WSR's Holosonic™ Home Theatre System
Part IV — Equipment Selection & Setup

GARY REBER

Widescreen Review's New State-Of-The-Art Reference Theatre At New Facility

This is Part IV of a series of articles on the design, development and execution of a new state-of-the-art Reference Home Theatre Laboratory at *WSR's* new office facility in Temecula, California (north of San Diego, southeast of Los Angeles) that serves as *Widescreen Review's* and Surround Music.net's review laboratory. Part I appeared in Issue 48. Part VII will conclude in Issue 53 (October 2001).

When I set out to create a "reference" home theatre experience, wherever I turned, the words "home theater" were stamped on products or services. It seems that everything in consumer electronics is being packaged as new "home theater" products. (Though most companies don't use the traditional "re" spelling used by the motion picture industry since its inception.) Yet, ironically, relatively few consumers, and for that matter, designers, engineers, and marketers of consumer electronics, have been inside a home theatre architecturally and acoustically engineered for optimized cinematic picture and music playback. So, when the opportunity was presented I set out to build from scratch a home theatre room and system that represented my philosophy and experience developed and gained over four decades in seeking to create an experience with all the emotional excitement and impact of "real life."

The Room

What follows is an exposé that covers the points of consideration that went into the design and implementation of that dream as realized in our new Reference Holosonic™ Home Theatre Lab.

Our dedicated theatre measures 26 feet deep x 21 feet, 8.6 inches wide x 13 feet, 11.9 inches high, or approximately 8,000 cubic feet in volume. These dimensions, as previously discussed, were derived from a tested formula based on sound acoustical principles (see Part III, Issue 50).

Architecturally, the entire home theatre room and the rear-projection room were constructed with the complete QuietZone® Noise Control System build-materials package from the Owens Corning Science and Technology Center Acoustical Design Division (see Part II, Issue 49). This is a tested and scientific approach to home theatre architectural design that is the best system I have seen and worked with to date. An important component to the success of the QuietZone construction is the integrated implementation of Industrial Acoustics Company's acoustic doors that support the high STC-63 rating for the theatre construction. IAC doors are the best acoustic doors made and the subject of conversation by everyone who experiences our new home theatre laboratory. These doors, along with the Quiet Zone construction work—shutting out noise potentially entering the theatre and sounds in the theatre from leaking into the other areas in our new facility. It is important to remember that, at least a STC-60 rating is recommended to assure that the room will support maximum dynamic range.[1] Of course, the HVAC system needs to be absolutely noise-free when in operation to insure the room will perform as specified.

Inside Quietzone Rough-Framed Interior, Looking Toward Projection Room

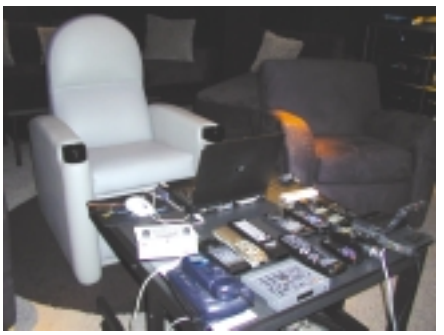
Double IAC Acoustical Doors For Easier Equipment Access

Finally, the acoustical design approach taken for the theatre uses RPG Diffusor Systems' VariScreen® and Skyline® acoustic treatments to provide an even sonic character throughout the room so that the six principal speakers plus the two .1 LFE subwoofers see essentially the same acoustic environment to optimize the experience heard at the sweet spot or "the chair" listening position in the room. By achieving an even reflected energy around the room, problems caused by too much or too little reflected sound are avoided. In our approach, we used all the tools in the acoustical palette, namely absorption, reflection and diffusion in the design of our critical listening room. The end result is a room that supports the fullest resolution of nuances in playback—both picture and sound.

Now I acknowledge that not all home theatre enthusiasts will have the opportunity to build from scratch a "dream" theatre. Nevertheless, I think there are numerous lessons to be learned by understanding our particular approach—lessons that can be applied in your own homes. You'll have to improvise a bit to implement the speaker and listener positioning parameters we recommend, as you will likely be constrained by the size of your room and the floor plan.

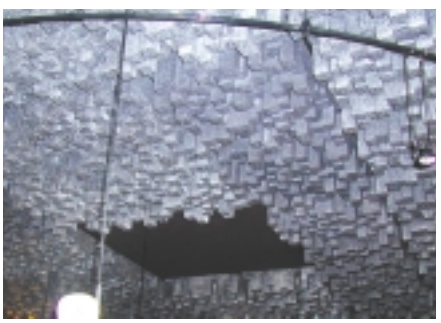
1 STC is a single number (laboratory) rating of how well a structure (wall, floor, door, window partition) reduces sound passing through it.

RPG Variscreen® Acoustical Treatment



Remote Control Station

Billy Bags Pro-54 Equipment Stands



RPG Skyline® Diffusor Drop Ceiling Treatment

You'll also have to deal with the acoustic limitations of your room. Perhaps you're fortunate to have a spouse that is supportive of your passion to "change" things around in the room or to stiffen and dress the walls with absorptive and diffusive material to better optimize the home theatre experience. If not, other obstacles will be the "look" of the room and whether the new equipment, both speakers and all those black boxes, will complement the decor in the room—not to mention all those cables strung around. I think most home theatre installation successes happen when a family decides to completely dedicate a room in their home to their home theatre. Of course, each family's aesthetics are always different and that is where you can learn from us what we think are the ideal aesthetics for optimizing picture quality and sound—the two elements that create the end result in terms of performance.

There is one other thing that is always a challenge with sophisticated home theatre systems—that is, their operation. While there are a number of products available that seek to "automate" system operation, practically speaking, advanced systems such as *WSR's* are complicated, requiring a slew of remote controls for their operation. Of course, there are those approaches to home theatre in which you enter a room and first ask: "Where's the home theatre?" There is no sign of speakers, screen, or equipment. Everything is hidden out of site. There is a single remote and with the push of one button the screen drops from the ceiling or the drapes open to reveal a screen, the lights dim and as if by magic, an on-screen menu appears to "Play" the DVD. This latter approach to implementation is not optimum. Such an approach is interior design-driven. It typifies what most people want in a "home theater," and what most people envision home theatre to be. Such an approach is what "sells"—as a lifestyle solution.

Partial View Of The Room

Be warned then, this is not *WSR's* approach. Our approach is to maximize picture and sound performance with the right equipment, acoustical treatment, and room layout and construction. Our goal was not to "hide" the speakers or the equipment out of sight, but when you experience the end result, you find yourself in a completely "darkened" charcoal black environment with a bright window to a world of imagination and sound that is holosonic in spaciousness and imaging. The black-finished speakers disappear into the darkness. You are captivated in a dream-like state. With the finest source material you become mesmerized with the picture and sound. This Is Real Home Theatre!—in our view, with the convincing ability to suspend disbelief.

Of course, our approach can be implemented with everything hidden except for the speakers (that is a sure compromise)—even remote controlled with a single controller—and still achieve the same high level of presentation performance. But as an enthusiast, I thrill at the sight of our Billy Bags equipment racks and enjoy the hands-on operation of the equipment. But then, it's just my enthusiast's opinion.

No matter what approach you decide to implement, my advice is to consult with an acoustician along with a CEDIA (Custom Electronic Design & Installation Association—800 669 5329) consultant to provide solutions for room acoustics, sound isolation, ergonomics, architectural design, HVAC and a host of other factors. These professionals have a wealth of experience that they can offer in the early stages that will

Dunlavy Signature Series SC5-5 And TSW-5

save you time and money in the long run.

Speaker Selection And Room Size

With regard to equipment selection, I think it is critical that one start with the selection of the loudspeaker system, as this will determine the minimum size of the room to support the fullest performance from your speakers. If you are adapting a pre-built room as your home theatre, then the size of the room will dictate the speaker selection.

When I set out to create the *WSR* Reference Holosonic Home Theatre Lab, I wanted the room to support truly full-range speakers that were time- and phase-correct throughout the frequency response range of 20 Hz-20 kHz. The choices in speaker design limited my selection to just a few models. I decided that our reference speakers should be the Dunlavy Signature Series SC-V. No other speaker on the market, except for the larger SC-VI, provides such fully time- and phase-accurate performance. This speaker is capable of accurately reproducing complex musical transients and playing at levels needed to recreate the illusion of live music. The SC-V has an audible and measurable frequency response of 20 Hz-20 kHz ± 1 dB at a 10-foot distance to the listener, measured anechoically with a rated sensitivity of 91 dB and a nominal impedance of 6 ohms! The SC-V are designed to be "pulse-coherent," simulated point-source radiators of sound with symmetrical radiation patterns, controlled angular dispersion and a dynamic range equaled by few other designs. Their smooth, clean and boomless bass is legendary. As documented through individually serial numbered testing in one of Dunlavy's large anechoic chambers, the SC-V is capable of passing a square wave that is as accurate as what one would expect of the most advance CD players. They not only deliver true full-range frequency response with wide vertical and horizontal angular dispersion, they are incredibly revealing of source fidelity. When a recording is excellent, these speakers are mesmerizing in their ability to fully resolve the smallest nuances and project a three-dimensional soundstage with exceptional depth and imaging, and with the full might of distortion-free dynamic range to mimic live music.

These speakers are large with a footprint that measures 28 inches deep x 15 inches wide x 75 inches high—and are heavy at 330 pounds. The optimum 10-foot distance recommended between speaker and listener requires a generally large room. While the Dunlavys perform well at an eight-foot distance between speaker and listener, their ideal performance is in the range of 10 to 12 feet.

When deciding on a speaker system, research what the designer specifies for the optimal speaker-to-listener distance and spread. Every loudspeaker manufacturer designs for an optimized listening distance from the position of the tweeter for the best in-room response. Typically, two-way (a bass and midrange-high frequency driver) systems will focus as a "point source" within four to five feet of the listener if their drivers are time- and phase-correct (true coaxial designs will focus virtually within a foot of the enclosure front). Three-way (separate bass, midrange and high frequency drivers) systems will typically focus within five to eight feet. Large four-way speakers require greater than a eight foot distance to the listener. Experimentation is recommended to precisely "dial-in" speaker positioning.

In the *WSR* theatre, I have carpeted the "circle of sound" (20-foot diameter) in gray carpet, outlined by black carpet throughout the rest of the room and in the rear-projection room.

The larger the loudspeaker and optimal distance to the listener, the wider the potential separation the speakers can support. The test here is in the presentation of music, or what we refer to as the "soundstage." Experimentation is required to identify the precise placement of the speakers (nearer or further apart) that best optimizes the fullest and widest soundstage with complete "center-fill" of the phantom images projected in space between the two speakers. In the current *WSR* arrangement (experimentation stage), the Dunlavys are separated 14 feet (tweeter, center-to-tweeter, center), yet their focus and imaging are extraordinary. Few speakers can support such a wide separation. With time- and phase-accurate designs, the impulse response or time signature is precise, resulting in an uncanny soundstage with unsurpassed phantom imaging suspended in a three-dimensional space between each speaker. With most speaker systems generally, separation is limited to eight to ten feet, while smaller systems tend to be limited to six to eight feet separation. That is not to say that the larger systems can't perform optimally at distances, say eight to ten feet, but they are capable of supporting a much wider soundstage, thus a more realistic spatial representation.

In home theatre applications where a center channel speaker is used, splitting the speaker pairs always depreciates the phantom image soundstage effect. But you can move your principal pair of speakers further apart without the center-fill suffering. When not having to review movie soundtracks mixed with a "hard" center channel, I actually prefer listening to center-fill phantom images or a partially (variable) center-fill and "hard" blend enabled by some surround processors and electronic crossovers (such as the Mirage LFX-3 Active Crossover Networks used in Reference System L). This is an entire discussion in itself as it relates to the differences in a home environment vs. a movie theatre environment that needs to provide "stereo" to large audiences. In move theatres, most listeners cannot be in an ideal listening position and a third "center" channel proved to be an effective method of filling the "hole in the middle" and anchoring dialogue to the screen. My experience is that this approach provides inferior results in home theatres with a "sweet spot listening position," but it obviously works well in movie theatres and in "home theater" setups (though the balance is always skewed to one side of the room or the other) which emulate a movie theatre where there is typically no "sweet spot" for various reasons having to do with interior design or placement of video projectors. Nonetheless, at *WSR* we review all movie soundtracks using the center channel along with the principal pair of front speakers, plus surrounds (including back "center" surround) and dedicated .1 Low Frequency Effects (LFE).

In addition to the distance to the listener, there is the distance out from the walls that a speaker performs best at. There is an optimal distance from the side wall, floor and ceiling that minimizes reflections. Of course, acoustical treatment can greatly help to further minimize unwanted reflections. Typically, speakers of any size should by at least three to four feet or further from side walls with unequal distances between the speakers and their adjacent boundaries.

The distance from the wall to the principal midrange and high-frequency drivers is what matters. I personally find that larger systems are better optimized with distances out from the boundary walls of four to six feet. (More bass is generated with subwoofers placed near room boundaries.)

Also experiment with angling the speakers inward toward your listening position, so the tweeters point toward your ears. Reproducing optimized spatial phantom imaging generally requires that the pair of speakers be placed at a 50- to 60- but not exceeding a 90-degree included angle relative to the listener. And ideally, the tweeters should be at ear level when you are seated, for optimum high-frequency detail.

With acoustical treatment, the objective is to transform the room reflections into a reflection pattern with a uniform linear decay and uniform energy. Using absorption to reduce the effects of a specular reflection will produce pinpoint spatial phantom images. On the other hand, diffusion will produce sonic images with more spaciousness (width, depth, and height). As to the latter, I have always been partial to bipolar speaker designs, such as the Mirage M1si, OM-5 and the new flagship OM-1, and the large Definitive Technology bipolar designs. These speakers are designed to enhance the width, depth and height of the soundstage for what can be regarded as a more enhanced lifelike spatiality. Dipolar designs such as electrostatic models from MartinLogan and planar/ribbon models from Magnepan use back reflective energy to enhance spatial depth. I find these design approaches to be emotionally and musically satisfying and at *WSR* these system types are used in our various reference systems. But for absolute accuracy, time- and phase-coherent speaker designs from Dunlavy, Thiel and Vandersteen are preferred.

Once the speaker parameters are set, the distances dictated by their optimal positioning in a room will determine the room size and dimensions. Thus, in essence the room is built-out from the listening position. (See Diagrams 1 and 2.)

The screen width determination was a critical factor in the size of the room and the distance from the screen area to the choicest seat or "the chair." We built a custom screen housing that supports two 1.78:1 (otherwise referred to as a 16:9 aspect ratio in television terms) seven-foot wide screens, one for rear-projection (our primary screen) and the other, front-projection. A fixed Stewart Filmscreen AeroView® 100 that measure 84-inch wide by 47-1/4-inch high (90-1/2 inches diagonal) handles the theatre's rear-screen day-to-day DVD and HDTV picture review demands of the magazine. Behind the screen is a dedicated flat black-treated and acoustically isolated mirror-less projection room, which measures approximately 8 feet by 14 feet, 6 inches, sufficient to handle the throw distances of the largest nine-inch CRT projectors without the use of a first surface mirror. The Aero Screen 100 is fitted with Stewart Filmscreen's Model LVC Horizontal ScreenWall ElectriMask electric motorized aspect ratio masking panel system using Stewart Filmscreen's Ve-Lux® non-reflective light-absorptive black fabric material for the frame treatment and the front screen wall.

Above the AeroView 100 is a motorized drop front-projection screen of the same aspect ratio dimensions housed in a black batten Luxus Model A ElectriScreen enclosure. The screen material is made of Stewart Filmscreen's newest screen fabric, GrayHawk® 088. This material is optimized for displaying images projected from fixed pixel displays. Thus, we are able to review both CRT projectors in rear-screen mode and fixed pixel projectors, such as those based on LCD, DLP™, D-ILA™, LCoS (Liquid Crystal on Silicon) and Grading Light Valve™ MEMS technologies in front-projection mode. A third six-foot wide (54 inches x 72 inches; 1.33:1 aspect ratio) Stewart Filmscreen StudioTek® 130 is available as a roll-in for front-projection reviews of other CRT projectors.

Our primary CRT projectors are the nine-inch Runco DTV-1101 coupled with Runco's VHD-4404 Ultra multi-function video processor and the Sony G-90 coupled with Faroudja's DVP5000 digital video processor/scaler.

A note on screen size: If you sit too close to a screen while viewing standard-definition video the picture is poor, because you can distinguish the scan lines that produce the picture. We use Runco and Faroudja scalers with standard-definition sources to eliminate scan line visibility. If you sit too far from the screen, your eyes can't resolve all of the picture detail, particularly with HDTV source material. Studies have also shown that the preferred field of vision for video is between 25 and 30 degrees. Finally, there is an optimum balance in which the distance to the screen for viewing a DVD picture is the same as the best listening position. Considering all of these factors, our rule of thumb says the distance from the screen to the prime viewing seat should be two times the screen width. That puts our "eyes in the chair" position at 13 feet, 6 inches from the screen, which produces a 30-degree viewing angle in the *WSR* Reference Holosonic Home Theatre Lab. Too often home theatres are built with screens far wider than seven-foot and this presents a light output problem for CRT-based projectors. If you want a much wider screen size, then a high output DLP or D-ILA projector would be a better choice. However, I opted for CRT projectors because this technology still provides the best picture quality with the richest color and blacks.

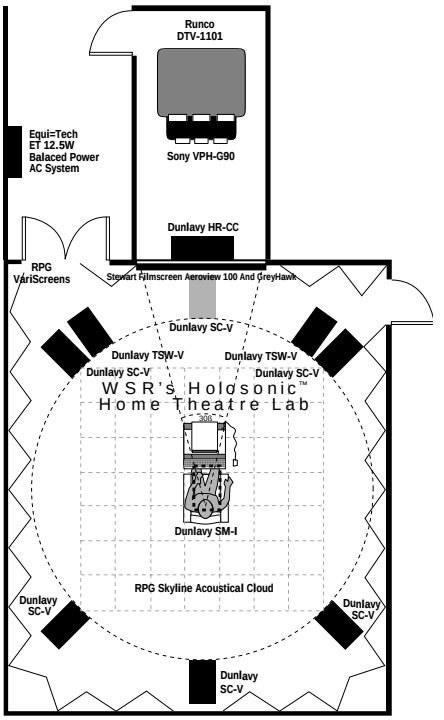


Diagram 1 Theatre Layout

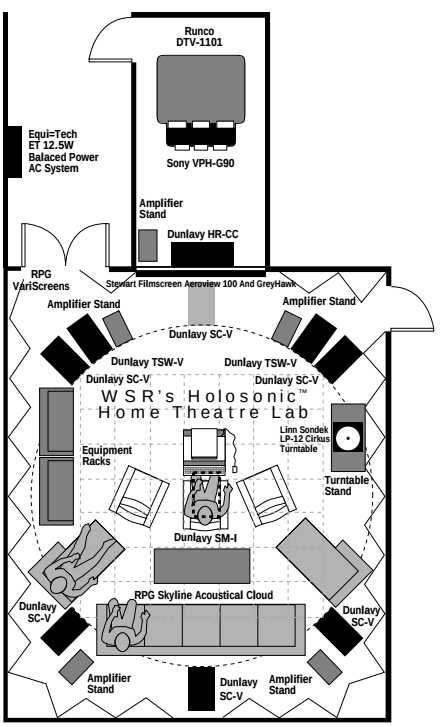


Diagram 2 Theatre Layout

I used a 90-degree angle between the listener and left/right front, left/right rear,

front/rear right, and front/rear left. This was the preferred and recommend setup when multichannel music was first launched as a consumer format in the 1970s—quadraphonic. I recommend using identical systems at the four primary vector points representing front stereo pair and back stereo pair or surrounds (resulting in corresponding left sidewall and right sidewall stereo pairs). As well, it is important to practice physical equidistant speaker positioning for all the speakers, adhering to distances to listener and between speakers prescribed for the main pair (if possible). Even our Dunlavy height speaker, the SM-I is positioned at the same distance to the listener as the other Dunlavys (measured at the SC-V tweeter height of 40 inches off the floor). The two Dunlavy Tower TSW-V Subwoofers (which are flat to 16 Hz ± 1 dB and housed in an identical-looking SC-V sealed enclosure), used to reproduce the .1 LFE channel, are equidistant as well. I elected to allow for the movie center channel reproducer, the Dunlavy HRCC speaker, to be positioned at the same 10-foot distance as the SC-Vs or as far back as in the cavity below the Stewart Filmscreen AeroView® and GrayHawk® screen housings, slightly further away from "the chair" than the 10 feet prescribed for the SC-V. The frequency response of the HRCC is 29 Hz-20 kHz ± 1 dB. We are presently experimenting with the optimum positioning of the HRCC. As a rule, though, you should always start with the placement of your center channel speaker at the same physical distance as your main speaker pair to form an arc in from of your listening position. When we audition DVD-Audio or SACD multichannel recordings, we move into position another SC-V on the same radius as the front SC-V pair and disconnect the HRCC.

For Dolby® Digital Surround EX™ and DTS®-ES Discrete and Matrix monitoring, we use another SC-V speaker (the sixth SC-V) and position that speaker on the same radius as the back stereo pair of surrounds. I chose to use only one speaker to reproduce the mono EX/ES signal rather than two, which would muddy the phantom imaging potential of the mix. Also, the next generation of Dolby Digital Surround EX will have a height channel derived from the EX channel, first to be used in the upcoming *Star Wars: Episode II*.

With physical equidistant speaker positioning, the soundfield is so much more holosonic in character with coherent phantom imaging all around. When physical equidistant positioning is not possible, one must resort to electronic time delay, though this is a compromise, especially in regards to three-, four- and five-way speaker systems which require a minimal physical distance to the listener, in which the individual drives focus to resolve a coherent full-frequency wavefront. (Please see Issue 15 for a comprehensive article on "Home Theatre Surround Sound—Doing It Right.")

First Impressions' Rocker And Two ImageCrafters Recliners

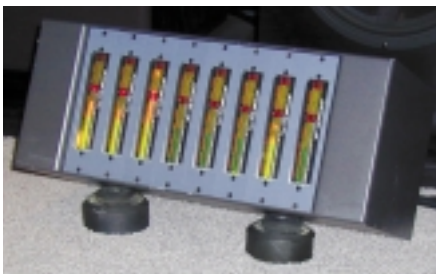
With any speaker design or model, the variables you'll need to work with are the distances your speakers are from you, the walls, the floor, and each other. I do not prescribe, as does THX®, that the height of surround speakers should be aimed well above ear level when seated, but that all speakers in a 5.1 or 6.1 setup should be positioned at the same height. Even slight changes in positioning can make major differences in how your speakers sound. Contact the speaker manufacturer to offer specific recommendations for their ideal placement, based on a speaker's performance during the design phase. The more you experiment, the more likely you are to find the best sound your room can offer.

Just one other note before we move on to the equipment selection: While I embrace the use of truly full-range speaker systems at each vector point in a multichannel array, the professional audio production community has yet to "standardize" on speaker system types, speaker placement and setup. One assumption is that an existing audio production facility, traditionally using small-sized monitors, will do the same for surround sound, with the low-end from the main channels redirected to a subwoofer. You might be thinking that such an approach is rather like your own, and typically like that of most consumer surround systems which use small satellite speakers and a subwoofer. For such systems bass management is essential. But this approach negates the truly optimized articulation of a full-range surround speaker system, especially those whose designs are time- and phase-accurate. I believe that a professional sound facility should be a truly benchmark working environment. That is the approach I have taken with our Reference Holosonic Home Theatre Lab. Bass management is a compromise and does not

Martinsound MultiMAX EX Surround Sound Multiformat Monitor Controller

facilitate the coherent response of the system to be fully optimized nor take into account the directionality of bass. At minimum, a reference system not based on single-structure full-range speaker systems should have a subwoofer paired with each speaker system (using outboard high-pass filters) at each channel vector point (so that each speaker position is capable of full-range playback), and a dedicated subwoofer to reproduce the .1 LFE channel (see *WSR's* Reference System L setup in the very front of the magazine under Reference Systems).

Further, the placement of speakers is absolutely critical in defining the "sweet spot," that precise position in which "the chair" is placed. Practicing equidistant alignment of speakers relative to the sweet spot is also critical. As discussed elsewhere in this issue (see accompanying article entitled "The Holosonic Sound Imaging Reference"), laser measurement tools, such as the Checkpoint Sound Alignment System SA-S tools we use, allow for very precise distance and angle measurement to be made. While consumers typically have not had such tools at their disposal and have had to "rough" out speaker positions, such a practice should never be tolerated in a professional working environment. The same is true with respect to monitoring through SPL loudness meters, such as the Dorrough® eight-channel meters we use at *WSR*, which are known for their accuracy.



Dorrough Loudness Monitor (340-Analog Meters)

Audio Control R-130 One-Third Octave
Real Time Spectrum Analyzers (RTA)

Equipment Selection

The Cornerstone

The one essential component in a home theatre that is designed for performance is "the chair." At *WSR*, "the chair" that we use primarily in the "sweet spot" was specially designed for us by First Impressions of North Miami, Florida. Another three chairs specially designed for us by Image Crafters are position as well in our critical viewing and listening area in the theatre. "The chair" is the cornerstone of a home theatre. It/they need to be comfortable so that you can sit for two or three hours (in our case in review use for upwards of eight hours with breaks) without hurting your back or falling asleep. Our chairs feature a low back (below ear level), so as not to block the ears receiving the soundwaves from the surround hemisphere of the room. The height of the seat in our chairs place the ears and eyes at near center of the screen (bottom of screen below eye height) and within plus or minus two-inches of the 40-inch tweeter height of the Dunlavy Signature Series SC-Vs depending on the size of the reviewer sitting in the chairs. The First Impressions' designed chair is a gray leather rocker on a 360-degree caster mechanism-supported base. This allows the movie sound reviewer to turn in any direction to monitor the sound-field presentation and to monitor the various sound performance meters we use to determine the sonic makeup of the soundtrack or mix. The Image Crafters chairs, two gray and one black, are recliners with a swede fabric covering.

Checkpoint LG-120
Sound Alignment System Line Generator

Audio Monitoring

As presented previously in Issue 48, Part I, we use a Martinsound MultiMAX EX Surround Sound Multiformat Monitor Controller to critically monitor individual channels or any combination of channels and to precisely control "reference level" when reviewing soundtracks. The MultiMAX EX controls individual or combination channel selection (or for that matter allows us to A/B up to five different 6.1 processors and two different 6.1 speaker systems) and provides monitoring control of discrete 8, 7.1, 6.1, 5.1 or LCRS and all Dolby and DTS® formats including Surround EX and DTS-ES, as well as DVD-Audio and SACD. We also use a M-Audio CT14 SPDIF switcher to evaluate up to four 6.1 Dolby Digital/DTS Digital Surround processors at one time.

A specially fabricated Dorrough Loudness Monitor (340-Analog meters) serves as a visual means for monitoring the loudness levels in a soundtrack or music mix. It is capable of accurately displaying the SPL of eight discrete channels by showing the relationship between the Peak and Persistence levels of the audio signal, which are based on the time and amplitude criteria of the audio waveform. This meter bridge is extremely important to ensuring that our reviews are credible, and allows us to accurately calibrate each independent channel. The Dorrough Loudness Meter C scale provides an analog correlation to the SMPTE (Society of Motion Picture and Television Engineers) standard established for level calibration.

Our other monitoring tools consist of nine channels of Audio Control R-130 One-Third Octave Real Time Spectrum Analyzers

Equi=Tech Model ET 12.5W SIF
Balanced Power Hard-Wired AC System

Richard Gray's Power Company
14 Model 400S and 2 Model 1200S

(RTA). These have been used at the magazine since its inception to determine the frequency spectrum of the various movie soundtracks we review routinely. So when we report bass extension to below 25 Hz in particular channels, we are relaying the readings from the Audio Control units.

Audio Setup

As previously mentioned, our sound system setup uses the Checkpoint LG-120 Sound Alignment System "Line Generator," a calibrated tool with the industry standard angles of dispersion (120˚, 90˚, 60˚, 45˚, 30˚ and 15˚). By dialing in the desired angle and aiming the LG-120 in the same direction, we are able to clearly see the angle of sound dispersion and the area of coverage.

Electrical System

Before we proceed further, it is important to relate that entire room has a dedicated electrical system with power distribution provided by Equi=Tech's Model ET 12.5W SIF balanced power hard-wired AC system. Balance power is essentially a 120-volt circuit that has 60 volts to ground on each side, instead of 120 volts on one side and zero, or neutral, on the other. The design virtually eliminates electrical noise in an audio and video system. The Equi-Tech system is the quietest electrical system I have ever experienced and results in a sonic and picture improvement that is nothing less than startling, with much tighter and deeper bass

California Audio Labs Custom Amplifier

response as well as better imaging, and blacker blacks, whiter whites and fewer digital artifacts. At SPL reference levels of 85 dB you can put your ear to any of the Dunlavy Signature Series SC-Vs and hear absolutely no noise or hum. We are presently installing an Equi=Tech Model Q with 5kVA output capacity in Reference System L. This is the high-end version, equipped with "Q" transformer technology designed to enhance amplifier performance, of the Equi=Tech professional power conditioner used in our Reference Holosonic Home Theatre Lab. (See accompanying article in this issue by Martin Glasband, Equi=Tech's President and designer of the balanced power technology.

Additionally, numerous (14 Model 400S and 2 Model 1200S) Richard Gray's Power Company AC power optimizers run in parallel to the various electrical outputs distributed by he Equi=Tech. The Richard Gray units are not in-line filters that go between the AC outlet and the component. Unlike the inline filters utilized in virtually all conventional power line conditioners (PLC), the Richard Gray's devices do not limit current flow to the components plugged into them. Instead, the Richard Gray's device is a large inductor that is wired in parallel with the electrical components in the system. The inductance is placed across the hot and neutral lines of the AC power to the components. Each component is still connected in parallel directly to the power outlet—the current supplying the component is not limited by any series filter at all. The Richard Gray's inductor acts like an electronic flywheel. It extends the charge time during which the power supply in an electronic component can replenish its stored energy. As reviewed in Issue 36 of *Widescreen Review*, the Richard Gray's units deliver a "jaw-dropping improvement in surround sound quality and picture definition." Please see our Web site at www.WidescreenReview.com under "Industry Gateway", "Manufacturers Speak Out" for a statement of findings that test the contention that Richard Gray's Power Company's patented technology provides nearly instantaneous noise reduction as well as energy storage/release when needed.

Equipment For Playback Sourcing, Audio Processing, And Amplification

As previously stated in Issue 48, Part I, we are constantly being solicited to use particular equipment in the magazine's various reference home theatre systems. As it turns out, we get to determine which equipment will best serve our purpose for each reference system. We often cross-reference our equipment and DVD movie reviews on different reference systems, which represent varying levels of component system cost and performance.

For this ultimate Reference Holosonic Home Theatre Lab we have left our options open so that we can explore other equipment as an on-going experiment to test and use the best products available.

At present, we have selected the Dunlavy Signature Series SC-Vs, HRCC, TSW-Vs and SM-I as our reference speakers.

Amplification is provided by California Audio Labs and soon Krell, as a second system. As previously stated we desired extremely high-powered, effortless, distortion-less amplifiers that operated mainly in true Class A bias, and that wouldn't distort or melt down handling sustained 100 dB plus levels. California Audio Labs custom designed for us a special 1,000-watt per channel (at 8 ohms) version of their CL2500 MCA power amplifier technology (reviewed in Issue 38, May 2000), but built on a two-channel chassis. CAL will be making this version available to consumers on special order. We are using five of these two-channel units to drive the entire nine channels of our Dunlavy Signature Series loudspeaker system.

The CAL amplifier is unlike any other amplifier on the market today. It has a unique "zero voltage transition" digital switching power supply and microprocessor control over all operational parameters, and its effortlessly delivers over 1,000 watts to each of ten channels (two channels in each chassis).

You could think of this amplifier as a direct-coupled 100-watt per channel Class A amplifier with 900 watts per channel of headroom. The main difference between the CL2500 MCA previously reviewed and this custom configuration is the CL2500 MCA was throttled back to a mere 500 watts for safety. This is one of the most powerful amplifier on the planet.

As Audio Equipment Review Editor Richard Hardesty stated in his review of the CL2500, "most high performance amplifiers use a conventional, inefficient power supply and a 'hot rod' output stage to deliver the best compromise between power and sound quality. The CAL amplifier uses a fairly conventional, although extremely high performance, output stage and a hot rod power supply. This power supply is a digital switching type, but it's nothing like the switching supplies from other manufacturers. It uses a 'zero voltage transition' switching system that, to my knowledge, has never before been used in audio applications. This system eliminates the switching noise spikes that have plagued previous switching supply amplifier designs and limited their performance in high-fidelity applications.

"Other amplifiers have claimed output capability that can't actually be achieved because of the current limitations imposed by the 20 amp circuit breakers used in normal homes. [In combination with the Equi=Tech balance power system] the CAL amplifier can deliver far more power in 'real-world' conditions than any conventional design using a linear power supply."

As with the CL2500 MCA this amplifier delivers stunning performance with exceptional bass output and definition, transparency, and absolute control over the Dunlavy Signature Series speakers. Subtle details are perfectly resolved with outstanding clarity. This is an extremely neutral-sounding amplifier with outstanding image focus and depth. It has tremendous dynamic prowess with a presence that is full and smooth, and revealing of the most subtle nuances. It is supremely accurate sounding.

When the Krells arrive they will be used in another setup using our Martinsound MultiMAX EX Multiformat Monitor Controller to switch. We will be using eight Krell FPB Series 350-watt Class A bias monoblock amplifiers (FPB-350Mc) and one FPB-250Mc 250-watt Krell for the SM-I height loudspeaker. These are state-of-the-art amplifiers, and as with our reference speakers, we will be able to accommodate other manufacturers' amplifiers for review.

For our reference high-end digital surround sound processor, we are using the latest upgraded Casablanca II Music and Cinema Controller from Theta Digital. Theta has maintained an enviable reputation for outstanding sound quality by producing home theatre products that can be directly compared to audiophile-grade stereo components. The Casablanca II uses a "card cage" architecture with "distributed intelligence." As we wanted a future-proof processor, the Casablanca II perfectly fit our requirements, as the unit can be custom configured to suit the current needs of the customer, reconfigured as those needs change, and upgraded to keep pace with

Theta Digital Casablanca II

the changing technologies of home theatre. Our next upgrade will be Dolby Pro Logic II when it becomes available this fall and DTS digital surround processing with 24-bit/96 kHz capability.

While the Theta Casablanca II is incredibly versatile and commensurately complicated to set up, once set up it is easy to operate. This product should be installed and set up a by a highly trained dealer.

One of the features that I particularly liked about the Casablanca II is that it provides the capability of applying adjustable, high frequency shelf equalization to ALL channels. This is a very effective method of compensating for overly bright soundtracks without the deleterious side effects of Re-EQ. I wish other processor manufacturers would adopt such a re-equalization scheme. While we don't use the Central Power Redistribution feature (a type of variable phantom center-fill and "hard" signal blend) when we are viewing DVD soundtracks, this is a unique process that spreads sound across the front three channels to correct for theatre mixes that direct too much sound to the center speaker. This proves to be an effective means of correcting for the poor dialogue integration found on many film soundtracks.

While Casablanca II provides for Circle Surround® 5.2.5 playback processing, it does not use this processing to create a proper "Surround EX" back surround channel. Therefore, we use in our Reference Holosonic Home Theatre System the excellent SMART® Devices Center Surround 3X™ (CS-3X, Jr.) back surround decoder, which is also based on Circle Surround processing. Theta needs to upgrade their Circle Surround circuitry to process a proper back surround channel.

Our particular Theta unit is configured for 12 channels, all 96 kHz-capable with the Superior DAC option. This is coupled with Theta's sophisticated jitter reduction circuitry which Theta calls *Jitter Jail*.

As for performance, Audio Equipment Review Editor Richard Hardesty wrote in his review (see Issue 48): "The Casablanca II delivered on its promise of high-end audio performance for home theatre. Most movies sounded better when played through the Theta controller. The sonic presentation from the best film soundtracks was exceptionally smooth and natural. The soundfield was unusually well integrated and seamless. Dialogue sounded more like people talking and less like speakers squawking, especially when using the Central Power Redistribution circuit.

"The sound from the Casablanca II was dramatically dynamic. This controller delivers an exceptionally wide range of dynamic contrasts. This extended dynamic range really drew me into the experience of film and made that experience far more involving.

"The Central Power Redistribution and shelf equalization features helped to improve the experience of films with poorly recorded soundtracks. I found both of these features to be very useful and effective."

In conclusion, Hardesty reports: "The Casablanca II Music and Cinema Controller is one of only a few multichannel home theatre products which can provide sound that can be directly compared to the best stereo components... The Theta Casablanca II continues a tradition of leadership among an elite group of components which define high-end home theatre today...When all is considered, the Casablanca II is a remarkable home theatre product. It provides a level of sophistication that few competitors can challenge and it is the only truly plug-and-play upgradeable controller that I've reviewed. If there is an all-in-one component that offers better overall performance than the Casablanca II, I haven't heard it."

Of course, there are a few other high-end processors/controllers that we will experimenting with in future issues that are sure to challenge the state-of-the-art performance of the Casablanca II. Stay tuned for the adventure.

All of the source components in our Reference Holosonic Home Theatre Lab are connected through the Casablanca II, with the exception of the video signals sourced from the various DVD players and other video source components. These signals are fed directly to our Extron® Matrix 128 HV/Crosspoint/Component Converter, which handles the system's video switching. I have always preferred direct feeds of video signals to the projector processor or TV monitor, rather than through an unnecessary set of inputs and output links in a surround sound processor or controller, regardless of the quality of the video signal path. This way, the video signal can be kept in its most pristine state.

We are using two Sony DVP-S9000ES progressive scan DVD players with two-channel SACD capability. Soon to arrive is a Toshiba SD-9200 progressive scan DVD player with DVD-Audio capability.

For dedicated multichannel SACD playback we are using the Sony SCD-C555ES. This player is a multi-disc carousel style CD/SACD player. It is Sony's first multichannel-capable SACD model. It performs flawlessly in every respect. The built-in bass management system is not as complete as those found in the best receivers and digital controllers but it is sufficient to allow users of satellite speaker systems to redirect the lower frequencies from small speakers to full range front speakers or to a subwoofer. Bass management can be bypassed by selecting MCH Direct (multichannel direct), which is how we use the player in our reference system with our all-full-range Dunlavy Signature Series speaker system.

Various DVD-Video-Audio-SACD Players

For multichannel DVD-Audio we also have in the system at present the Technics DVD-A10, the first multichannel player to hit the market. While the DVD-A10 has audiophile aspirations and includes many "high-tech" features, its place in our reference system is temporary. We are awaiting DVD-Audio players from true high-end companies that promise to deliver state-of-the-art DVD-Audio performance. Look for upcoming reviews of this new breed of DVD-Audio player in future *WSR* issues.

On the DVD-Video front end of our reference system the two Sony DVP-S9000ES progressive scan DVD players perform flawlessly. The latest top-of-the-line Sony is more than a worthy successor to the DVP-S7000 and DVP-S7700 models. (See review in *WSR* Issue 45.) It is the first DVD player to play Super Audio CDs, though not in the multichannel format. The DVP-S9000ES introduces dramatic improvements in digital video processing that were not found in the S7000 series. Sophisticated Motion-Adaptive algorithms are available to reduce noise that may be in the original picture source or noise introduced by the MPEG encoding and decoding process. Video Technical Editor Greg Rogers reported in his review of the Sony: "Motion-Adaptive refers to the ability to detect movement between video fields, i.e. image changes at specific areas of the picture, and then adapt (vary) the digital signal processing algorithm according to the amount of movement in each

area. This optimizes the effectiveness of the noise reduction at the same time it reduces unwanted artifacts."

While the DVP-S9000ES employs a process called inverse-telecine deinterlacing to produce flawless progressive-scan video from DVDs that originate from film sources, in the *WSR* reference lab we switch off Sony's internal deinterlacing and progressive-scan processing, slightly preferring the interlaced component video output processed through our Runco VHD-4404 Ultra and Faroudja DVP-5000 scalers (which cost many times that of the Sony DVD player) for their picture definition. As Greg Rogers reports, "Measurements of its video picture quality are more like the specifications of a laboratory-grade signal generator than a product-under test. A level of fundamental performance has been reached that is visually transparent to the quality and accuracy of the digital video information being reproduced." Finally, the Sony DVP-S9000ES is much more than a reference-quality DVD-Video player. We have found it to deliver stunning two-channel SACD performance as well.

Also in our reference system is a Pioneer Elite CLD-99 LaserDisc player, which is used for comparison reviews with DVDs.

There is one last piece of equipment that some of our readers will wonder about. We have at our command a Linn Sondek LP12 Cirkus turntable with Ekos tone arm and Arkiv cartridge, Linn Lingo power supply and Linn Linto phono preamp. The Linn LP12 represents over 25 years of world leadership and is unquestionably one of the finest belt-driven turntables ever produced. I have always been an analog fan and still have an extensive vinyl collection. In our comparisons with SACD we have found that the format is much closer to analog audio than has ever before been achieved in digital—it sounds closer to what music sounds like in real life. The Linn Sondek sits on top a Billy Bags Pro-35 Turn-Table Stand, which we move in place in front of our two Billy Bags Pro-54-5 Component Centers when we want to play vinyl records.

Speaking of equipment stands, we use Billy Bags Pro-Stands. These stands exhibit a build quality for no-compromise performance, and as well are beautifully executed in design. The Pro-Stand™ line is virtually custom-made to order as was in our case. Bill McCready, the man behind Billy Bags, has both a background in architecture and interior design. The Pro-Stands are made of three different grades of steel. Everything is precision milled and then welded in place on the inside so you don't see any welds. There are five welds per corner, and there are four corners to a shelf. With our Pro 54 stands there are five shelves, which represents 25 times that much welding. These stands are just incredibly rigid and strong. (Bill says he could balance a Porsche on top of his Pro Stands and they won't collapse.) But also furniture grade pieces of steel work that are put together with a choice of colors that allows the customer to end up with exactly what they want.

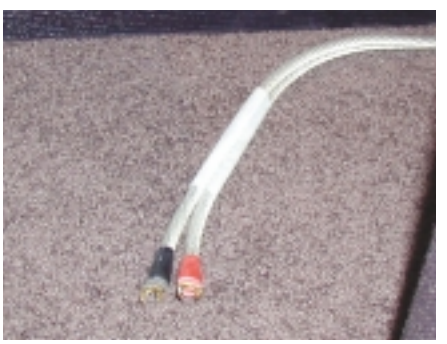
What attracted me to these stands was the level of stability and rigidity in their build quality, as well as the excellent level of ventilation they provide for the components, which in our never-off state generate substantial heat. And heat can cause problems if it's allowed to build up inside your rack. The Pro-Stands use a special truss system for crossbracing to provide the ultimate in stability and rigidity. The tube pieces, which are made of finer grade cold-rolled steel, are filled with silica sand to give each piece mass. This helps to dampen any airborne vibrations. The actual shelves are plenty deep to accommodate the deepest components.

The stands come equipped with isolation tips but, as in the case of the Pro-35 Turn-Table Stand, you can specify the new Pro Glides, which are made to glide across the floor so you can change equipment easily. Our Pro 54-5 stands are equipped with large industrial casters that will hold a lot of weight, and that allow us to easily move the racks out from the wall to make equipment changes. Our Pro 24 Amp Stands our fitted with the Pro-Iso Tips, an isolation tip that is three pieces with a large lock washer that locks itself into the bottom of the leg. The Pro-Iso Tip allows the user to precisionally dial in the level that you want your rack to sit, while maintaining the stability and firmness you need in an isolation tip.

Billy Bags Pro-Stands table tops are available in eight colors along with four steel finishes, including a new metallic silver finish, all power-coated and baked on at 450 degrees. Wilson-Art high-pressure laminates are used for the final quality finish. Of course, with volume, the company will created to order any custom finish. The company also is introducing Corian-style cracked glass as a table top finish. It's expensive but is also very beautiful.

McCready started manufacturing in 1987 in Laguna Beach, California. His current factory is based in Santa Barbara, where his extensive product offering is on show. Bill got the name for his company from a bean bag idea he executed in the '60s using a Swedish leather covering and supported with a steel base and a hammock support system (though the interior was stuffed with loose rubber from pads of carpet, not beans). The "bean bag" chair sold with its own ottoman. He called it "Billy Bags."

Assortment Of Monster Cable, Transparent Audio, And Extron Audio And Video Cables



Dunlavy Audio Ultra-Zip Speaker Cable

Along with the expensive bean bag chair, Bill started designing audio/video furniture, and that side of his business took off.

While I chose to equip our Reference Holosonic Home Theatre Lab with the Pro-Stand series. Billy Bags offers a complete and extensive line of less expensive entry-level stands, which are more affordable for people who are just getting the bare bones to support their system, yet want it done in style. Billy Bags stands are available in an adjustable option as well, and they offer TV tables, entertainment system stands, and a complete complement of LP, CD and DVD (and VHS) storage racks.

We are using several complete system interconnect and loudspeaker cables from Dunlavy Audio Labs, Monster Cable, Transparent Audio and Extron. Cables are typically the weakest link in one's home theatre system, but not ours. We use each of these companies' premium high-end lines that have been meticulously engineered and quality built. The differences are subtle in performance, but nonetheless I prefer to optimize each component connection with the best in cable quality. You many be asking, can you get better quality from a better cable? Definitely. From time to time other high-end cables will be auditioned as well.

From Monster Cable we use the *M*•Series® *M*2.2S™ speaker cables, *M*1000i and ProLink™ Studiolink 500 audio interconnects, Interlink® Lightspeed 100 and *M*1000D digital audio interconnects, *M*1000RGB, and *M*2000HDSV

video interconnects. From Transparent Audio we use the Reference Series audio interconnects and speaker cables, digital audio Toslink and coaxial interconnects, Transparent Video Datalink RGB video interconnects, and Premium Transparent Component Video interconnects. From Extron® we use their component and GB video interconnects. And from Dunlavy Audio Labs' Opti-Match Cable Company we use the new Ultra-Zip™ Loudspeaker Cable, a parallel-pair (twin-conductor) of large diameter, highly flexible, stranded, high-purity, plated copper wire, separated by a low loss dielectric material.

We use the following configurations:

- (8) 8-foot speaker cables for Krell amps
- (8) 8-foot speaker cables for CAL amps
- (2) DB25 male to 7 RCA 30-foot interconnects split off near DB25 termination and 1 30-foot Y-pair, split off near DB25 termination (for LFE or channel #4 in DB25 pin routing chart) [for outputs to amps]
- (2) DB25 male to 7 XLR male 30-foot interconnects split off near DB25 termination and 1 30 foot Y-pair, split off near DB25 termination (for LFE or channel #4 in DB25 pin routing chart) [for outputs to amps]
- (5) DB25 male to 8 RCA 2-meter interconnects split off near DB25 termination [for multiple surround processor inputs]
- (5) DB25 male to 8 XLR male 2-meter interconnects split off near DB25 termination [for multiple surround processor inputs]
- (1) DB25 male to 8 XLR male 15-foot interconnects as a "snake" [for outputs to Dorrough Loudness Monitor]
- (1) DB25 male to 8 RCA, 2-meter interconnects split off near DB25 termination [for outputs to RTAs]
- 1-foot DB25 Male to XLR Males as a snake
- 10 30-foot XLR Interconnects
- 3-meter DB25 Male to XLR Females as a snake
- (12) pair 2-meter RCA interconnects [various stereo connections, SACD, DVD-Audio, Surround EX decoder]
- •- (6) 2-meter coaxial digital interconnects
- (4) 2-meter Toslink digital interconnects
- (2) 45-foot component video cable sets as a "snake" [Runco 4404 Ultra and Faroudja 5000 to projectors]
- (2) 45-foot RGB 5-Wire video cable sets as a "snake" [Runco 4404 Ultra and Faroudja 5000 to projectors]
- (5) 2-meter component video cable sets [DVD players]
- (1) 15-foot composite video cable [Sony Video8 portable monitor used for setup]
- (2) 2-meter composite video cable

Several of the cables in our installation required special termination following particular channel numbers and DB25 Pin numbers. This is not a simple wiring scheme.

A high quality video cable should be 75 ohms, which the Monster, Transparent and Extron measure (the Dunlavys are strictly audio cables), including the connectors used. The characteristic impedance of the cable/connectors must match the 75-ohm input and output impedances of the video components to prevent signal reflections at the ends of the cable. Signal reflections will appear in the picture as ringing or edge outlining artifacts, and also create frequency response aberrations.

Adapters are never a good idea when compared to direct terminations. RCA connectors are an unfortunate consequence of the consumer world. BNC terminations have a more consistent impedance. But note that BNCs are available in 50-ohm versions, often used for RF power transmission applications, and 75-ohm versions for video. All of our connectors are true 75-ohm BNCs, as they should be in a video system. (See *WSR's* Special Edition *Imaging Science 2000*, which features our extensive "Video Cable Survey.")

Long cable runs to a projector from a scaler or switcher should use larger diameter, lower-loss video cables to avoid frequency response losses. HDTV and highly scaled picture formats require flat frequency response to 30 MHz or more to avoid a loss of picture definition. It is also important to match cable lengths when using RGB or YPbPr component video signals. Otherwise time delays between video signal components may create a variety of effects including color smearing on the edges of objects, or what appears to be picture misconvergence in RGB systems. The low-loss video cables we use in our reference system are carefully matched and exhibit none of these picture degradations.

We'll cover the digital television decoder, D-VHS recorder, DISH Network Model 6000 HDTV satellite system, video projection, and monitoring equipment in *WSR's* Issue 52. ■

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