at 600 lines was tolerable, but when I increased the height of the picture to accommodate a 4:3 image, the appearance of individual scan lines became, to me, unbearable. I recommend, for 4:3 screens or 16:9 screens larger than 80 inches, that one choose either a 1024 x 768 scan rate or a 720p scan rate for this projector. I tried higher scan rates to see if I could still see scan lines, and indeed I could, even at 1080p—solid indication of a very sharp picture.

I used a variety of software for evaluation, including DVD and HDTV sources. The combination of the 8" CRTs with a liquid-coupled lens and a relatively small screen (80 inches wide) produces a picture that has both definition and "snap," my term for a vivid three-dimensional quality with excellent brightness. I believe this is the only 8" CRT projector on the market with liquid-coupled lenses. Liquid-coupling provides better contrast than does air-coupling, and I could see this advantage in the 1200X's picture. The only disadvantage I found with the supplied USPL HD-215 lenses is that they exhibited a slight softening of focus in the corners. Other brands of 8" CRT projectors that use air-coupled USPL HD-8 lenses have a slightly sharper corner focus. If I were given the choice of either lens for a home-theater application, I would opt for the better contrast of the liquid-coupled HD-215s every time. If I were using the projector for data, however, I would go for the HD-8s, since improved contrast is not much of a concern when displaying data (characters) on a dark background.

With the Zenith properly adjusted and calibrated, the colors of *Austin Powers* practically jumped off the screen. Three words say it all: deep, clean, rich. It never fails to amaze me how viewing a well-transferred DVD displayed on a projector of this quality provides a truly cinematic experience. There is a performance threshold for me, and when it occurs, I get lost in the image. The sharpness, naturalness of the color, and the incredible contrast allow me to forget about the projector and immerse myself in the film. The Zenith Pro1200x reaches that threshold—the real reason we own home-theater systems.

High-definition TV on a display device of this caliber is something you need to experience yourself. I find the now-trite "like looking through a window" line does not do the Zenith justice. I continue to find that HDTV on a fine display device has a "wow" factor that far surpasses most people's expectations. That does not occur too often. All the hype we hear has made us a society of skeptics, and reality very rarely lives up to expectation. But a well-produced HDTV program or a movie on a big screen does it for me every time. I am still awed.

With the sharpness of a projector of this caliber, the quality of the line multiplier (scaler) is vitally important. I have viewed the 1200X with several different line multipliers; getting one that works well with it can make or break the image quality of DVDs and

Special Features

Auto Convergence (using built in camera)

Contrast modulation to improve brightness and color uniformity

CRT drive in three modes: normal mode, economy mode for longer CRT life and boost mode

Multi-language on-screen menus: English, French, German, and Spanish

32 frequency related memory banks (up to eight per frequency)

Linear Digital Interpolation

On-screen set-up guide

Automatic adjustment storage

Color-temperature adjustment (3200K, 4900K, 6500K, 9300K or custom)

Built-in projection distance calculator

"Seagull" correction to improve corner geometry

RS232 data communication port

SPECS

CRT projector with 8"lenses

Scan frequencies:Horizontal 15-75kHz autolock,vertical 37-200Hz autolock

RGB bandwidth:75MHz (-3dB)

Light output: 1250 lumens (10% peak white); 210 lumens (Normal mode); 250 lumens (Boost mode)

Inputs: RGB or component on five BNC connectors, with sync on green or separate sync, auto sync detection and auto polarity; RGB analog on a D9 connector, with automatic sync and polarity; video loop-through with 75 ohm termination switch, S-Video with loop-through.

Power consumption:500W max

Dimensions:14.25"x 23.23"x 42.36"

Weight:148 pounds

MANUFACTURER INFORMATION

ZENITH
2000 Millbrook Drive
Lincolnshire, Illinois 60069
www.zenith.com
Price: $29,995

other NTSC sources. Every line multiplier (higher than a 480p scan rate) under $4,000 I have looked at has had major problems, making them all unacceptable for this projector. I had a chance to briefly evaluate the new HT 720 from Key Digital ($7,999, www.keydigital.com), and it looked most promising. One more point: I have found that line quadrupling (960p) for any 8" CRT projector is too much for anamorphic DVDs and actually slightly softens a 16:9 anamorphic image, rather than making it look sharp and filmlike.

To use the Zenith's Proverge feature, which automatically converges the projector and performs new geometry settings for additional aspect ratios (i.e., 16:9 letterbox; 4:3) and scan rates, I adjusted one reference geometry pattern (horizontal and vertical lines straight and linear with each other) at the highest scan rate I was using. The Proverge will then do an excellent job of learning the geometry settings and applying them to different scan rates and aspect ratios. It will also automatically converge the set, employing a video camera and computer to analyze the picture and converge it. I rate the accuracy at 95 percent. I still needed to touch it up to get the convergence exactly on, but the home-theater owner can get that 95 percent performance without calling the technician.

Gray-Scale Tracking and Light Output

I measured color temperature in the 1200X's 6500-degree Kelvin setting, and it was too red, but not fatally so. It ranged from a low of 5500 to a high of 6400K. After calibration, the temperature ranged from 6300 to 6575K, producing neutral gray and jet blacks. I measured 13.5-ft. Lamberts of brightness hitting the screen.

Summary

Zenith has produced an 8" CRT front projector that would make a fine centerpiece to any home theater. Coupled with a high-quality scaler, this projector produces remarkable pictures with NTSC (480i) sources as well as breathtaking high-definition pictures. If you have the room and the budget, the Zenith 1200X would be a wise choice for anyone looking for an 8" CRT front projector. Its auto-convergence feature, easy-to-use remote, and 32 memories provide a convenient and simple way to maintain the high-quality pictures it projects.