D-VHS® D-Theater™
Hollywood Studios Support New HD Platform

GARY REBER

Required Reading

Gary Reber, Editor-In-Chief and Publisher of *Widescreen Review*, asked me to look over his article covering the introduction of the D-VHS® D-Theater™ format for any corrections or additions. My first reaction was that this article is so long that readers may simply fall away in exhaustion. But in reading it over several times, I came to understand that Gary has presented a definitive view on a way forward for HDTV. Gary has given his audience a sense of security that the format is indeed worthy, and timely. I think *WSR* readers will be enthralled by the complexities of this industry through the insights and long historical look Gary brings to it. In the end, all formats are secured by public acceptance and eagerness to acquire. I urge *WSR* readers to digest this article and to make their choices to support Gary's direction.

What film studios must come to learn is that everything in their vaults is made brand new again by HDTV. No doubt there will be formats in the future which will eclipse even D-VHS. Gary has alluded to it, but the sheer enjoyment of movies in true HDTV NOW is an overwhelming reason for this format to be eagerly embraced and, predictably, to be with us for many years to come, even as a side-by-side companion with something from a spinning disc—just as it is today with VHS and DVD.

Dale Cripps, Publisher
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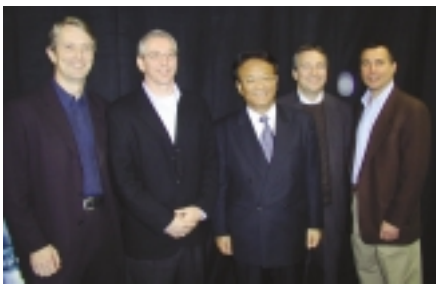
D-VHS® "D-Theater™" Prerecorded High-Definition Videocassettes

The HDTV enthusiasts have been asking for it, and now it's here—the first prerecorded high-definition movies based on the latest-generation D-VHS® format. On Thursday, January 31, 2002, at the JVC D-ILA Theater Zone in Beverly Hills, California, VHS developer JVC (Victor Company of Japan, Ltd.) formally announced that the home entertainment divisions of four major Hollywood studios—Artisan Entertainment, DreamWorks Home Entertainment, 20th Century Fox Home Entertainment, and Universal Studios Home Video—have joined with JVC to support the new D-VHS "D-Theater™" software platform for high-definition copyrighted prerecorded content. The support of these major content providers marks the next phase in the acceptance of high-definition (HD) as the new standard for home entertainment and television viewing.

The new generation digital VHS platform incorporates a new proprietary encryption system that is regarded by the supporting studios as the highest level of protection available, to prevent the unauthorized duplication of copyrighted prerecorded HD content. The system reinforces the existing D-VHS security system, providing significantly stronger levels of protection against illegal copying of movies and other high-value content. Prerecorded D-Theater videocassettes can only be created on duplication equipment licensed and approved by JVC. The system was added as an option to the D-VHS standard for products in the North American market.

In the original release statement, Patricia Wyatt, President, 20th Century Fox Home Entertainment said, "The D-VHS format offers superior picture quality to any other format in existence today and the solid copyright protection technology built into the D-Theater system makes the format extremely attractive to us as content providers. Nothing else can reproduce the visual impact of film and we anticipate that true film enthusiasts will adopt D-Theater now that HD prerecorded content will be available."

"As the only hi-def format in existence, the D-Theater option allows us to offer movie fans an unprecedented home theatre experience," said Kelley Avery of DreamWorks Home Entertainment. "This format offers the most pristine viewing quality to the increasing number of households with hi-def systems."



(Left to Right) Peter Staddon, 20th Century Fox; Michael Weetman, DreamWorks Home Entertainment; Eiichi Tsuchiya, JVC Company Of America President; Jerry Pierce, Universal Pictures Technology; and Jeffrey Fink, Artisan Entertainment at JVC Showcase Center Press Announcement

"It has always been our goal to provide consumers with the option to obtain the best picture quality in which to view our product, and the D-VHS D-Theater platform offers just that," said Steve Beeks, President, Artisan Entertainment. "This idea, combined with the ability to record high-definition television and the option to view standard cassettes from a consumer's existing [VHS] home library, makes this product very attractive."

Then, too, tape offers an advantage in the amount of data it can store. Even next-generation optical discs can only store 20 to 30 gigabyte (GB) of data on a single side, which is only about half that of D-VHS. And, while some think that tape is obsolete as a medium, it is important to note that virtually all hi-def professional recordings are currently being made using a tape medium.

This expected, but long-awaited announcement is certain to cause a reaction within the consumer electronics industry and the Hollywood studio community, who have invested heavily in DVD. Some DVD supporters are certain to view this new development as somewhat of a nightmare scenario. And the argument is sound that this is no doubt a last-ditch attempt to extend the VHS format as an intellectual property revenue source into the 21st century. Those anti-tape proponents who believe tape is at an end worry that D-VHS will confuse consumers, cause a slowdown in sales of DVD, and is ill-timed. While the introduction of the D-VHS format follows the relatively recent launch of DVD, the launching studios view the two formats as offering unique benefits to the consumer. DVD is fast becoming the preferred mass-market standard-definition format, while D-VHS is the first high-definition record/prerecorded format that addresses a niche market. But this fledgling HD market is projected to significantly grow in coming years with the shift from standard-definition to high-definition content.

"D-VHS is in a unique class different from DVD. This meets the videophile's highest quality expectations for an in-home experience," said Craig Kornblau, President, Universal Studios Home Video. "JVC's D-VHS D-Theater video recorder will allow consumers to play hi-def content which clearly differentiates it from a DVD player. It is the only hi-def option."

Speaking on the copy protection issue, Kornblau said, "We would only put out HD product if we were absolutely guaranteed that it would be fully copy-protected. Frankly, that's why it has taken so long."

The bets are on as to what the other Hollywood studios will do—join or resist. If new digital VCRs such as D-VHS never became available, some entertainment industry lawyers would lose little sleep. At present, several competing Hollywood studios do not plan to release any HD D-VHS D-Theater titles, setting what they see as the stage for a new battle over competing prerecorded video formats. (This is not a new scenario—read *WSR* Issues 15 to 30 which covered the DVD format wars.) But D-VHS is not the enemy of DVD. There is no reason why both D-VHS and DVD formats can't survive. It would make no sense for the Hollywood studios to cannibalize the successful DVD format. D-VHS provides a unique opportunity to provide an incremental revenue stream to the studios—high-definition prerecorded movies.

1 Prior to the introduction of the D-VHS format, in Issue 4, July/August 1993 and again in Issue 5, September/October, we reported on JVC's introduction at its TechnoFair in Japan of an analog HDTV-compatible video recording format, dubbed W (for wide)-VHS. The new format, developed to support the proposed next-generation widescreen HDTV global broadcasting standard with a 16:9 (1.78:1) aspect ratio, maintained backward compatibility with the conventional VHS/Super VHS systems. It was positioned as an interim format pending the standardization and introduction of true digital HDTV VCRs. The W-VHS format used one-half-inch metal tape. Recording of an original HDTV image was accomplished with newly-developed baseband two-track parallel recording technology which splits the incoming, widescreen, high-density HDTV signal onto two adjacent tracks, each less than half the width of standard VHS or Super VHS. When used to record NTSC, it allowed the recording of two high quality NTSC programs simultaneously, in the VHS or Super VHS formats. Two other modes, named SD and SD2 provided improved picture quality of standard analog TV transmissions. In the SD2 mode, the VCR provided a recording time of a single incoming signal of up to 540 minutes using a T-180 cassette. Two different programs with a maximum recording time of 180 minutes for each could be recorded when in the SD2 mode. Both the SD mode and the SD2 mode employed "depth multiplex" analog FM recording with rotary heads, which is based on the FM audio sound recording system for the VHS format. The SD2 mode provided for an additional two-channel 16-bit PCM digital audio recording system.

The format was compatible with the Japanese analog Hi-Vision system for HDTV. The first W-VHS recorders, licensed by JVC's parent, Matsushita, plus Hitachi, Sharp and Mitsubishi, were introduced in Japan in late 1993, and priced at about $5,000. They were then introduced in 1994 to the professional market in the U.S.

Consumer Electronics Companies Adopt D-VHS

In the following article, I will attempt to provide an in-depth overview of the long history associated with the development of the D-VHS standard, and discuss the technical aspects of the platform.

I first wrote about the new digital Data-VHS (D-VHS) format, developed by JVC, back in Issue 14, May/June 1995.[1] The format is capable of recording compressed HD digital signals and other forms of bit stream data. At that early stage of development, the first D-VHS VCR prototype was integrated with a RCA-brand DSS receiver. The DSS DirecTV® interface was co-developed with Thomson Multimedia and Hitachi, and as well, Philips was working on an EchoStar DISH Network™ digital broadcast set-top box (STB). In that report, specifications for the D-VHS format were scheduled to be finalized at the end of the year. The first D-VHS VCR was to be introduced in the U.S. in mid-1996.

JVC first announced the imminent launch of its new high-definition prerecorded format, D-Theater, at the 2001 International Consumer Electronics Show (CES). In Japan, which does not have the D-Theater system, the D-VHS system has been adopted by Hitachi, Mitsubishi, Panasonic, Sony, Toshiba, and JVC, and in Europe by JVC, Philips, and Thomson Multimedia. JVC senior executives at the press conference said that they were in discussions with all of the above D-VHS licensees and that at least one or two are expected to adopt the D-Theater platform option, which would appear on new units slated for the U.S. market. No plans exist to introduce the platform outside of North America at this time.

The platform assures interchangeability of non-D-Theater-marked content between D-VHS machines. But right now the JVC HM-DH30000U is the only D-Theater product in the marketplace in the U.S. D-Theater

software, identified by a prominent "D-Theater" logo on the packaging, will be playable only on D-VHS video recorders that incorporate this secure platform and bear the same "D-Theater" logo.

High-Profile, Effects-Laden Catalog Titles

At the press conference, the supporting studios alluded to a number of high-value titles in the initial rollout. Among the titles name-dropped were: Fox's *X-Men* (see review) *Fight Club*, *Die Hard*, *Independence Day, Bedazzled, Courage Under Fire, The Siege, Titan A.E., Entrapment, Butch Cassidy And The Sundance Kid,* and *The Sound Of Music*; Artisan's *Total Recall*, *Basic Instinct*, *Terminator 2: Judgment Day, The Terminator*; DreamWorks' *Galaxy Quest*; and Universal's *U-571* (see review). The first two D-Theater promotional titles (not for sale) are Beyond Records' *Motley Crüe—Lewd Crüed & Tattooed* (see review) and *House Of YES—Live From House Of Blues*. The studio representatives I talked to said that as the market penetration for D-VHS D-Theater develops, more and more titles will be released. I got the impression that upward of 100 titles would be released in 2002. I had hoped for even more releases, but because there will be so few D-VHS D-Theater players available the first year, the launch will be initially limited. The on-going slate of releases would be comprised of both feature film and music titles. The studio representatives said they would officially announce their title slate by summer, with the first release dates scheduled most likely for June 2002. All the initial releases will be mastered in 1080i (directly off the 1080p film vault masters) with 5.1 Dolby® Digital soundtracks, though 20th Century Fox Home Entertainment's Senior Vice President of Marketing, Peter Staddon, said Fox would release 11 catalog titles in their first wave with some initial titles carrying the DTS® Digital Surround™ soundtrack option. The studios noted that they have not defined their strategy in terms of day-and-date releases and other supplemental content.

The studio representatives said they would take a wait-and-see approach to evaluate day-and-date releases with standard VHS and DVD. Their focus initially, they said, will be releasing high-profile, effects-laden action and science fiction catalog titles on D-Theater that appeal to consumers with high-end home theatres. And they were in unanimous agreement that no D-Theater-specific titles would be released first on D-VHS and then only later on DVD. That view, I believe, could change over time if the D-VHS D-Theater platform is eagerly embraced by HDTV enthusiasts willing to pay a premium price for exclusive first-run home video ownership of in-demand feature films.

No information was provided by the studio representatives as to marketing plans or where D-VHS D-Theater titles would be sold. But presumably, such specialty home theatre dealers and mass-market chains such as Best Buy and Circuit City, which sell HDTVs, would find D-VHS D-Theater titles advantageous to selling high-ticket home theatre equipment. In future issues, I will provide updates on the studios' marketing plans as they develop.

And while no representative could officially provide pricing of D-Theater titles, at least one studio source indicated that the movies would retail for about $30 to $40 each (no doubt due to D-VHS' higher duplication costs compared to DVD, and the initial low volume demand). Those *WSR* readers who built a library of LaserDiscs will remember similar pricing. With D-VHS D-Theater titles about double the price of a DVD title, the platform is not meant to undercut the DVD format, but to provide a source for a true high-definition viewing experience.

As 20th Century Fox's Staddon succinctly stated, "If we thought it (D-VHS) was going to kill DVD, we wouldn't be doing it." Cheryl Glenn, DreamWorks' Publicity Director said that D-VHS is intended to "satisfy a very small and dedicated market with the highest-quality product possible."

Staddon further commented on branding, saying, "We are looking at the D-Theater branding as being a very important element in the D-VHS launch, both in terms of hardware and software, making it understandable to consumers that this is not a Super VHS (S-VHS) or standard VHS player but a D-Theater HD 1080 player. All the tapes and packages will have very clear D-Theater branding and 1080 branding as well."

Staddon stated, "Directors who have been concerned with the best possible presentation of their movies have been very impressed and supportive of the format. D-VHS is great for putting their movies out in the most pristine format that they can. Every title to be released will have the full cooperation of the filmmakers involved to make sure that the transfers are exactly right. That is why we have not announced titles because, although we are very close, we are still working on a couple of the masters to make sure that some of the

higher caliber directors will sign off completely. The reaction is universally very good."

Jeffrey Fink, President of Sales and Marketing at Artisan Entertainment said, "The first releases will be *Total Recall*, *Basic Instinct*, *Terminator 2: Judgement Day,* and *The Terminator*. Our product will be distributed through Fox." (Artisan owns the VHS distribution rights to *The Terminator* while MGM owns the DVD distribution rights.)

DreamWorks' Glenn said, "We are still in the process of planning and making a decision in terms of what titles we will be releasing. Certainly *Galaxy Quest* will be one, but the others haven't been locked in."

Filmmaker Excitement

At the 16th Annual ASC Awards for Outstanding Achievement in Cinematography for 2001, held on Sunday, February 17, 2002 at the Century Plaza Hotel in Century City, California, I had the opportunity to share the news on the new D-VHS D-Theater developments with several prestigious ASC and Academy Award®-winning cinematographers—Steven Poster (ASC President), John Hora, Allen Daviau, John Toll, Bill Fraker, Woody Omens (Head of the Cinematography Department at the University of Southern California), Andrew Lesnie (nominated in the ASC feature film competition for The *Lord Of The Rings: The Fellowship Of The Ring*), Laszlo Kovacs (Lifetime Achievement Award winner), and Vilmos Zsigmond. (Use *WSR*'s interactive search engine with our Find It DVD Movie Guide database, found on our paid subscriber Web site, to look up their distinguished credits.) Without exception, they applauded the news with excitement. No doubt they want their cinematic vision seen in a consumer video format in the most pristine picture quality possible, and D-VHS D-Theater, they say, will serve the cinematographer's vision well. I'll have a full report on the creative community's response in a future issue.

At the ASC Awards, I had the opportunity to speak to Leon Silverman, Executive Vice President of Laser Pacific, the post-production facility handling much of the initial authoring for D-VHS D-Theater titles. I asked Silverman to share with our readers his feelings about the new HD platform. "Part of what we are doing with the D-VHS format is allowing professionals in the motion picture industry to see dailies and their other work using this technology along with D-ILA®. For the first time, this technology allows cinematographers and directors to see their best work in the best way. As well, the technology is being used in the premiering of motion pictures." Silverman shed more light on the professional aspects of the technology's application. "There is a consumer format as well as a professional format that the JVC HM-DH30000U platform supports. We're helping filmmakers learn about how to see their best work using this format. Laser Pacific is working with filmmakers and encoding in both the professional format and the consumer format. JVC will be introducing a professional version of the format that will be ultra secure so that people who make motion pictures will have encrypted tapes that will only play in the professional players. In this way, the motion picture work that is done can be extraordinarily secure."

I asked Silverman what feedback they have gotten back from the filmmakers they have worked with using the D-VHS format. "It's been extraordinary! At a recent demonstration I gave with Universal's Jerry Pierce at the ASC Clubhouse, the D-VHS format rivaled the professional D-5 format (the standard 1080 24p mastering format used by every studio). There was just the slightest difference in resolution quality. With the D-VHS format, we will be able to seed the professional and consumer environment with low-cost playback devices that exhibit the same image quality that we have been seeing in the professional environment for years. The D-VHS format represents an enormous leap in what we have been able to see in professional applications. I am very optimistic about this format."

A Viable, But Interim Solution?

JVC expected to announce the new D-Theater-compatible D-VHS system at the 2001 CES, followed with the player launch in the U.S. by late spring, which actually was introduced in September, but without the expected prerecorded software support from all the major studios. At that time, other than 20th Century Fox and Universal, no other studio had officially announced their support for the new D-Theater HD prerecorded format, though New Line clips were also featured in JVC's CES booth.

But JVC persevered in its pursuit to enlist support of their format with Hollywood studios. Thanks to JVC and these four pioneering studios, there is a new opportunity to refresh the HDTV revolution with on-demand, prerecorded blockbuster movies in true 1080 high-resolution on the D-VHS D-Theater videocassette platform.

To me, D-VHS is a viable, but not the only solution to HD recordability and prerecorded playback. The advent of HD-DVD also will be viable. I have no doubt that D-VHS D-Theater will jumpstart the acceptance and demand on the part of consumers who will need a new HDTV set. At the same time, D-VHS D-Theater serves all those early adopter enthusiasts who put their faith in the new technology, and now can fully appreciate what all the anticipation was about.

The new D-VHS format comes at a time to renew faith in achieving the Federal Communication Commission's (FCC) mandate of a 2006 deadline for transition to all-digital broadcasts, and end the pointing of fingers by broadcasters and set manufacturers over who's to blame for the sluggish conversion rate so far.

I firmly believe that with an aggressive prerecorded release schedule and the further support of the rest of the major Hollywood studios for the D-Theater prerecorded platform, HDTV digital set ownership will be spurred, along with home theatre entertainment. I believe this new format will hasten the emergence of mass-market demand, which in turn will drive set prices down and thus propel high-definition programming demand, and substantially quicken the transition from analog to HD digital (and HD-DVD). Most significantly, this format puts the acid test to the industry as to whether JVC's proprietary copy protection encryption security system is robust enough to meet the challenge that the studios have said it must meet—that is, a copy protection system designed to prevent the propagation of amateur (non-professional) copying. (See "From The Editor's Couch" in Issue 40, July/August 2000.)

Encrypted Security Platform That Studios Trust

In Issue 40, July/August 2000, I first reported on JVC's new proprietary copyright protection system for high-value, prerecorded D-VHS content as well as in-home analog and digital recording. This new standard, now dubbed "D-Theater" makes it possible to develop and produce prerecorded HD content, as well as add momentum to the development of D-VHS hardware products. D-Theater is said to provide a higher level of copy protection than that provided via IEEE 1394 networks and DTCP (5C) copy protection alone. In that report, Hiroki Shimizu, JVC's Senior Managing Director, observed that "The system will provide consumers with a true digital viewing experience and offer content providers superior digital asset protection. We also hope that this development will give the much needed boost to the HDTV industry by providing long-awaited, high-definition content to the consumer."

D-VHS VCRs bearing the "D-Theater"

logo are compliant with the advanced D-VHS security system. The platform includes not only encryption but also other internal design securities. In addition, such tape functionality as chapter search, audio selection, and closed-captioning are added to the basic D-VHS format. And since there is support for running audio commentaries, the support is also there for alternate foreign languages. But other interactive features found on DVD just won't be possible on the D-VHS platform.

These technologies provide content owners protection, while allowing consumers to record and play standard-definition (SD) and HD digital video content. JVC is now calling on other hardware manufacturers to adopt its proprietary secure digital platform in their D-VHS models.

At the press conference at the JVC D-ILA Theater Zone, DreamWorks' Michael Weetman discussed with me the workings of the copy protection. "The copy protection was absolutely critical to us. If we are going to put out high-definition in prerecorded format, it has to have the right level of security. This copy protection is very, very sound. In terms of the actual hardware, there are no unsecured interconnect connections. As to the encryption on the tape, the engineers at JVC have done an incredible job. Another important aspect is that it doesn't connect to the Internet. You can't spread it around, like DVD at this stage. DVD is standard-definition and just competes with over-the-air broadcasts. High-definition is a very valuable asset to protect."

JVC's landmark technology offers compatibility with all types of TV broadcast systems used worldwide, accommodates both digital and analog systems, and offers compatibility with conventional prerecorded analog VHS content. A D-VHS digital recorder for home use, the model HM-DH30000U, has been available from JVC since September 2001, which incorporates their proprietary D-Theater encryption security feature. The manufacturer's suggested retail price is $1,995 (actual $1,299 Internet street price). JVC plans to introduce at least one more D-VHS recorder this year. The company is hoping to sell 100,000 D-VHS recorders within the first year. Blank cassettes are priced under $20 (DF300, $15, DF420, $25). The premium pricing is reflective of a new format launch, but assuredly prices will fall as market demand swells and consumer-priced MPEG-2 codecs become available for incorporating into standalone D-VHS VCRs. This has been the historical pattern for virtually

every successful format—VHS, CD, LaserDisc, DVD, etc.

D-Theater is the first such encryption security platform for prerecorded high-value HD digital content, adopted by a significant representation of Hollywood studios.

Should JVC's D-Theater encryption security system prove to be successful (i.e., non-hackable) with the initial niche market now targeted, I believe, as previously mentioned, that the opportunity will present itself for Hollywood studios to release high-definition versions of their feature films on a post-theatrical first-run basis, in an exclusive sell-through (and rental) window far ahead of DVD release. Such would support a premium-priced sale and/or rental niche market that otherwise has not had the necessary demand or facilitation to be developed because of the inferior picture quality associated with standard-definition releases such as DVD and VHS. I think that once people become used to watching true HDTV, they won't be willing to settle even for progressive-scanned, anamorphic-enhanced 16:9 DVDs.

Digital Transmission Content Protection

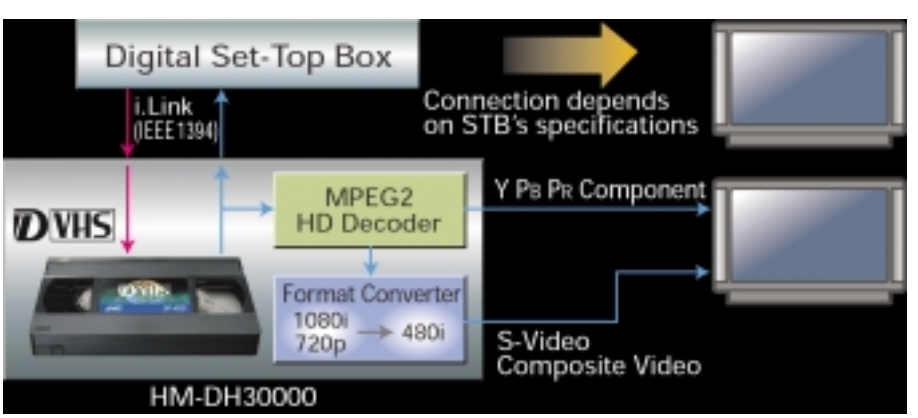
The D-VHS platform also supports a copyright protection technology, dubbed DTCP (Digital Transmission Content Protection) and pushed by the consumer electronics industry for digitally-delivered, copy-protected studio content transmitted via IEEE 1394 high-speed digital interface connections between the D-VHS VCR and an MPEG-2 compressed HDTV source. The actual data for the HDTV signal is carried over this link for both recording (from a set-top box to the D-VHS VCR) and playback (from the D-VHS VCR to the TV display or back to the STB). (See *WSR* Issue 52, September 2001.) Sony Pictures Entertainment (Columbia TriStar) and Warner Bros. are the first studios to formally adopt DTCP. The other major studios are still evaluating this digital interface-based transmission and display standard.

The DTCP copy protection standard (also known as 5C) is implemented in the JVC D-VHS format standard on output and input. For its IEEE 1394 terminal, D-VHS uses the same four-pin terminal as used in DV terminals. The HM-DH30000U's IEEE 1394 DTCP interface requires a separate digital set-top box to record in HD-compatible formats, such as 720p and 1080i, and provides full-spec recording compatibility with all 18 Advanced Television Systems Committee (ATSC) broadcasting formats. Various set-top box implementations are in development that will support the HM-DH30000U's interface.

Monster Cable® FireLink® IEEE 1394

Originally developed by Apple Computer under the name FireWire® (Sony calls it i.Link®), IEEE 1394 is a general-purpose, high-speed serial bus which uses from four to six wires (two carry power voltages not used by some devices) on a single, relatively small connector. The data transfer capacity of IEEE 1394 is close to 400 megabits per second (Mbps). The latest 1394b standard supports transfer rates as high as 3.2 Gbps and will support the high-definition DTV formats.

Universal Pictures Technology's Senior Vice President Jerry Pierce said, "The inputs on the D-VHS JVC HM-DH30000U are IEEE 1394, so existing IEEE 1394 non-copy-protected content would be able to be recorded. The 5C copy protection will be there, so



programs are marked in such a way that you would know whether the content would be able to be copied."

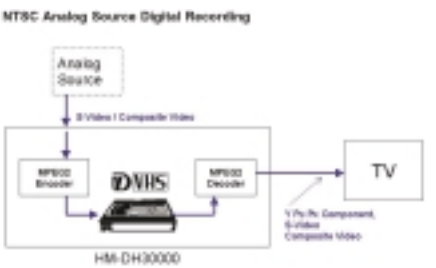
While the JVC D-VHS HM-DH30000U, other D-VHS recorders, and digital camcorders use an IEEE 1394 interface (conforming to the EIA 775A DTV 1394 Interface specification), digital TV sets, DVD players, digital cable, and satellite receivers, which have been on the market for several years, cannot connect to each other digitally. That's because the entertainment industry and electronics manufacturers haven't been able to agree on a standard technique for transmitting digital signals without encouraging piracy.

As a result, digital signals had to be converted to analog before they could be passed form device to device. While the conversion is argued to have deterred would-be pirates from making pristine digital copies, in reality, illegal copying continues to be a troublesome reality in today's society.

While I support the idea of digital copy protection to stop thieves and pirates, nevertheless, I would hate to encourage studios to copy-protect or eliminate analog HDTV outputs, which would effectively hinder honest consumers. Unfortunately, the evidence suggests that Hollywood is actually more concerned with controlling honest consumers —with the ultimate aim of extracting more money from their wallets—than stopping pirates.

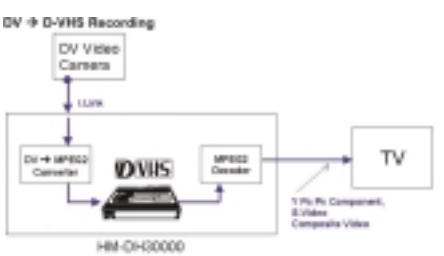
Some studios already want to force their HDTV content from satellite receivers, and potentially from broadcast HDTV set-top boxes, to be downconverted to a lower resolution analog output. That would make millions of current rear-projection HDTVs and front projectors without digital inputs obsolete. This would greatly slow down the adoption of HDTV, or more likely kill HDTV all together, since consumers will have wasted thousands of dollars on obsolete HDTV technology and will no longer trust (for good reason) the manufacturers and content providers. If Hollywood gets its way, all sources of video will have only digital copy-protected outputs—the analog outputs will be gone.

I think everything possible should be done to encourage manufacturers to continue to provide full-resolution analog HDTV outputs on all set-top boxes and full-resolution analog HDTV inputs on all TV displays. They should copy-protect the digital interfaces, but not eliminate or lower the resolution of the analog HD interfaces that are the only means to drive several million existing HDTV displays. There are no products that make HDTV copies from analog signals,



and this capability can be prohibited on future HDTV recorders. The JVC D-VHS HM-DH30000U recorder is a good example. It has no analog HDTV inputs, which prevents copying the analog signals from other HDTV set-top boxes, but it has an analog HDTV output. It would be tragic if the JVC D-VHS recorder were driven off the market because it had a full-resolution analog HDTV output. I don't want any product to ever to be outlawed because it has an analog HDTV output.

JVC's D-VHS HM-DH30000U incorporates a built-in MPEG-2 encoder to make standard-definition 480i digital recordings from any analog NTSC source in the recorder's HS, STD, and LS3 (low speed) modes. A frame synchronizer, which removes jitter from analog input sources, assures pristine analog-to-digital dubs that can actually surpass the quality of the original. There is even a DV input (i.Link, IEEE 1394) for DV to MPEG-2 conversion recording.



Even if you don't own a HDTV-capable monitor yet, you can still enjoy D-Theater-encoded D-VHS material downconverted to 480i.

The DTCP technology, which was developed by the Digital Transmission Licensing Administrator, LLC (DTLA or 5C companies) —Hitachi Ltd., Intel Corp., Matsushita Electric Industrial Co. (Panasonic), Sony Corp., and Toshiba Corp.—attaches rules to a digital signal as it is being transmitted over a high-capacity IEEE 1394 connection. Those rules can prevent a program from being recorded (termed "Copy Never") or, once it has been recorded ("Copy Once"), from being reproduced. The unhindered level of DTCP is "Copy Freely."

As previously reported, the rules won't apply to programs received over-the-air, so local broadcasts on digital TV channels won't face limits on recording. Nor do the long-term, royalty-free licenses signed by Sony and Warner Bros. allow the companies to limit recording on basic (non-high-definition) cable and satellite channels.

Instead, the rules are designed to limit copying of pay-per-view programs and premium channels, such as HBO and Showtime. The rules can limit how long a program can be stored on a personal video recorder (PVR), such as those powered by TiVo® Inc., Sonic Blue's Replay TV®, and Microsoft Corp.'s Ultimate TV™, and how the resolution of HD programs can be reduced when passing them to HDTV sets that don't have a IEEE 1394 or DVI (Digital Visual Interface) connector. (To my knowledge, only two manufacturers, Sony and Mitsubishi, have actually provided IEEE 1394 inputs on their newer DTV displays.) In future, both connection standards are expected to be adopted by all manufacturers, a DVI connection for set-top boxes and a IEEE 1394 port for digital recorders and other devices.

It is the reduction in the analog HD output resolution that troubles us. If they cut the resolution on the analog outputs. they will kill HDTV and *WSR* will actively campaign to stop this. It is a red herring since there is no way for consumers to record analog HDTV signals. The same goal can be achieved by simply preventing consumer HDTV recorders from having analog HDTV inputs. If the studios and manufacturers police themselves, there won't be a problem with analog HDTV copying.

While the technology also is designed to prevent a program, delivered through a compliant cable or satellite receiver, from being re-broadcast over the Internet or shared Napster-like via the Net, in its current form, it won't stop a local TV station's digital broadcast form being pirated over the Net.

That's a major issue for everyone involved who want the DTCP technology to read hidden electronic "watermarks" that could prevent over-the-air broadcasts from being retransmitted over the Net. But that means a revision to the technology that will necessarily take time to implement.

Each studio will make decisions on how to mark content enabled by the 5C platform to allow unlimited tape-to-tape or one-copy copying, etc. It is my hope that, as the studios move forward to utilize DTCP, they ensure that Americans' normal and customary fair-use rights are preserved. DTCP is one of the technological means to honor artists' rights while delivering the promise of high-definition digital television to consumers.

D-Theater Licensing

In addition to developing D-VHS recorders that are compliant with JVC's new proprietary D-Theater copy-protection technology, JVC will be working with the hardware industry to promote the adoption of the new system into more consumer and professional D-VHS units. Prior to the HM-DH30000U, there were D-VHS recorders from JVC, Panasonic, Hitachi, and Mitsubishi that contained DTCP copy protection but did not incorporate the D-Theater encryption security feature.

Mitsubishi, which manufactures the only other D-VHS model currently for sale in the U.S., is not compliant with the new D-Theater security standard adopted by the studios. Thus, while the unit is capable of being networked and controlled through a menu on new Mitsubishi NetCommand™ integrated HDTV sets, and recording full, digital HDTV signals as well as analog signals, as per the D-VHS standard, none of the D-Theater prerecorded movie titles to be released by the studios supporting D-Theater will be playable on the Mitsubishi unit. This is because Mitsubishi chose not to license the necessary D-Theater encryption security system adopted by the studios. While my source told me that Mitsubishi was appraised of the pending Hollywood studio support, Mitsubishi decided to manufacture and market a less expensive D-VHS recorder (HAVi-Enabled D-VHS HDTV VCR model HS-HD2000U with a $999 MSRP) without the JVC D-Theater-licensed feature. While Mitsubishi's VCR performs all of the other standard D-VHS format functions and even features their proprietary HAVi—Home Audio Video interoperability—technology, which allows for sophisticated control via IEEE 1394 networks and 5C copy protection, Mitsubishi would have to introduce a new D-Theater compliant D-VHS machine to support D-Theater-encoded digital content. Thus, D-VHS content encoded with D-Theater can only be played back on a D-VHS player that is equipped with the D-Theater encryption security required by the studios!

In a statement for the product launch of the Model HS-HD2000U, Robert Perry, Mitsubishi Digital Electronics America's (MDEA) Vice President of Marketing said, "While many digital recording solutions have been offered to consumers, this is the first consumer component that presents a full 28.2 Mbps recording capability, which enables the recording of HDTV broadcasts from a digital connection—IEEE 1394. Unlike hard-disk-based products, our D-VHS can record from the DTV MPEG-2 format IEEE 1394 network source and keep that recording on a tape for archival and later viewing. And with the HAVi technology, it offers a superior interface capability over non-HAVi-based products."

Perry could not be reached, though repeated efforts were made, for reaction to the implications the studio-required D-Theater security platform will have on Mitsubishi D-VHS VCRs.

Renewed Sales Growth For VCRs

Commenting on the potential of D-VHS, News Corporation's Fox Filmed Entertainment (former) Chairman and CEO Bill Mechanic noted in Issue 40, "This promises to be the system for the content of yesterday, today, and tomorrow, allowing the 90 million VHS households in the U.S. alone (and more than 400 million homes worldwide) to continue to use their existing VHS libraries. Further, by offering content providers like Fox and the other studios virtually perfect copy protection, it should encourage more availability of HD content for home recording."

This is not a surprising statement by Mechanic given that rather quietly, VCR hardware sales have passed the 200 million mark in North America. Even before D-VHS, as a popular product that brought movies to the living room, the VCR is showing signs of renewed sales growth just as new DVD players add their impact to a consumer market that is establishing widescreen home theatre systems in the home.

In a report in *WSR* Issue 38, May 2000, Charles Van Horn, President of the International Recording Media Association (IRMA) said that there was a 93 percent VCR penetration of TV households in North America, with 53 percent of the homes now having multiple VCRs for use by the family. "The more important ownership number is now that of homes containing more than one VCR, just as television evolved into a multi-receiver environment in the home," said Van Horn. And in Issue 57, February 2002, Van Horn noted that 800 million VHS VCRs have been sold since 1977 worldwide, along with 10.7 billion programming tapes. "This $350 billion investment by consumers on a worldwide basis will surely help preserve the continued life of VHS videotape," said Van Horn. Adding, it is now obvious that VHS retains a formidable presence in consumer minds as shoppers find lower hardware prices and the broadest selection of prerecorded tapes. "Retailers who employ a strategy that puts emphasis on one particular product category may be missing out on the continuing strength of other products that have already achieved a strong product base," Van Horn said.

Potential For Mass Penetration?

With that as background, is it just possible that D-VHS, with full backward compatibility to every VHS standard, has the same potential for mass penetration with lower hardware prices and HD prerecorded tapes? I believe that the new D-VHS D-Theater platform will no doubt create a new resolve with manufacturers to swiftly standardize on an assured-security high-definition DVD format that can be supported by the Hollywood studios. It's about time, though much more time will pass before a HD-DVD standard is accepted. So let the competition intensify!

(As background, read in *WSR* Issues 11 through 30 about the turbulent launch of the DVD-Video format, the format wars between Toshiba/Warner's Super Density Digital Video Disc SD-DVD and Sony/Philips' MultiMedia CD MMCD, and the resolution of those wars to create a single DVD-Video standard.)

What about the healthy growth prospects for the emerging PVR or digital video recorder (DVR) market? I don't think the PVR/DVR can compete in the HD arena as the technology is now formulated. While the PVR/DVR offers personal television viewing on demand in combination with satellite TV service and bundled Internet applications, it is limited in its lack of removable storage.

The D-VHS format is a good solution to the demand for removable storage with immense data record capacity, as is the recordable DVD format. But today, the recordable DVD format is not HD-capable, with that feature not expected to become a reality for quite some time.

Currently, a proposal devised by Fox is being contemplated, in which a broadcaster can insert a flag into a particular program to indicate that it must not be "re-transmitted" (including recording onto removable media). But this sort of reasoning from the entertainment industry was unsuccessfully promoted during the "Universal vs. Sony" litigation over the original analog VCR. In that lawsuit, movie studios insisted that the VCR would devastate their industry, by enabling unbridled illegal copying. We all know that the VCR has served the entertainment industry fantastically well, proving to significantly enrich studio coffers with a new stream of revenue from "home video" sales and rentals.

DVI/HDCP Connectivity

Another new digital interface system for the D-VHS standard is DVI (Digital Visual Interface) with HDCP. DVI is fast becoming the preferred way to connect PCs to flat panel monitors. To adapt it for use with digital TVs and sources of digital content such

as D-VHS, the CE industry has added an encryption protocol known as HDCP (High-bandwidth Digital Content Protection), invented by Intel with contributions from Silicon Image (a major manufacturer of chipsets for the DVI interface). A DVI interface with HDCP will not show up until the next-generation JVC D-VHS D-Theater models.

The bandwidth of DVI/HDCP is high enough to handle high-definition signals without compression. The lack of compression facilitates the use of menu overlays and Graphic User Interfaces (GUI). This capability is utilized by a standard called HDMI (High-bandwidth Digital Multimedia Interface). HDMI is fully compatible with DVI protocols but adds command and control capabilities to devices with DVI interfaces. Thus, HDMI can provide on-screen graphic control of device functions such as D-VHS or DVD transport operation, or HDTV set-top box tuner channel selection.

DVI CE is yet another and latest implementation of DVI. This is an extension to the DVI standard, created by three companies: Genesis Microchip, Broadcom, and Texas Instruments. The standard specifies smaller, consumer-grade connectors and adds the ability to transfer audio over the DVI/HDCP interface as well as high-definition video. It also includes a provision for conversion from DVI's traditional RGB color space to the YCbCr (component) used to transmit video between consumer devices. (YCbCr is the digital version of YPbPr.) Genesis Microchip, Broadcom, and Texas Instruments are all expected to introduce chipsets compliant with the DVI CE standard. Silicon Image favors a different method for transferring audio over the DVI interface and has already introduced a chipset to support their scheme, which they call PanelLink A/V®, although the company has yet to bring this to the market.

At this point, it is uncertain to what extent HDMI, DVI CE, or PanelLink A/V, or what interface will be included in implementations of DVI/HDCP in consumer products.

JVC will have three HDTV displays in the market by spring, including the first D'Ahlia RPTV, a direct view 36-inch set and another 48-inch RPTV, incorporating DVI/HDCP inputs but without a digital tuner/decoder. Philips and Thomson also have announced plans to include DVI/HDCP interfaces in their display devices to be sold in 2002. There is no doubt that DVI/HDCP copy-protected digital interfaces will soon become a standard feature on HDTV set-top boxes, D-VHS VCRs, DVD recorders/players, and scalers.

Silicon Image, an Intel licensee, was the first to demonstrate HDCP technology in February 2000 when Intel introduced the HDCP specification for DVI. The Intel system offers protection for uncompressed digital signals (baseband signal) over DVI. The HDCP copy protection standard is regarded by most experts as more robust than the Content Scrambling System (CSS) used for DVD. CSS has been hacked and studios are working on a more rigorous standard for DVD as a countermeasure. (See "From The Editor's Couch" in Issue 47, April 2001, for a story on "DVI/HDCP Proclaimed The Interface For HDTV.")

Steve Tirado, Chief Operating Officer for Silicon Image. said at the January 2001 CES, "HDTV represents the next revolution in home entertainment, and DVI with HDCP is the logical choice for the last critical connection between digital hosts, such as D-VHS players and set-top boxes, and digital TVs. We are thrilled to see so many examples of consumer electronics products featuring DVI with HDCP at CES. Once consumers see premium high-definition content on a HDTV and experience its unparalleled visual quality, we don't think they will want to go back to the status quo. In order for HDTV adoption to really take off, the industry needs to rally around a new standard. Key players at all levels of the HDTV supply chain, including consumer electronics manufacturers, satellite broadcasters, and Hollywood studios, have already endorsed DVI with HDCP, bringing us all a step closer to more widespread proliferation of HDTV."

(See Contributing Editor Alen Koebel's article in *WSR* Issue 47, entitled "Digital Video Interfaces And Consumer Displays," for further insight into the issues associated with digital video interfaces.)

At the time of Silicon Image's announcement and preview of JVC's D-VHS HM-DH30000U, along with prototype digital set-top boxes from EchoStar, Scientific Atlanta, and Samsung, Andrew Setos, Executive Vice President of the Fox News Technology Group said, "The entire 20th Century Fox library of motion pictures and our future productions released in digital, high-resolution formats will represent a whole new viewing experience on widescreen digital TVs. Up until now, few motion pictures have been available in consumers' homes in this high-quality form. We look forward to making our motion pictures widely available using new consumer electronics devices such as D-VHS and digital set-top boxes, as these products begin to embrace DVI output connections that only transmit HDCP content to displays for an all-digital, high-resolution experience."

Until the advent of HDCP for DVI, studios have been reluctant to release their premium digital content for fear of unauthorized reproduction and distribution of perfect digital copies. By encrypting premium HD video between digital consumer electronics host and display devices, DVI with HDCP provides an effective defense against piracy, while providing the home viewer with the highest quality visual experience. As previously reported, we should see widespread adoption of DVI/HDCP digital interfaces in manufacturers products during 2002, with universal support furthered in 2003.

According to Silicon Image, DVI is the only digital interface with enough bandwidth to accommodate uncompressed high-definition digital video. Lower bandwidth alternatives must transfer compressed video to a display, which will require additional components—including an MPEG decoder in the TV. DVI has the bandwidth to address each pixel in a TV display individually—enabling the highest possible picture quality. The company says this is achieved without concern that the internal electronics will be made obsolete by changing interface or compression technologies. Furthermore, HDCP, which has been endorsed by Twentieth Century Fox, Universal, Warner Bros., and Buena Vista (Disney), has only been available over Silicon Image's DVI PanelLink A/V, which is touted as the leading DVI implementation.

A single DVI "link" consists of three pairs of differential, low-voltage digital signals—one each for red, green, and blue components—plus a fourth pair for transmitting a pixel clock. The data for each RGB component, at eight bits per component color for each pixel, is transmitted as a serial bit stream. The maximum data transfer rate for a single 24-bit RGB DVI link is 4.95 Gbps. This allows a single link to easily handle all ATSC HDTV formats uncompressed, as well as computer formats as high as UXGA (1600 x 1200) at 60 Hz refresh. The DVI connector supports up to two links (sharing

DVI/HDCP Link Connector

the same clock), giving a total data rate of nearly 10 Gbps. This will comfortably handle pixel formats as high as QXGA (2048 x 1536). DVI also includes a low-speed, bi-directional communication link to allow the video source or PC to talk to the display.

The JVC D-VHS HM-DH30000U does not incorporate DVI with HDCP, but JVC officials at the press conference held on January 30 said that the next generation or the one after may do so.

Kazuo Kohda, General Manager of Digital Strategy, JVC AV & Multimedia Company, noted, "JVC is planning to adopt DVI with HDCP as an output connection for prerecorded D-VHS content in the future. We believe that high-definition uncompressed digital signals are essential to providing the highest quality home viewing experience for consumers. DVI/HDCP is the only practical, secure solution today for those uncompressed digital connections and will be essential when transmitting high-value, high-definition content. Likewise, we will aggressively pursue the adoption of DVI/HDCP inputs on all future high-definition displays."

What is known for a fact is that D-Theater movies will continue to output HD images all the way into the future with the HM-DH30000U. What is not known, is whether the movie studios will turn on copy protection that forces the players to down-convert the analog output to 480i when DVI is incorporated in future units. The studios' strategy still needs to be clarified. The critical question is: Will the studios support full resolution analog HDTV outputs for their commercially released D-Theater videotapes?

Universal Pictures Technology's Pierce said, "High-definition movies will offer consumers the ultimate in a home theatre experience. DVI ensures the highest quality image in a home system. HDCP provides a secure environment that offers content providers the necessary protection for the HD format. Systems that require HDCP can expect the highest quality content in the future."

The "D" In D-VHS

In *WSR* Issue 29, November/December 1998, I asked the question, "Will DVD Interests Support D-VHS?" in the "From The Editor's Couch" section. At that time, the "D" in D-VHS officially stood for "data," not "digital." Nevertheless, most people were calling it digital, and indeed first generation D-VHS and D-VHS HD recorders (as they were referred to) did, in fact, record and playback digital bit streams, as do the current-generation D-VHS recorders.[2] As such, D-VHS is a method of recording digitally processed or compressed signals on magnetic tape, directly as digital data, and outputting them in the same state as they were input. The first-generation D-VHS recorders, such as the Panasonic PV-HD1000 used in *WSR*'s reference systems (see review in Issue 34, September/October 1999), were strictly bit stream "data" units that did not incorporate functions such as digital-to-analog (D/A) conversion, or digital compression/decompression and descrambling (internal MPEG-2 decoding). Those functions were incorporated in the source components, whether digital TV receivers, set-top boxes (such as the Panasonic TU-DST51, also used in *WSR*'s reference systems), or DVD players. The Panasonic set-top box implementation provided over-the-air broadcast HDTV decoding and MPEG-2 decoding for D-VHS via a proprietary IEEE 1394-like interface between the PV-HD1000 and the TU-DST50 and TU-DST51 set-top boxes. Other first generation D-VHS SD VCRs, which featured integrated, built-in recording components, were available from EchoStar and JVC, and in the form of Digital Satellite System (DSS) receivers manufactured by Hitachi. In such units, the D-VHS portion records and plays the compressed MPEG-2 bit stream provided by the IRD (Integrated Receiver Descrambler), allowing digital satellite customers to time-shift digital broadcasts with original quality.

The new generation D-VHS recorders have a built-in MPEG-2 codec and analog-to-digital conversion for analog SD content processing, and are equipped with i.Link IEEE 1394 ports. They can output analog signals as well as bit streams to digital receivers and set-top digital TV converter boxes with the proper interface.

2 For background insight into setting standards for digital video recorders, in *WSR* Issue 9, June/July 1994, HDTV Technical Editor, Dale Cripps, reported that at its second general meeting, held on April 14 in Tokyo, the HD Digital VCR Conference announced agreement on "Consumer-use Digital VCR Specifications." These covered compressed baseband recording of both conventional standard-definition (SD) and high-definition (HD) television signals.

The HD Digital VCR Conference—established in September 1993 to determine technical specifications for consumer-use high-definition digital VCRs—is open to industry participation and was then made up of 50 companies from around the world. The conference was divided into four working groups, each responsible for a particular aspect of the specifications: 1) SD Compatibility; 2) HD Baseband; 3) Advanced Television (ATV); and 4) Editorial.

The specifications agreed upon were based on the "SD" and "HD" specifications developed separately by the SD Compatibility Working Group and the HD Baseband Working Group. They were then prepared by the Editorial Working Group for submission to the International Electronics Commission (IEC) by the end of 1994 in an attempt to have them accepted as an international standard.

The ATV Working Group has since been studying methods of recording compressed signals of the ATSC HDTV system, specifications for which were expected to be finalized by the end of 1994.

The first implementation of the standards was to be a digital VCR camcorder that used compact one-quarter-inch tape. Besides a standard cassette with an incredible four and one-half hours of continuous record and play, an even smaller one was included in the standard that plays one hour. This was for the palmcorders and other smaller applications. The VCR was to record the ATSC compressed signal or digitized NTSC and play back through a HDTV MPEG decoder or NTSC digital decoder to produce virtually noise-free pictures of brilliant color and sharpness, both in the 4:3 (1.33:1) and widescreen 16:9 (1.78:1) aspect ratio formats.

The sound format was the 16-bit, 48 kHz DAT digital standard, with EIAJ optical digital-out configured into the standard AES-EBU format, which would allow use of an audiophile-quality six-channel discrete codec utilizing the full 1.5+ megabit per second data rate of the digital tracks.

The specifications can be found in *WSR* Issue 9 on the www.WidescreenReview.com Web site.

While the consumer-use digital VCR specifications are not D-VHS, one can appreciate the momentum that has been in progress since 1993 to develop a viable consumer HD Digital Video recorder. The momentum has been thwarted by the lack of copy protection agreements on the part of the primary, and most important, content providers. The actual JVC-developed D-VHS format is a first cousin to this original format proposal, and JVC's approach was to create a backward compatible version which would permit the playing of one's existing VHS videotape library, as well as providing high-definition recording for the future.

Will D-VHS Thwart HD-DVD?

Obviously, since the initial announcement of the D-VHS format, first reported in *Widescreen Review* in 1995, JVC has had an interest in developing prerecorded software for D-VHS, but at the time the question was, would Hollywood support the format as they have successfully with analog VHS (and DVD)? This issue has become one of great significance because the D-VHS format offers what recordable DVD does not—true high-definition recordability. Then, too, there are three DVD Forum-approved, but incompatible, recordable DVD formats (see "From The Editor's Couch" in Issue 56, January 2002), and one worldwide D-VHS recordable high-definition format. A worry perplexing supporters of the DVD platform is that the launch of the new D-VHS D-Theater HD prerecorded format could steal thunder from the optical disc-based digital recording formats, trying to gain a foothold before "true" high-definition recordable DVD systems arrive. But persistent recordable DVD format incompatibility is, itself, a deterrent to success.

As for HD-DVD, there are serious obsta-

cles ahead before a standard can be set. With so many company R&D departments developing proprietary blue laser technologies necessary for HD-DVD implementation, each with their own patented invention and application, there looms the time-consuming battle for a single blue laser standard. But what if the ensuing battle doesn't end up with a single standard and the result is, as with recordable DVD, more than one incompatible format? That would spell disaster for consumer confidence and acceptance. Consumers are already frustrated by the format wars that have thus far plagued recordable DVD.

There is promising news, however. On Tuesday, February 19, nine leading companies announced that they have jointly established the basic specifications for a next-generation large capacity optical disc video recording format called "Blu-ray Disc." The Blu-ray Disc enables the recording, rewriting, and playback of up to 27 GB of data on a single sided, single layer 12cm CD/DVD size disc cartridge using a 405nm blue-violet laser at a maximum data transfer rate of 36 Mbps. The Blu-ray Disc format is said to achieve over two hours of digital high-definition video recording. The companies that established the basic specifications for the Blu-ray Disc are: Hitachi Ltd., LG Electronics Inc., Matsushita Electric Industrial Co., Ltd., Pioneer Corporation, Royal Philips Electronics, Samsung Electronics Co. Ltd., Sharp Corporation, Sony Corporation, and Thomson Multimedia. The companies are also aiming to further enhance the appeal of the new format through developing a larger capacity, such as over 30 GB on a single-sided single layer disc and over 50 GB on a single-sided, double layer disc.

The nine companies involved in the announcement say that they will respectively develop products that take full advantage of Blu-ray Disc's large capacity and high-speed data transfer rate. In addition to actively promoting the new format throughout the Industry, the nine companies plan to begin licensing the new format as soon as specifications are completed. Licensing is expected to start around spring 2002.

In past *WSR* issues, we have reported on similar developments and consortiums of companies supporting particular "blue laser" technologies and applications. While Blu-ray sounds promising, readers should understand that this is still in experimental stages. If we look at the historical perspective, new technologies often take years from the time they are announced to the time they become a market reality. VDI/HDCP was announced over a year ago, and there is yet to be a standard set or products implemented with the digital interface. Time will tell whether a single standard can be adopted, which would further speed the launch of HD-DVD—the sooner the better.

Then, too, there is the further complication presented with a HD "disc" technology that a personal computer can "read." That will require a level of encryption security that further complicates matters. Such requires time to develop, prototype, and implement. Even if the industry does succeed in standardizing on a single solution, the development of single-standard HD-DVD commercial player models aren't likely to be ready for at least three to five years or more.

While Pioneer Corporation is one of the developers of the Blu-ray Disc format, a Pioneer Electronics representative agreed with my assessment, saying that HD-DVD is three to five years away. At the January 2002 International CES, Pioneer showed the first functional HD-DVD player.

So now that D-Theater is here, this added incentive of competition from D-VHS just might speed up HD-DVD's arrival (and that is an event I completely welcome).

It will be interesting to see, with some companies adamant about no plans for D-VHS D-Theater movies or players, if they will be able to hold off until a high-definition version of DVD is perfected and standardized for market. It will also be interesting to see, as the D-Theater launch fills out during 2002, just how aggressively the signed-on studios will support both D-VHS and DVD simultaneously.

"You have consumers today who would love to have a high-definition alternative, and we have nothing to offer them," said Universal Studios Home Video's Kornblau. "High-definition DVD isn't going to be here for several years, but with D-VHS, we can offer those consumers a high-definition alternative."

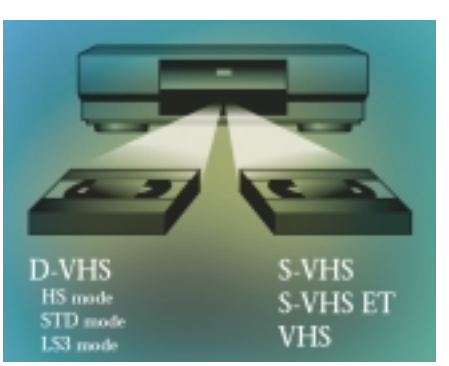
While JVC has been successful in garnering thus far the official support of four major Hollywood studios, with previously reported Paramount interested (which has shown a willingness in the past to license its movies for use on new home playback formats), there still remains Warner Bros. and Columbia TriStar, as well as MGM, New Line, and Buena Vista. Warner Bros. is the strongest studio supporter of DVD, and is adamantly opposed to the introduction of a second digital prerecorded format at this time, fearing that it could disrupt the DVD market. While less stringent in its views than Warner Bros., Columbia TriStar is also skeptical of D-VHS. With such major studios not wanting to direct attention to a tape-based digital recording format that could derail DVD, this could turn out to be a stumbling block to the success of prerecorded D-VHS D-Theater content. Eventually, JVC will need both Warner Bros'. and Columbia TriStar's, as well as MGM's, New Line's, and Buena Vista's support to launch D-VHS D-Theater with the same level of success as occurred with DVD's launch and subsequent market growth. This central issue is certain to escalate and will ultimately determine the success of D-VHS as a prerecorded HD format.

In *WSR* Issue 46, March 2001, Columbia TriStar Home Entertainment President Ben Feingold said, "I think the lateral compatibility of DVD with DVD-ROM, laptop computers, and PlayStation® [as well as Xbox®] make it clearly a preferable format to any tape-based product."

But the biggest threat D-VHS poses to DVD's market dominance undeniably stems from the fact that it's a high-definition format, fully compatible with the U.S. HDTV standard. DVD is based on the current NTSC resolution standards for U.S. TVs and cannot deliver HDTV picture resolution, nor be compatible with HDTV receivers capable of true 720p, 1080i, or 1080p resolution.

If HDTV takes off, and the prospects for such are brighter today with the launch of the new D-VHS D-Theater prerecorded HD platform, D-VHS could establish itself as the prerecorded format of choice for the high-definition era. In its favor is that D-VHS recorders play and record standard VHS, S-VHS, and S-VHS ET, thus offering a logical replacement to those families seeking to replace their old VHS recorders and protect their VHS library investment. As an extension of the existing VHS format, D-VHS is fully compatible with tapes recorded on the older machines—of which there are 90 million alone in the U.S.

Industry veterans will concede that as long as software suppliers don't have to sell retailers on another inventory item, the prospects for supporting the new D-VHS D-Theater platform are very good. In such a scenario, two digital formats, DVD and D-VHS, would compete for consumer acceptance. But there remains the cost issue as tape duplication will always cost more than optical disc duplication, and that premium



in price will necessarily have to be reflected in the price of the software at retail. And while the format can support an integrated standard VHS and high-definition D-Theater version on the same prerecorded videotape, with the price of prerecorded HD D-VHS D-Theater at $30 to $40 a movie, no one is going to pay that to watch the VHS version. So a single inventory only makes sense if the price is driven down to the lowest common denominator, which won't happen with low-volume demand and higher costs associated with creating the HD version. Thus, an integrated VHS/HD D-VHS release (for which there are no plans) will always cost more than the same HD-DVD release. But we are several years ahead of ourselves, because there is no HD-DVD platform today.

At the press conference, I asked what impact DreamWorks thinks D-VHS will have on DVD's future? Weetman responded, "Well clearly, the big impact on DVD's future will be to get much better protection and security on high-definition DVDs. In terms of sales impact, I don't think there will be one because we are embracing different markets—the two million hi-def homes want to view the movies. And you know what? They may buy them both, one to view the movie and the DVD for the extras."

Limited HDTV Broadcasts

As everyone who owns a HDTV display knows, the amount of programming produced and aired in true HDTV format is extremely limited, when originated from DSS satellite or over-the-air. Yet to date, that has been the only sources for true high-definition programming. Increasingly, executives at networks say they don't see a reason to increase the amount of programming produced and aired in true HDTV format, especially since fewer than one percent of American households own a digital television (about two million HDTVs). Many executives are content to cheat by upconverting NTSC-produced programming (e.g., 480p) and letting air as supposed HDTV. This is true for HBO-HD and Showtime-HD as well. They argue, "Why spend the money to produce true HDTV when there is nothing to suggest real interest in HDTV, not even reaction, on the part of the public."

Outside of limited sporting events in high-definition, the consciousness has not been raised when it comes to normal prime-time programming in HDTV, say broadcasters. As broadcasters have lowered their expectations, what was previously broadcast in true high-definition is now being broadcast in NTSC 480p standard-definition, or what the Fox Network has dubbed "Fox Widescreen," first used for the 2002 Super Bowl broadcast. Broadcasters and set manufacturers are waiting to see if any real buzz surrounds the changeover to HDTV. Hopefully, the Winter Olympics coverage, which has been super on HD-Net/NBC (though poorly publicized) will help to reinforce broadcast HDTV.

A Complementary Platform To DVD

Remember that it is going to take quite awhile to get to HD-DVD. The marketplace is now two million households owning HDTV displays—the high-end customer is the initial market for D-VHS, not the average home entertainment consumer. These home theatre enthusiasts, who have heavily invested in HDTV displays, want HD movies, and D-VHS makes that possible today. D-VHS D-Theater is a means for HDTV display owners to record HD signals off-air (when there are compatible set-top boxes), and to play prerecorded movies as well. The fact there has been no prerecorded HD movies has been a stumbling block for HDTV.

Supporters of the D-VHS format believe it is logical to expect from this small, but decent base of HDTV households, that the cry for "I want my HDTV" will gain momentum, and along with that, D-VHS will achieve a foothold in the marketplace—even if that means ahead of HD-DVD. But the studios supporting D-VHS proclaimed unanimous agreement that they do not intend to undermine the existing DVD market.

At the press conference, 20th Century Fox's Staddon said, "This is a complementary platform to DVD aimed at customers who have access to high-definition satellite feeds and over-the-air high-definition broadcasts. They want to time-shift. Once they have gotten used to seeing 1080i broadcasts and the quality of high-definition on their HDTVs, they will want to see that quality in the movies as well."

Staddon continued, "The future of home entertainment is in the high-definition environment, so if someone has a HDTV system and high-definition broadcast access, along with a high-definition D-VHS player they are always going to be using that platform."

Full-Spec HD Progressive Resolution

The D-VHS player is fully compatible with standard VHS-sized cassettes, both for recording and playback of standard VHS, S-VHS, and S-VHS ET. (There is even a provision for VHF, UHF, and CATV channel reception.)

The D-VHS mechanism is essentially the same as that of VHS video. A 62mm diameter drum rotates at 1800 rpm. The difference is in the heads. For D-VHS, heads with a narrower head gap for digital recording are used. And since the recording track width is changed, the tape speed is also changed accordingly.

The recording track width is 29 microns, which is half the 58 microns used for VHS SP mode. The tape speed differs depending on the recording mode.

Head azimuth is 30 degrees, which is the same as the Hi-Fi VHS audio head. For this reason, shared use with the analog Hi-Fi VHS audio recording head is made possible. The standard STD mode uses two heads, while four heads are required for HS mode, and three heads for one of the LS modes.

Both 720-line progressive (720p) and 1080-line interlace (1080i), as well as 1080-line progressive (1080p), 480p and 480i, are supported, though the current JVC HM-DH30000U has no 1080p output capability—you only get 720p or 1080i HD output. The ATSC standard defines 720p (SMPTE 296M 1280 x 720), 1080i (SMPTE 274M 1920 x 1080) and 1080p 24 frames per second (fps) as HD formats.

The 720p format has been recognized by some engineers as equal or superior to 1080i because it progressively scans more video lines in each 1/60 of a second interval, and thus has fewer motion artifacts and more vertical resolution on fast moving images. But other engineers (including *WSR*'s Video Technical Editor, Greg Rogers) believe the best format depends on the type of the programming. The 720p format has less than half the spatial resolution of 1080i. While 720p has advantages for images with fast movement, such as sports, the higher spatial resolution of 1080i produces more detailed images in other programming, including many movies. Of course, the ultimate goal of HDTV is 1080p resolution, but that is not implemented on the JVC HM-DH30000U.

I asked Greg Rogers to comment on the issue of 1080p video outputs. "SMPTE 274M, which defines the 1080i video format, also defines rarely used YPbPr and RGB analog interfaces for 1080p 60 fps (frame-per-second) video. But only a few front projectors, and a handful of ultra-expensive rear projectors based on multi-scan front-projection technology, will accept and properly display 1080p analog signals. Only a few scalers, including our reference Faroudja DVP-5000, produce 1080p.

"D-VHS recorders and set-top boxes that advertise full compatibility with all 18 ATSC standards must be designed to decode 1080p 24 fps digital video from tape or broadcast sources. But a HDTV would pro-

duce massive flicker if it displayed video at a native 24 fps progressive rate, so these products currently convert that source format to 1080i. They could also convert it to 1080p 60 fps, but none do because it would add significant cost (they would also have to convert 1080i sources to 1080p to consistently provide a 1080p output) and there are so few displays that can use 1080p. There is little incentive for TV manufactures to add costly 1080p display capabilities to CRT-based HDTVs. Fixed-pixel DLP and LCD technology will replace CRTs in rear-projection HDTVs, and DVI digital interfaces will become standard. So analog 1080p outputs may never become common."

The JVC authoring system currently encodes 1080p 24 fps masters in the 1080i format, but the D-Theater platform supports 1080p 24 fps encoding so that format can be used in the future. A JVC representative told me that the HM-DH30000U has been designed to decode 1080 24p sources and would convert it to 1080i. JVC has wisely created a format with flexibility and adaptability, just as VHS was capable of accommodating extending recording times, higher audio quality and improved picture quality while keeping compatibility with initial VHS in the SP mode intact.

At *WSR* we have supported both 720p and 1080i, but have preferred 720p to identically-produced 1080i DTV program material displayed in a real living room environment, on large screens, and high-resolution displays that tend to show interlaced lines and motion artifacts. All four of the studios who have announced support for the D-VHS format with the latest D-Theater security encryption system have officially opted to initially release their prerecorded movies in 1080i, but reserve the possibility of 720p and ultimately 1080p 24 fps releases. As for supporting native 1080p 24 fps, the studios are awaiting the resolution of issues with encoders and the finalization of JVC's encoding system for 1080p mastering. As soon as this becomes functional, D-Theater titles, say studio representatives, will be released in 1080p! But, as previously discussed, don't expect a quick leap in this direction before there are displays on the market which can accommodate a 1080 24p signal.

One other aspect that will please *WSR* readers is that all the studios have pledged a commitment to preserving original theatrical aspect ratios on all their D-VHS D-Theater releases.

Twentieth Century Fox's Staddon said, "The transfers are taken from the 1080p 24 fps masters that are within our film vault. We will look to see if we need to do any work to them to clean them up or improve them more, or re-transfer them for the D-VHS market."

Universal Picture Technology's Pierce said, "We are using the 1080p 24 fps studio master, which is the best quality we have. We are analyzing the masters to make sure they are of the highest quality we have for these new D-VHS D-Theater releases."

Pierce commented further, saying, "Everything Universal does on the D-VHS format will be mastered in 1080i. Everything we have in our film vault is 1080p 24 fps. We may change and offer 720p at some future time, but we have no plans to do so today. But as soon as we can release in 1080p 24 fps (the highest quality ATSC HD format), that's what we will deliver on D-VHS. With the exception of *U-571*, Universal has not announced its initial slate of D-Theater titles. This is the only way to get high-definition in the home. It is absolutely fabulous."

In recent years, digital mastering equipment has become more prominent and is now virtually used universally by the studios to produce a single master for standard-definition NTSC (480i) and high-definition (720p, 1080i, and 1080p) while working in the native frame rate of film at 24 fps. The 1080-line progressive 24 fps format has enabled the studios to create one economical master for HD deliveries, while preventing editing problems when 3:2 pulldown is introduced.

This new mastering system, which is called "24p," records 1920 x 1080 images at 24 fps, and can be used to deliver dub masters of any programming in NTSC standard-definition formats or any one of the 18 ATSC-recognized digital formats, including HDTV, without requiring re-transferring the cut negative of a program, reconstructing the program, or re-transferring the film. The D-VHS format is fully capable of encoding and recording 1920 x 1080 images at 24 fps progressive. (See "From The Editor's Couch" in Issue 32, May/June 1999.)

Single-Inventory And Regional Coding?

While D-VHS technology can be worked so that any prerecorded D-VHS cassette can contain both an analog VHS and D-Theater digital version of a movie to prevent duplication of inventory, the economics would prohibit dual (SD/HD) recordings. I'll reserve this lengthy and potentially confusing subject for perhaps another article. (For a primer on a proposal by former Technical Video Editor Joe Kane and *WSR*'s DVD Zealot Jim Taylor for single-inventory 720p HD-DVD, see *WSR* Issues 33, 34 and, 35.)

While the D-VHS format supports regional coding, none of the four studio proponents have officially said that they would region-encode their D-Theater prerecorded titles. Not surprisingly, DVD regional coding has been ignored on a grand scale internationally. The England-based Understanding and Solutions reported in 2000 to the 30th Annual Recording Media Forum that more than two-thirds of DVD-Video players in Europe have been modified to play discs from any region, and demand for Region 1 (North America) DVDs is huge.

Nevertheless, the JVC HM-DH30000U VCR we reviewed and are using in *WSR*'s Reference Holosonic™ Home Theatre Laboratory displays a "D Theater Region 1" sticker on the back panel. As previously stated, JVC said no plans exist to introduce the platform outside of North America at this time. When JVC does do so, the ability to region-protect D-VHS VCRs and prerecorded content is obviously there.

DOLBY DIGITAL

DIGITAL dts SURROUND

Full-Spec Dolby® Digital And DTS® Digital Surround™

The JVC D-VHS HM-DH30000U will support S/PDIF digital audio output via optical Toslink® connectors both for "throughput" of 5.1 Dolby Digital and DTS Digital Surround bit streams. At present, JVC is not ready to encode the DTS bit stream on the initial title releases, but eventually it will be possible as soon as they complete work on their DTS encoder. There is a caveat—the JVC HM-DH30000U will have to be returned to the manufacturer for a software upgrade (perhaps at some cost to the consumer like computer upgrades). The player will support DTS 1509 (DVD standard full-spec) kilobits per second (kbps) playback at 96 kHz/24-bit (96/24) resolution if the DTS bit stream is encoded on the tape. In actual fact, due to the massive data storage capacity of the D-VHS format, significantly higher bit rates for DTS can be supported. Twentieth Century Fox's Staddon said at the JVC press conference, "Some of the releases from Fox will have a DTS soundtrack." The other studios confirmed as well that they intend to release in DTS 96 kHz/24-bit high-resolution surround sound when the encoding is available.

DTS was the first to develop 96/24 technology for 5.1-channel surround sound while still allowing for full-motion video on a DVD-Video disc. As with DVD, the DTS 96/24 technology raises the bar on high-resolution audio for D-VHS D-Theater high-definition motion picture releases by delivering greater bit depths, which provides extended dynam-

ic range and higher sampling rates. This allows for wider frequency response and provides the listener with a more refined audio performance than they have ever experienced before when viewing motion pictures. Already, consumer electronics manufacturers of receivers and processors are quickly adopting DTS 96/24 as the new codec standard for high-resolution audio. The DTS 96/24 soundtrack on D-VHS D-Theater releases when available, as on DVD-Video or DVD-Audio releases, will be fully backward-compatible with all existing DTS decoders. And DTS 96/24 is supported as well with DTS-ES®, a 6.1-channel surround sound technology available in discrete and matrix modes.

While the JVC executives at the press conference were enthusiastic about the HM-DH30000U's DTS capability, this feature is hardware specific, and future D-VHS players from other manufacturers may not provide DTS support, even though studio D-Theater releases provide for a DTS soundtrack option. (That was the scenario with first generation DVD-Video players, but virtually all second generation and later DVD-Video players provide "DTS Out" throughput.)

The D-VHS format uniquely supports the full-spec 640 kbps Dolby Digital bit rate (though the initial titles reviewed by *WSR* were encoded at 576 kbps). This rate is significantly higher than DVD's maximum 448 kbps. The DVD format limits the bit rate to 448 kbps due to buffer limitations.

Universal Pictures Technology's Pierce said at the press conference, "One of the reasons there will always be a Dolby Digital track on D-VHS releases is because we have to be 5C compliant in that HDTV sets designed for 5C viewing have to have Dolby Digital support. But I am very enthused about the prospects for DTS 96/24 on D-VHS."

Impossibility Of Interactivity

In addition to supporting standard two-channel linear PCM audio output along with 640 kbps Dolby Digital and 96/24 1509-plus kbps DTS Digital Surround, the D-VHS platform will support other sound formats, which are under consideration. According to the JVC representatives at the press conference, there is so much data storage capacity associated with D-VHS that there is virtually no limit to the number of audio tracks the format will support (or the resolution quality). The capacity is there to have a number of audio tracks to support commentary, foreign languages, and chapter search capability, but branching and the other types of features common to DVD aren't supported.

In the end, D-VHS D-Theater is all about experiencing a motion picture in pristine high-definition picture and high-resolution audio linear playback (without those annoying layer change dropouts inherent in DVD playback). The platform is geared toward the serious, high-end home theatre enthusiast with a movie collector's interest. At least initially, enthusiasts should not look for extras other than the film itself, and perhaps filmmaker commentary. This is the aim—showcase the movie, not the extras (though supplemental extras such as featurettes, deleted scenes, etc are certainly possible).

Perhaps ultimately, the Achilles heel of the D-VHS D-Theater platform will be the impossibility of interactivity as with DVD (unless, of course, these obstacles are overcome by, say, a combination of a D-VHS unit and a hard disk drive). There is also the aspect of compactness, convenience, and accessibility on top of interactivity that DVD provides. DVD is also more durable than a tape-based format. Those who have experience with both mediums will attest to tapes being far more susceptible to, if not reckless handling, machine damage. Still, with such negatives said, this is the moment for home theatre enthusiasts to embrace because D-VHS with D-Theater is the only HD record and prerecorded playback platform out there.

Incredible 28.2 Mbps Data Rate

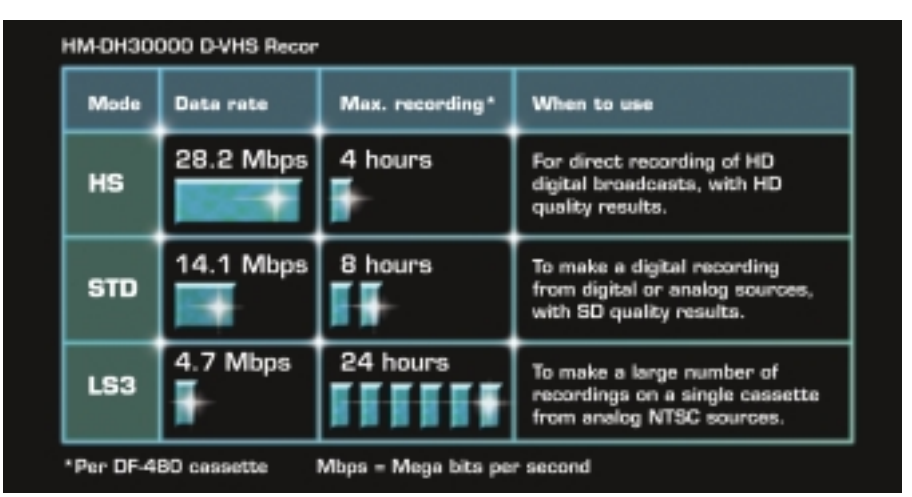
D-VHS machines record bit stream data using a one-half-inch-wide S-VHS ferric oxide tape in a D-VHS-branded plastic shell cassette, the same familiar size as the standard VHS cassette but with a 50 GB capacity (DF-480 cassette). Ferric-oxide magnetic particles have a proven track record and cost advantages. Ferric-oxide magnetic particles have already proven their reliability through VHS and S-VHS, and basically the same S-VHS manufacturing facilities can be used for D-VHS. Since the mass production facilities of tape manufacturers can be used without retooling, large-scale distribution can be done at reasonable cost.

The branding of D-Theater will differentiate from standard VHS with a clear message as to how to play the D-Theater cassette. On the cassette, there is a D-VHS logo which signifies the quality level required for D-VHS guaranteed performance. A D-VHS cassette also has the ID holes on the bottom of the cassette. These ID holes are used for the purpose of cassette discrimination by D-VHS recorders.

The HDTV digital broadcast bit stream recording/playback time is four hours (a 23 Mbps digital HD broadcast sent along with 5 Mbps data in a sub carrier), in the D-VHS HS (high speed data rate) mode (an incredible 28.2 Mbps—surpassing the 19.3 Mbps ATSC standard for over-the-air HDTV broadcasts), eight hours in the STD mode (14.1 Mbps), and 24 hours in the LS3 mode (4.7 Mbps). The LS mode includes the LS2, LS3, LS5, and LS7 sub modes. So, if the signal is 2 Mbps (level equivalent to Video CD), then 56 hours of extended-time recording will be possible per cassette! (Not all modes are incorporated and the modes available will be model specific.)

Although D-VHS can be used as a standalone digital VCR, when it is combined with DVD-RAM its broader potential can be realized as a household digital recorder that can be used as a home server that offers both the huge-capacity characteristics of tape and the fast-access characteristics of disc.

The STD mode can be used to record SD sources such as 480p and 480i ATSC broadcasts. And with the built-in MPEG-2 encoder, digital recordings from analog NTSC sources can be made in HS (recorded signal will be 480i), STD, or LS3 modes.



High-definition digital sources recorded at 28.2 Mbps (HS mode) maintain all the quality of the original, even studio masters with 1080p resolution.

Since the launch of HDTV is still in its early stages, it is difficult to imagine that potential users will have the optimum equipment pre-installed by the time they purchase a D-VHS D-Theater-featured VCR such as the JVC HM-DH30000U. That is why D-VHS models offer flexible playback picture format conversion capabilities. So for instance, even if you recorded at the highest quality 1080i (or 1080p) in anticipation of a future HDTV upgrade, you can play back and view on the 480i NTSC TV you have now. Or, if you record in 720p, you will be able to view the playback picture on native 720p, or 1080i, HDTVs as well as current 480i NTSC TVs.

Selectable Output Format

The JVC HM-DH30000U's output format is selectable to match your home theatre display device capability and maintains that selectability with display upgrades.

Recorded Format	Selectable Playback Output
1080p	1080i / 720p / 480i
1080i	1080i / 480i
720p	1080i / 720p / 480i
480p	480p / 480i
480i	480i

No Denying D-VHS' Superior Performance

While I would prefer to see HD get started as a DVD format, where quality standards could be set higher than anything we would expect from broadcasters or DSS sources, I plan to support D-VHS. This new tape-based platform not only adheres to such quality standards but is the first consumer format that truly matches the pristine picture resolution and color fidelity of studio HD masters, whether 720p, 1080i, or 1080p! There is just no denying the superiority of HD D-VHS over DVD. Yet, no self-respecting home theatre enthusiast reading this won't ponder the question, as I did—why videotape? It comes down to the D-VHS team doing a better job at encryption security. The DVD Forum and others, such as the DVD Entertainment Group, simply have not been able to overcome the copy protection issues surrounding HD-DVD, nor agree, until now, on the "blue laser" technology necessary to further compact the data bits on a DVD-sized disc to hold sufficient HD content. (For additional commentary, please see "Bringing DTV Home" in Issue 38, May 2000 for a discussion of DTV issues.)

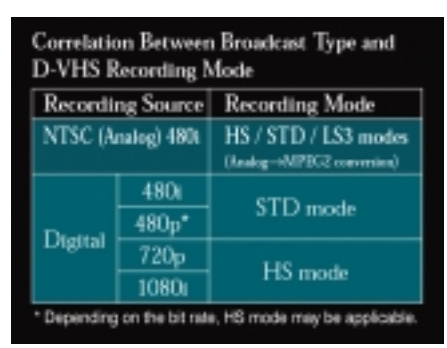
Important to note is that not all digital signals are equal. Just as there are very noticeable differences between high-definition and standard-definition broadcasts (which are both "digital" and use MPEG-2), there is a major difference between the picture quality of D-VHS in the HS mode (which is high-definition with a maximum data transfer rate of 28.2 Mbps) and that of DVD Video (which has an average data transfer rate of around 4.5 Mbps for a two-hour movie), although both use MPEG-2. The key word is "resolution."

DVD resolution is only 720 x 480 pixels compared to HDTV resolution of 1920 x 1080 pixels. The difference in information density contained in a single picture is immense.

I believe that it will be impossible for die-hard home theatre enthusiasts to reject this format because HD *anything* is what is propelling their desire to experience "the best that it can be." Speaking point of fact, D-VHS D-Theater is currently the only way to get prerecorded HD content into the home. But make no mistake, supporting this new platform is not without risks. And no one reading this should conclude that I or *Widescreen Review* are wavering in our support for DVD—HD-DVD is long overdue.

The hardware, both D-VHS player and compatible-HDTV display, and software are on the expensive side, and for most enthusiasts, they'll no doubt end up having to re-purchase the movies released on the D-VHS D-Theater platform. (But then, such factors will be true for HD-DVD.) That said, it would be a sad day if the studios ever decided to end their support for the format. No studio representative could say how long his or her studio plans to support D-VHS. The eventual advent of HD-DVD is certain to be a factor, should that scenario ever occur. But then, that's a given risk with consumer electronics' launches.

If I seem eagerly supportive of D-VHS D-Theater, it is because it was becoming increasingly doubtful that *any* studio would allow true HD-quality versions of their films to be released at all. I just hope that the D-VHS D-Theater platform passes the studio acid test for the encryption security that the studios will insist on before they further embrace the idea of HD for the masses, whether videotape, optical disc, or broadcast. With that perspective in mind, how could any self-respecting home theatre enthusiast not see D-VHS D-Theater as a cause for celebration!?



Stunning Picture Quality

The demos at the press conference were stunning examples of D-VHS' picture superiority. The experience confirmed my own viewing experience during the past two years (on our Panasonic D-VHS system) with one-off 1080i D-VHS videotapes provided by some of the studios whose DVD releases *WSR* has reviewed. The JVC HM-DH30000U supports a significantly higher bit rate than the Panasonic D-VHS system, and at 28.2 Mbps far surpasses the ATSC standard of 19.3 Mbps for HDTV. Since prerecorded D-Theater movies are mastered in the 28.2 Mbps HS mode, viewing the HD resolution is simply amazing.

Three side-by-side demonstrations bore this out: a DVD/D-VHS comparison of 20th Century Fox's *The Sound Of Music* on two JVC 34-inch direct-view CRT widescreen displays, with the left display exhibiting DVD upconverted to 1080i and the right display showing native 1080i D-VHS resolution; a DVD upconverted to 720p versus D-VHS 1080i downconverted to

720p of Artisan's *Basic Instinct* on two JVC 50-inch plasma screens; and Universal's *U-571* front-projected using two JVC D-ILA projectors, one from DVD and the other in 1080i D-VHS. If that wasn't convincing enough, Fox's *X-Men* and Artisan's *Total Recall* were displayed in 1080i on a 15-foot-wide screen. JVC representatives said that the high-definition masters used for both the DVD and D-VHS displays were the same, all recorded in the 1080i format, with an average video bit rate of about 23 Mbps (the format maximum bit rate is 28.2 Mbps).

From the perspective of a videophile, the appreciable differences in picture quality were dramatic, with D-VHS being clearly superior. Even inexperienced, non-professional viewers just raved about the pristine picture quality, the depth and richness of detail, and sharpness that HD D-VHS imparts. Even viewing an old VHS tape looks better than ever on the JVC D-VHS player, no doubt due to all the advanced digital picture technology builtin to this player. To borrow a phrase that my good friend Rick Bergamaschi, General Manager of high-end projector maker Runco International, coined to describe the profound and appreciable difference that high-definition resolution imparts, "Viewing movies on the D-VHS D-Theater platform is like seeing through a new pair of glasses for the first time."

JVC executives also demonstrated the Video Navigation System chapter stop feature and menu. While with obvious limitations due to the linear tape format, the feature allows easy fast forward and rewind access. The memory portion of this feature stores information on the programs you record (approximately 2,000 titles maximum), allowing quick on-screen selection of the program you want, followed by automatic search and playback by the deck. Prerecorded D-Theater movies have imbedded chapter stops that show up on the menu for easy search and find operation. This smart system for finding any program or movie chapter is incredibly user-friendly.

The machine will perform full forward and rewind of a standard cassette in less than 90 seconds. As well, the player has continuous loop capability for repeat playback up to 50 times. While menu design at present is rather simplistic in appearance, JVC is working on a slicker graphic style for future-generation D-VHS players. The menu implementation is not dictated by the format standard, but is a function of the design of the player.

At the time I was writing this article, the JVC D-VHS HM-DH30000U HD VCR was in transit to Greg Rogers, *Widescreen Review*'s Video Technical Editor, for review in this Issue 59. The supporting studios were sending over the first D-Theater titles they had readied for review by *WSR*'s technical review staff. Therefore, please see the new HD D-VHS D-Theater section in this issue and enjoy our exclusive picture and sound reviews—the first-ever published. D-Theater reviews will be on-going and published in every future issue of *Widescreen Review*. Furthermore, we have created a new paid subscriber Web site, www.DVHSMovieGuide.com, which will feature an interactive D-VHS D-Theater Movie Guide database (similar to *WSR*'s DVD Movie Guide), an interactive D-VHS VCR database, a FAQ section, a home theatre glossary of format terms, timely news on the new platform, and a readers' forum on the subject. Additionally, we will post all the articles published in *WSR* on the D-VHS format on our paid subscriber Web site, www.WidescreenReview. com. An Access Pass to both sites is a free bonus with a paid subscription to the *Widescreen Review* magazine.

Conclusion

The HD D-VHS D-Theater platform is a laudable achievement that will benefit the HDTV digital television transition and American consumers, and an important technology for providing high-value, high-quality compelling content for digital television viewers. The platform is truly performance-driven and fully capable of delivering a home theatre experience that is "the best that it can be." At a time when HD-DVD is but a distant potential reality, the D-VHS D-Theater platform delivers prerecorded high-profile, high-value high-definition content NOW to the home theatre enthusiast. The remaining major studios need to follow the lead of Artisan, DreamWorks, 20th Century Fox, and Universal to help bring froward true high-definition motion picture viewing in the home theatre. D-VHS D-Theater cannot but create a renewed excitement for the prospects of true HD content. I know that all of us at *Widescreen Review* are very excited to have pristine HD-quality prerecorded movies for our home theatres.

I'm hooked. Let the tape roll! ■

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Demo Environment At JVC Showcase Center