Reference Imaging CinePro 9x Elite CRT Projector

Jonathan Valin

Over the last year, I've been lucky enough to use an 8" CRT projector in my home-theater system—Ultimate Entertainment's Vision 3-X, a Vidikron Vision 3 modified with custom video and I/O boards. The mods were the brainchildren of Chris Stephens, an electrical engineer, video maven, and all-around A/V perfectionist, who, working with Bob Rosser at Ultimate, took the lessons he'd learned from building purist audio equipment and began applying them to Electrohome (now Video Display Corporation) 8" and 9" CRT projectors. Chris' immodest goal was to make the best large-screen video display in the world—the lowest in video noise and distortion, the highest in dynamic range and resolution, the most accurate in color rendering. In the CinePro 9x Elite—a $64,500 custom-made 9" CRT projector that is Chris' first product since he left Ultimate Entertainment to form his own company, Reference Imaging, with fellow videophile Robert Zuch—he has succeeded beyond expectation, surpassing the superb work he did for Ultimate and breaking through to an entirely new level of performance. The CinePro 9x Elite *is* the best display device I've seen—and I've seen the best. Moreover, it is not just a little bit better than the wonderful 8" projector I've been using, or the even-more-wonderful tricked-out 9" CRT projectors that I've watched at length at shows or in friends' homes; it is *a lot* better.

As delivered to me in generic "reviewer sample" form (consumer units are housed in a handsome custom chassis), the 9x Elite looks like what it started life as—a stock VDC 9500LC CRT projector, with nine-inch Panasonic tubes, U.S. Precision HD10GT17 liquid-coupled glass lenses, and all the bells and whistles that come standard with the top-of-the-line VDC. However, in this case looks are wholly deceiving.

Even if you didn't take a glimpse inside its plain-Jane box or have the technical savvy (as I do not) to recognize that *every single video and I/O board* has been customized and many critical components and much of the wiring upgraded, you might be able to tell by ear alone that something is different. The CinePro 9x Elite is relatively quiet. Unlike the 3-X and virtually every other CRT projector I've seen, it doesn't generate a lot of distracting hum or fan noise. Indeed, except when switching on or off, it doesn't seem to make much noise at all.

Then there are the inputs on the rear of the chassis. While the CinePro 9x Elite will accept an RGB/HV analog input (from your HD set-top box or scaler) through a single set of BNC connectors, it is also designed to accept digital signals via a pair of HD-SDI inputs and Reference Imaging's optional HDCP-15 digital input card. Given the ancillary gear that was provided to me as part of RI's deluxe home-theater system—a DVD player equipped with 4:2:2/D-1 digital out, the incomparable Teranex HDX Cinema MX upconverter, which processes video in the digital domain without any signal-degrading A/D or D/A conversion, and the HDCP-15 card—your source will remain digital all the way to the CinePro's inputs, converted to analog just before being fed to the cathode-ray tubes by the very-high-quality video DAC built into the HDCP-15. While it

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is true that with a digital projector—DLP, D-ILA, or LCoS—your signal could remain entirely digital from source to screen, without any D-to-A conversion at any stage, here is a CRT projector, an analog device, that offers you almost as pure a signal path and, of course, all the advantages of a cathode-ray-tube display.

Let's talk about those advantages, and how they've been enhanced by Chris Stephens and Bob Zuch's legerdemain. It is common knowledge that CRT televisions still have a leg up on even the best of their digital competition. Because CRTs shut off light output in the absence of a signal, their blacks are blacker and more detailed than those of any digital device. And because they are only limited in dynamic range by the voltage that is fed them, their gray-scale is more "continuous," their color rendering more subtle and saturated. They are also, depending on tube size (more properly, beam-spot size), capable of higher resolution than digital devices, though some of the newest digital projectors are beginning to challenge here.

While it is true that a well-calibrated CRT projector won't track the "steps" of a gray-scale test pattern with the uniformity or color-cast-free, right-on-the-6500-degrees-Kelvin results of a well-calibrated DLP or D-ILA projector, this is one of the many areas where evaluating by test patterns, and test patterns alone, can be misleading. In life, and on film, gray is not a "stepped" function but a continuous one. There are innumerable shades of gray that fall *between* the discrete steps of a gray-scale test pattern—and innumerable colors and hues that depend on the reproduction of those tiny "in-between" gradations. A digital device simply can't track these constant minute changes in luminance and color as faithfully and continuously as an analog device, like a CRT projector, can. And the 9x Elite is the best I've seen at this, even among CRTs.

On the downside, CRTs are big, bulky, expensive boxes that have to be more or less permanently affixed to ceiling or floor, carefully aligned and converged both physically and electronically, and painstakingly calibrated for proper color balance. They have relatively low light output, which makes them unsuitable for *very* large screens and necessitates watching in a darkened room or at night; they can go out of whack because of jarring or simply drift out of convergence over time; and their tubes are prone to burn-in and will eventually wear out, requiring expensive replacement.[1]

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Of course, not all CRT projectors are born equal. Even the kings of the hill, the nine-inch CRTs, vary in brightness, resolution, color rendering, and dynamic range. And it is in all these areas, particularly the last, where Reference Imaging has made such astounding strides.

To a great extent, almost everything you see on a display of any provenance depends on its dynamic range, its ability to go from light to dark without false contouring on the darker end or blooming on the bright one (without changing image color, size, or detail with changes in light intensity). A set with superior dynamic range will simply look brighter and sharper, have more three-dimensional "snap," and track grays more accurately (thus reproducing colors with greater variety and finer precision) than a set with limited dynamic range.

Although Chris Stephens is perfectly willing to talk about how the tighter tolerances, lower distortion, and superior reliability of the parts he uses in his mods improve dynamic range (and lower video noise), he is more circumspect about the layout of his proprietary circuits, which involves a good deal more than high-end parts-swaps. But his cautiousness doesn't matter; it's manifestly clear to any and all who have seen DVDs or HD through this projector that whatever Reference Imaging is doing it is doing it right.

After catching my own breath upon first viewing the CinePro 9x Elite, I invited a dozen or so experienced viewers over to see what RI had wrought. Every one of them has had the same reactions that I did, in virtually the same order.

The first thing that floors them is the absolutely uncanny three-dimensionality of the projected images. The CinePro's HD-like depth of field, smoothness and solidity of image, astounding contrast, and resolution of fine detail—whether in deep focus wide-angle shots, like the slow pan across the crowd of Palantine supporters in Chapter 18, (72.02 ff.) of *Taxi Driver: Collector's Edition* [Columbia], or in shallower focus telephoto shots like the gorgeously lit sequence in Chapter 4 (19.48 ff.) of *City of Industry* [MGM], in which Roy and Lee Egan sit beside the motel pool the night before the jewelry store heist—give actors and objects, whether in the foreground or the back, a *trompe l'oeil* presence that makes them look more like statuary than photographs.

Next, they rave about the CinePro's color rendering, which can only be compared to a series of beautifully lit, beautifully composed transparencies taken with a Hasselblad and Zeiss T-star lenses and projected via a 'Blad projector. Colors aren't just sensationally saturated, though they are certainly that when the cinematography and color timing allow them to be (as in the *City of Industry* sequence); they are also almost unbelievably subtle. None of us has ever seen color rendering of this range, delicacy, and lifelike realism from DVD. Only medium- or large-format still photography gives you this fineness of hue, this subtle modeling of features by light and shade, this sense of *direct contact* with the thing being photographed.

To use *Taxi Driver* as an example again, prior to receiving the CinePro 9x Elite, I watched the film with a friend, then invited him back after the CinePro was installed and replayed

1 But then so do the light bulbs in DLP and D-ILA projectors, at 500 clams a shot. I should also note that Reference Imaging has directly tackled the problems of CRT convergence-drift in the 9x Elite with what RI calls its "Zero-Drift" design. My own experience, and that of other professional reviewers, with the 9x Elite indicates that, unlike other CRTs, the CinePro does not drift out of convergence, even after nearly a thousand hours of use—a time-, trouble-, and money-saving convenience for owners.

some of it for comparison's sake. In the famous "You talkin' to me" sequence (Chapter 15, 66.06 ff.), both of us had the same reaction, expressed in the same words!

The first time through, projected via the none-too-shabby 3-X, Robert De Niro had looked like filmed actors look on video—flesh tones a little on the Man-Tan side (a little too uniform, a little oversaturated), the flesh itself a little like pancake make-up applied over flesh. De Niro looked good, all right; the transfer looked good. But he didn't look real—he didn't look "there." Through the CinePro 9x Elite, all of that changed, radically.

Suddenly, instead of looking like a slightly saturnine, rather-too-heavily made-up actor, De Niro looked the thirty-two-year-old man he then was. His flesh no longer had that Man-Tan uniformity but, in the enveloping glow of cinematographer Michael Chapman's soft-box lighting, took on the very color and pliancy of youth. Turns out De Niro wasn't made up with pancake; he wasn't made up at all (or only lightly). There he stood like the best still photographic image on the finest grain, widest contrast film you can imagine. It was as if veils had been lifted, veils that had aged and coarsened and disguised him. And that newfound look of youthfulness changed the tenor of the scene, made Travis somehow more childlike, lonely, and pathetic (and, yes, scary), made that sing-song game that he plays with himself in the mirror somehow more appropriate to a guy his age, a young guy spinning from quasi-adolescent macho revenge fantasies into truly lethal madness.

Though I have occasionally had this "lifting of veils" experience happen to me in audio, I've never had it to this extent with video, before the CinePro 9x Elite. While other great projectors have made DVDs look almost as good as, sometimes even better than, what you see in a movie house, none has matched the lifelike presence of this one, which takes you beyond the movie theater to something like direct contact with the actors, the lighting, the cinematography, and the direction, closer to what it must be like to stand on the set as the movie is filmed or to watch an answer print that has been struck directly from the camera negative. If I can borrow an example from audio (now there's a switch), it's like the difference between an LP mastered from tape and one recorded direct-to-disc. Layers of distortion are lifted; your window on the film is washed clean; and all you see, for the first time, is what was really captured by the lens, minus, of course, the inevitable artifacts of the telecine/MPEG process.

You can well imagine how good HD material looks with the CinePro 9x Elite. On HD video, which is almost invariably shot with a wide-angle lens (meaning that depth of field and focus is nearly infinite), the amount of visible detail and the quality of the color-rendering are truly phenomenal—unparalleled in my experience. On HDNet's Major League Baseball telecasts, for example, not only are the expressions on distant faces in the stadium crowd as clearly resolved as those on the faces of the players at bat, but the colors of their clothing and complexions don't bleed into a confetti-like blur, as they always do with NTSC broadcasts; they remain vibrant and distinct. On film-based material, which is not just shot on wide-angle lenses but on a variety of focal lengths, depth of field and focus will not always appear to be "infinite." (This is one reason why video-source material, with its razor-sharp-from-up-close-to-horizon-line landscapes, cityscapes, and peoplescapes, is almost always used to demonstrate HDTV.) Nevertheless, film-based images remain considerably sharper and less artifact-ridden than they are on DVD, both in the foreground and the back. On the JVC D-Theater D-VHS tape of *X-Men*, for instance, the exaggerated grain and excess edge-enhancement you see on the DVD version just vanishes (along with most MPEG artifacts), and the true dynamic range of modern-day film stocks, the astonishing resolution and color accuracy of modern-day prime lenses, and the successes and failures of the cinematographer's lighting schemes are more fully revealed.[2]

I guess I'm supposed to talk about the shortcomings of the CinePro 9x Elite at this point. Well, for me it comes down to price—and price alone. At $64,500 for the projector ($67,390 with HDCP-15 digital input card), plus another $49,500 for the world's best video processor, the Teranex HDX Cinema MX,[3] another $5000 bucks for the convenience of a Crestron remote, another grand or two for a DVD player with 4:2:2 output, and another $3000 or so for a suitable Stewart Filmscreen screen, you're looking at a total investment of $130,000 or thereabouts, for video alone. Of course, Chris himself comes with the package, and if you've ever watched him set up, converge, and calibrate a projector you know that you're getting the most meticulous job possible. (It took two sixteen-hour days to set up my CinePro 9x Elite,

2 Because film-based material on DVD is converted to 1080p/48fps by the Teranex upconverter/Elite 9x before being fed to the CRTs, the difference in quality between D-Theater HD D-VHS tapes and DVDs, though unquestionably large, is not as staggering as it is between, say, VHS and DVD. (For those of you who can afford the Reference Imaging home-theater package of projector and converter, this is scarcely bad news.) I might as well note, in passing, that as good as they are (and they are greatly superior to DVDs), 1080i D-VHS tapes appear to have their own problems, beyond occasional dropouts and other glitches common to a tape-based medium. For instance, in *X-Men*, during the first scene between Xavier and Wolverine in Xavier's study, I noted gross motion artifacts in the curtains behind Xavier's desk when the camera pans quickly to follow Xavier as he wheels out to confront Wolverine. More essentially, the very smoothness of HD D-VHS tapes (and HD movies) is a double-edged sword. Yes, there are undeniable improvements in overall sharpness, depth of focus, and color-rendering, less grain-pulsing (less visible grain, period), virtually no distracting edge enhancement, fewer artifacts of all kinds. But for all these genuine advantages, there is also, at least to my eyes, something almost *too* smooth and video-like about the HD presentation of film-based materials on D-VHS (or dish or cable)—something that, in spite of all the clear and obvious gains, ultimately makes D-Theater tapes look less like a film and more like what you might see through the HD video-assist on a movie camera. Take a look at the "provisioning" scenes in *U-571* (before the sub is launched on its mission), and see if you don't agree.Let's face it: film is film, and video is video, and with D-Theater you are simply coming up against the defining limits of digital technology.

3 Reference Imaging's price of $49,500 for a Teranex HDX Cinema MX includes the three-processor-card version of the Teranex upconverter with the 1080P/48fps format (far and away the most film-like scan rate I've seen, in spite of a small amount of flicker with very bright whites), and RI's "Perfect Picture" software, which matches the upconverter's processing of video information to the specific display device. (Along with Stephens' circuit mods, this is another way in which RI achieves its extraordinary color rendering and 3-D imaging.) Though I hate to say it, the Teranex is really an indispensable part of the Reference Imaging package.

and Chris was working every minute of those two days.)

So how do you praise a display device so good that it can reproduce everything from the most natural skin tones this side of fine fashion photography to the three-dimensional body of a large-format contact print to the subtle contrasts and modeling of light and shade of *Moonrise over Hernandez*? You name it Home-Theater Product of the Year—that's what you do! And that is precisely what we at TPV have done.

Congratulations to Chris Stephens, Robert Zuch, and you few lucky guys and gals out there who have the moolah to afford the Reference Imaging CinePro 9x Elite system. Believe me, you'll never regret buying it. As for the rest of us (and I'm one of 'em), we can always dream, which is what this column is for.

SPECIFICATIONS

CRT-based front projection system

Optics: High-definition hybrid lens; optical resolution of 10 line pairs per mm; liquid-coupled 9" electromagnetic focus CRTs; scheimpflug adjustment for top, bottom, and side-to-side focus

Resolution: 2500 x 2000 addressability; 1650 x 1400 ANSI pixels

Usable brightness per industry standard: 280 ANSI lumens (17fL on 54" x 96" screen, ±300K)

Frequency response: 200MHz bandwidth, -3dB (accommodates 3 nanosecond pixels and digital clock rates over 300MHz)

Inputs: Built-in RGB/HV interface, with stereo audio outputs; spare slot for HDCP-15 digital input card; built-in RS232 for computer control, with loop-thru for connection of multiple projectors

Mounting: Can be ceiling- or floor-mounted

Weight: 176 lbs. (229 lbs., shipping)

Warranty: One year parts and labor

MANUFACTURER INFORMATION

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Price: $64,500 ($67,390 with HDCP-15 Video Input Card)

Manufacturers' Comments

Reference Imaging CinePro 9x Elite Projector

We at Reference Imaging would like to thank Jonathan Valin for his enthusiastic review of our product, and the TPV staff for giving us the prestigious honor of Product of the Year. We are very proud of the CinePro 9x Elite projector, which is the result of a meticulous and painstaking design effort. We have endeavored to make a CRT projector and complete video system the very best it can be, and are delighted to be recognized for our efforts.

Jonathan did a wonderful job describing the emotional impact that a high-end video system has on its viewers. References to "the best still photographic image" and "direct contact with the actors" are typical of responses we receive from both first time viewers and experienced videophiles alike.

As Jonathan points out, the system reviewed is expensive as it uses the highest-quality components available and state-of-the-art technology (including recently declassified military video processing hardware and software). We also have less-expensive projectors in the CinePro series that offer many of the qualities in our top of the line system, allowing the benefits of a highly refined CRT projector to be enjoyed by a broader group of video enthusiasts.

Thanks again for your kind words, sharing in the passion of CRT projection, and honoring us with TPV Product of the Year!

Robert Zuch
President, Reference Imaging

Theta Casablanca II Controller

Dear Editor,

We are deeply pleased with Shane Buettner's review of Casablanca II. He mentions that one of Theta's "chief strengths has been [its] 'card cage' architecture." That got us to trying to remember how long ago the Casablanca took form.

In 1995, we got this strange idea for a different kind of component (well, not strange for us, really, considering the very first product Theta introduced was so unprecedented—the DS Pre—that people literally didn't understand it at first). The modular, distributed-intelligence concept for Casablanca was totally new to sound reproduction. We saw how fast our "cutting edge" world was moving, and wanted to offer some sane way for people to invest in quality equipment that wouldn't tie them to outdated technology as soon as they bought it.

We released Casablanca in 1996, to the usual consternation. But by 1997, one reviewer called it "future-proof." That is the first time I heard the term. The current Casablanca II, in all its many variations, is the result of thousands upon thousands of hours of engineering design and development. For us, it is a continuing wonder that a rather small U.S. company can even do this sort of work. We are absolutely delighted to be able to live up to the promise of "future proof" equipment. We try very hard to live up to the high standards we (and Theta owners, and the press) have set for us. We admit we've had some embarrassments.

Such high praise is not something we take for granted. Thank you so very much for a review so glowing I can't see how it could be any better.

Neil Sinclair

Zenith C34W23 Direct-View HDTV

As Mike Woods points out in his balanced review, Zenith's C34W23 is an entry-level integrated HDTV, designed for plug-and-view enjoyment of over-the-air HDTV broadcasts. This is the right time for this kind of product as the amount of HDTV programming (particularly on CBS and ABC) is starting to reach critical mass. While Zenith's primary focus is on higher-end digital products, such as the 60-inch HDTV plasma display first reviewed by TPV, we are committed to providing consumers a wide range of HDTV choices. That includes the industry's first integrated HDTV under $1500 (32-inch model C32V23) and its 36-inch cousin, model C36V23, which sells for $1999. HDTV is no longer an early-adopter technology, and Zenith's goal with these entry-level sets is to help bring HDTV to the masses, while giving videophiles a low-cost option for the second and third HDTV in their home.

John I. Taylor
Vice President, Public Affairs
Zenith Electronics Corporation

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