Cahners.

Broadcasting & Cable's

Digital Television™

Technology for the Digital Age

DECEMBER 1998 VOL. 1 NO. 10

COOL STUFF

Sony's Latest DVCAM

Sony recently introduced the DSR-PD100, offering journalists a DVCAM-based package with 550 TV lines of resolution in a lightweight package. The DSR-PD100 also has 4 lux illumination, the ability to shoot in 16:9 or 4:3 mode and several digital video effects. They include old movie, strobe, trail and poster, which is a built-in 48x zoom (12x optical) and a negative video mode for film. A wide angle lens adapter, wireless remote and a 3.5-inch flip out LCD active matrix panel viewfinder expand the camera's applications. An XLR mic adapter with

phantom power is included also and the unit accepts CAC-12 holder and shotgun microphones. For more information contact Sony at (800) 686-SONY or visit www.sony.com.

■ For more information circle Reader Service 200

Artel Video Systems

Artel has introduced an enhanced version of the Utah 1500 HDTV router to be used in conjunction with its HDTV Mini Master Control. The Utah 1500 is a fully scaleable 32x32 video routing switcher that allows users to start with a 4x4 routing system and add ports as required. The HDTV Mini Master Control is a compact master control panel that allows the Utah 1500 to be used simultaneously as an HDTV house router and for master control for on-air broadcast. For more information contact Artel Video Systems at (508) 303-8200 or visit www.artel .com.

■ For more information circle Reader Service 201

For more products see page 56

Not So Fast On Firewire

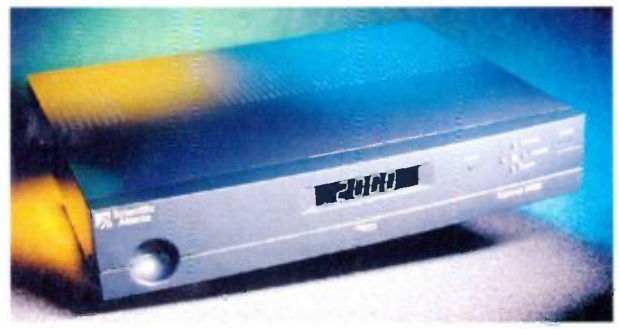
Physical specifications set but copy-protection issues still loom

By Peter J. Brown

Last month the consumer electronics manufacturers and cable TV took a step towards bringing DTV signals into a cable set-top box and into consumer's homes when they agreed on the physical specs for the Firewire or IEEE 1394 standard digital interface.

FCC Chairman William E. Kennard challenged the two industries to meet a Nov. 1 deadline, which they did, sparing the devotees of DTV what might have been an awkward moment.

At the same time, there are still many questions surrounding what has been billed as a significant achievement. Do these questions make the adoption of IEEE 1394 insignificant? Not by a long shot.



Agreements on copy protection hold the key to bringing HDTV to set-top boxes such as the Scientific-Atlanta's Explorer 2000.

IEEE 1394 is the original "Firewire" concept that a team at Apple Computer Inc. headed by Michael J. Teener created years ago. Apple's high-speed serial bus or isochronous data-transfer mechanism can handle up to 400 Mbps and has been incorporated into a number of digital appliances already. For example, besides Apple's original powered, six-pin solution, Sony Electronics' name for IEEE 1394 is "i.Link" which comes in both a more compact four-pin as well as the six-pin configuration.

"i.Link lets you have multiple video streams on a single bus. We identified its critical importance to cable year or so ago," says

Continues on page 53

Two Aspect Ratios a New Challenge for Producers

With planning and foresight, the 16:9/4:3 dilemma doesn't have to be a dilemma at all

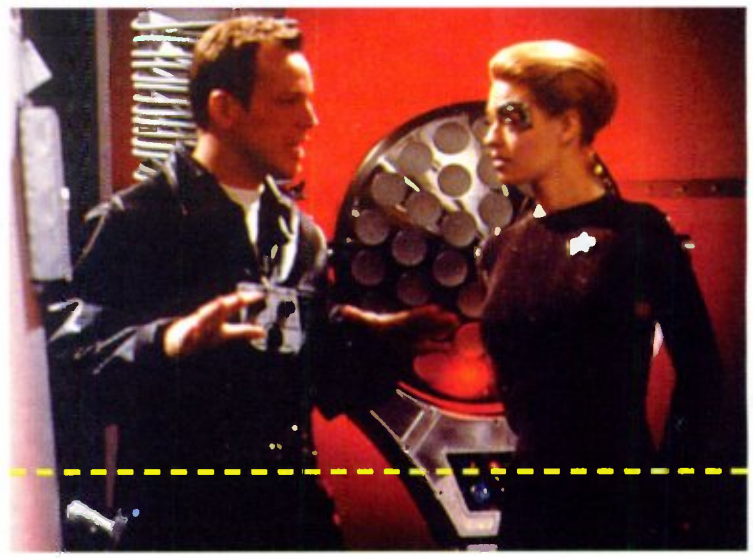
By Ed Eberle

As HDTV begins to creep into the national marketplace, so will 16:9 television sets, bringing a new aspect ratio to the viewing experience.

Joining the familiar 4:3 aspect ratio, the new 16:9 aspect ratio raises a new question for anyone involved in video production: How does someone create, preserve and display product for one aspect ratio while preserving the visual integrity of the other?

There are a number of options being bounced around the industry, and they range from letterboxing and windowshading to other more interesting ideas.

The option favored by most directors, editors and producers is to shoot the original television product in the 16:9 format and letterbox it for 4:3. They say that's easiest: Shoot one show, in one shape, exactly the way you want it, and viewers see the show as the creatives want it to be seen.



© 1997 Paramount Pictures

Cropping material shot for 4:3 at the bottom and then using dynamic tilt and scan in post is one way to make a program ready for 16:9.

Networks, on the other hand, complain that viewers perceive letterboxing or any fiddling with the picture as a loss of viewing area. And the last thing the major networks need is for their already fragmented audience to feel cheated.

Another option is to shoot widescreen, blow up the picture and cut off

Continues on page 52

NEXT GENERATION

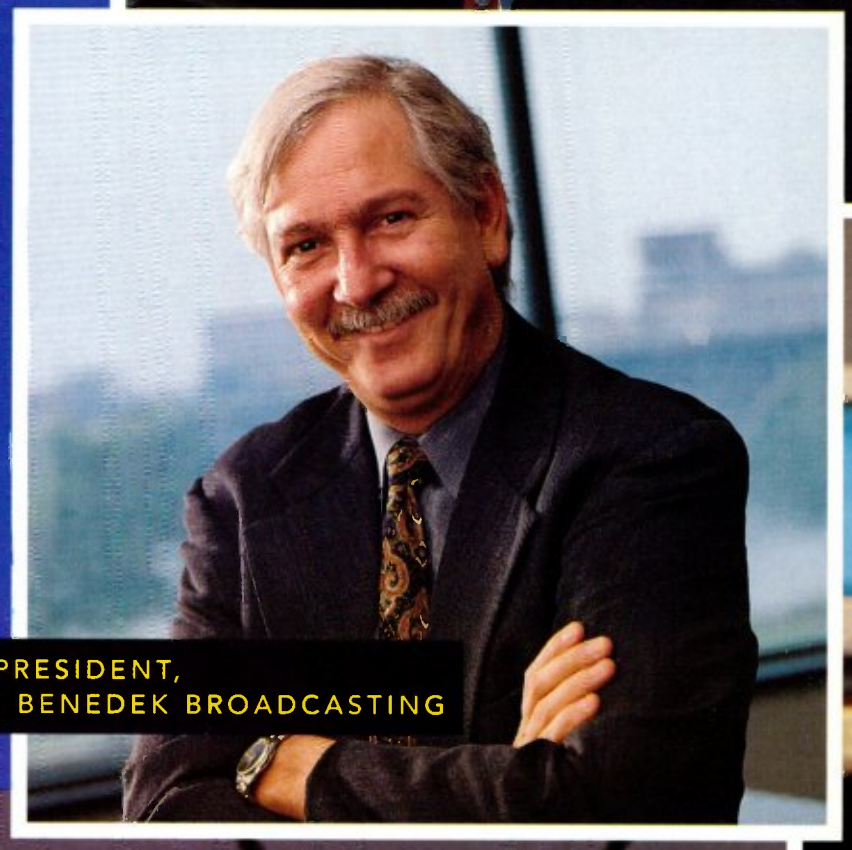
We couldn't it bet

DEL PARKS VICE PRESIDENT, ENGINEERING & OPERATIONS, SINCLAIR BROADCASTING

We have an awful lot of DVCPRO in the field and we're getting great reports. Our many stations are very happy with their deployment of DVCPRO for news and programming. The picture quality is great and it has improved our broadcasts.

Sinclair and Panasonic have been doing business for many years now. We have always had a great relationship, and have never been disappointed. Panasonic has always stood 100% behind their products and go above and beyond to support us.

Our cost of operation is much better with DVCPRO, reducing our overall cost of operations. This is particularly noteworthy where we have replaced Betacam products.



KEITH BLAND SENIOR VICE PRESIDENT, TECHNOLOGY, BENEDEK BROADCASTING

We have 18 months of experience with an extensive amount of DVCPRO equipment, some 60 camcorders, 250 decks. The cost of ownership has been very reasonable. A DVCPRO tape costs $20, but we get 350 passes! We're very pleased.

We have had substantially better results than we expected. In head life, the spec is 1,500 hours, but we are getting 4,000 hours plus of use; the tape life is fantastic.

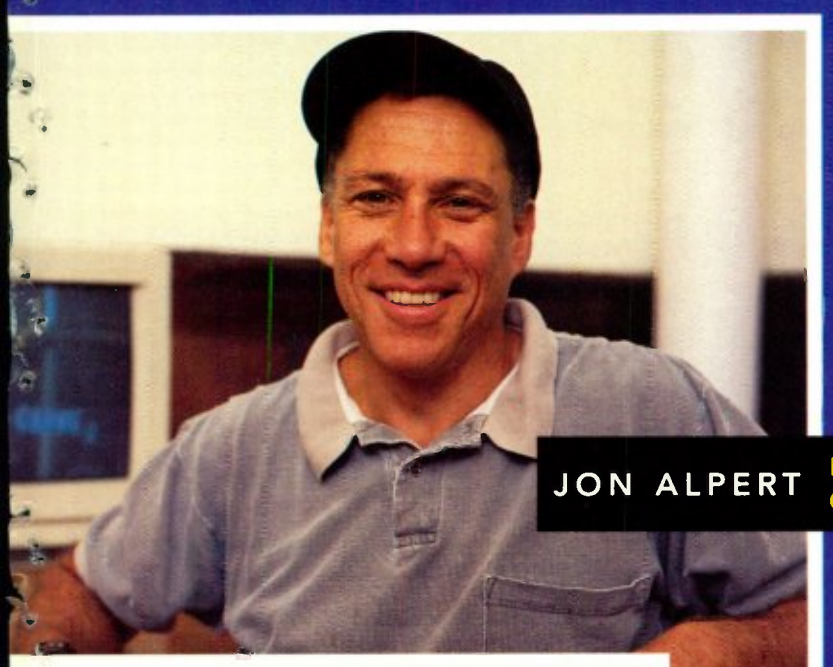
I'd give Panasonic an "A." On the whole, Panasonic provides a quick turnaround and is very responsive to design issues. They're experienced in coping with the real world.

DVCPRO

For more information on the latest DVCPRO products, call: 1-800-528-8601
(Upon request enter product code 3)

TELEVISION AND VIDEO

have said ter ourselves.

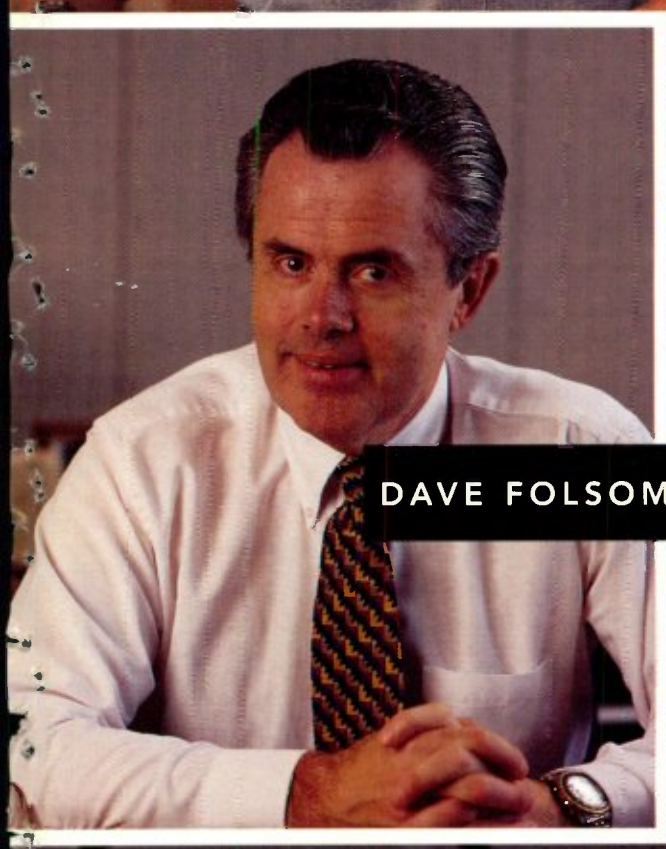


JON ALPERT — NINE-TIME EMMY AWARD-WINNING CAMERAMAN AND REPORTER

I just returned from shooting in one of the dustiest environments in America, the South Dakota Badlands. My DVCPRO camcorder worked great. I haven't lost a shooting day in the two years I've been using DVCPRO, that says it all.

I travel around the globe shooting documentaries. No matter where I am in the world, I call Panasonic and they straighten everything out.

Shooting with a lighter camcorder and the format's "shirt-pocket-sized" tapes provides me with many benefits. A lighter weight camcorder allows me to do more things in one day. If you do it all yourself, and I do, you can be more productive and creative.



DAVE FOLSOM — VICE PRESIDENT, TECHNOLOGY, RAYCOM MEDIA

Two years ago, KOLD, Tucson, AZ, served as our test bed for DVCPRO. Arizona is a very hot and dusty place. DVCPRO has meet the challenge at KOLD and at our other stations, and has proven extremely reliable. DVCPRO has been very reliable at Raycom with no signs of major failure. No news is good news here.

Panasonic has responded quickly every time we've called. They have gotten right on top of the few issues we've had. Panasonic is very responsive to our questions, doing all you could ask.

To us, value is the combination of product cost and its cost to operate. DVCPRO has been superb. We're very pleased with the original cost and the cost of maintenance and repair. DVCPRO is properly priced. We didn't have surprises like with competitive products. We originally evaluated warranty costs, product cost, spare parts costs, everything, and Panasonic met and continues to meet our requirements.

Panasonic
Broadcast & Digital Systems Company
www.panasonic.com/pbds

News

HDTV Captioning Solution Offered By Lucent, Ultech, WCVB and WGBH

The first working on-air closed captioning solution for DTV has been created by Lucent Digital Video, Ultech Corporation, WCVB Boston and the WGBH Educational Foundation.

On Nov. 4 WCVB's *NewsCenter Five at Midday* newscast was the first live, on-air broadcast to carry the new DTV closed-caption information. Lucent's Flexicoder converted the station's analog signal into an HD signal and received caption data from the Ultech DTV-708 closed caption data server.

Realtime captions were provided by The Caption Center at WGBH Boston.

Lucent's Flexicoder

"As an innovator in media access for more than 25 years, WGBH is pleased to have joined with the industry to take the first step in making digital closed captioning a reality," says Gerry Field, manager for WGBH's DTV Access Project.

Lucent Digital Video created an open interface between its Flexicoder MPEG-2 encoder and any closed captioning data server. To enable faster implementation of DTV closed captioning, Lucent Digital Video and Ultech plan to freely publish this open interface specification to the broadcast industry.

Nelson Botsford, chief design engineer for Lucent Digital Video, says, "In order to ease the transition to DTV, we want to create a seamless interface between closed captioning servers and our encoder."

"As more stations upgrade their studios for the DTV transition, and as receiver manufacturers refine their product lines, we look forward to further uses of this technology," adds Field.

WCVB was the first station to provide realtime captioning of local news and Ross Kauffman, WCVB vice president and director of engineering, says the station remains committed to providing captioning services for deaf and hard-of-hearing audiences.

The Lucent/Harris encoder used by WCVB is the only encoder currently on the market that can encode DTV closed caption information. ■

HOT SALES

Fox has purchased six **Philips LDK 2000** digital "true frame" progressive cameras for its Washington, DC-based *Fox News Sunday* program. Andrew G. Setos, Fox executive vice president of News Corporation's News Technology Group, says, "We believe in the visual superiority of progressively scanned images, as evidenced by the dramatic improvement in picture quality over the analog NTSC format."

Fox also recently installed four **ATSC encoder systems** from **NDS Americas**. The initial orders for the NDS E5810 series encoders are enabling the Fox Network Center in Los Angeles and four of its affiliates to handle DTV feeds. The four stations are WBJK Detroit, KDFW Dallas, WTXF Philadelphia and KTVU Oakland. NDS also recently announced a Master Purchase Agreement for ATSC encoding systems with Tribune Broadcasting, giving Tribune the opportunity to purchase the systems for its 18 stations.

Harris Corp. is providing a **DiamondCD solid-state UHF DTV** transmitter to **KCOP-TV Los Angeles**. The DiamondCD combines a redundant solid-state architecture and Harris' CD 1A second-generation ATSC 8-VSB exciter. "The clear advantage of the Harris solid-state transmitter over a tube becomes evident in the case of individual module failure," explains Bishop Ellison, KCOP director of engineering.

Click 3X's Manhattan division has become the first facility in New York to buy a **Quantel Henry Infinity**, the infinite-layered effects editor. The Infinity will help the company enter new markets, including online finishing work for broadcast design, editorial work and more longer-form projects thanks to the system's two hours of 601-quality storage.

Turner Entertainment in Atlanta, GA has purchased **Everest 3D Realtime Graphics** system together with Sherpa on-air production control to create a new generation of graphics for its sports coverage. CBS News also used the Everest system to generate live-to-air graphics on election night for coverage from New York. The show used a number of Everest systems together with Sherpa. The Sherpa system received and organized incoming results data and combined it with historical information and race contenders' names and faces.

HDTV HAPPENINGS

▼***When Space Shuttle Discovery took off for its 25th mission with John Glenn onboard on October 29 audiences in 20 cities were able to watch the broadcast in HDTV. Museums, stores and broadcast stations in the cities had viewing areas set up with the largest being the Smithsonian's National Air And Space Museum in Washington, DC. Harris Corp. oversaw the production and broadcast of the program and WRAL-HD Raleigh, NC, provided editing equipment and several HDTV vignettes shot in Houston and Washington, DC. A Tektronix Grass Valley 110-HD switcher was used for editing of the launch and a Philips Spirit Datacine was used by Eastman Kodak to transfer footage from Glenn's first launch for the 70-minute broadcast.***

Craig Blankenhorn

▲***Sony, General Instruments and CBS Sports teamed up to bring the New York Jets victory over the Buffalo Bills to local New York City viewers in HDTV on Nov. 8. The first of CBS' HDTV football broadcasts relied on an HDTV production vehicle from National Mobile Television. The truck is outfitted with 10 Sony HDC-700 studio cameras and HDC-750 field cameras, an HDS-7000 switcher, HDME-7000 multi-effects unit, DVS-V6464B SDI/SDTI video router, four DVS-A3232 audio routers, DXC0H10 HDVS cameras, HDM-20E1U and HDM-145U HDTV monitors and PFV-HD/HKPF series of HDTV conversion and distribution products. Content was compressed using a General Instruments DigiCipher II encoder configured for DS-3 transport via fiber to CBS Broadcast Operations in New York where it was decoded with a GI HD decoder to baseband HD for editing and graphics.***

▶ ***ABC aired its first HDTV program on November 1, Disney's "101 Dalmations." The broadcast originated from the ABC HDTV Release Center, designed, built and equipped by Panasonic System Solutions Company (PSSC). A key technology in the facility is the Panasonic AJ-HD2700 D-5 HD recording system. The HDTV Release Center consists of two, fully redundant edit/control rooms. Each room will serve as a standalone facility, providing the collective capability to originate two separate program streams or one stream with full backup. In addition, PSSC is offering ABC owned and affiliated stations turnkey HD station system packages consisting of prepackaged master control AJ-HD2700 VTRs.***

August 5, 1492 - Atlantic Ocean

Columbus looked beyond fear

and discovered a new world.

MAV-70 Server

Five hundred years ago, the world was flat. But Columbus didn't let the uncertainty of the unknown stand in the way of discovery. And now,

Discover the world of digital broadcasting with us and you'll never look back.

as you move into the world of DTV, you don't have to either. That's because with Sony, you get the broadest range of digital solutions for broadcasting today. Start with our MAV-70.

dtv READY

BDX-E1000 Encoder

It's a scalable, MPEG-2 video file server that lets you navigate the transition to multi-channel SD and HD programming. Then we have our BDX-Series encoders, which make it easy for you to begin efficient digital transmission, today.

HDCAM HDW-500 VTR

MAV-70 Server
- FibreChannel networked
- RAID-3 disc array
- Selectable MPEG-2 profiles/levels
- Data tape integration

BDX-Series Encoders
- HDTV/SDTV MPEG-2 models
- Multi-channel multiplexer
- Scalable bit rates 1.5 to 50 Mbps

HDCAM HDW-700 Camcorder
- 40 minute 1/2" HD cassette
- Memory setup card
- Lightweight one-piece camcorder

And Sony provides the most comprehensive line of glue products in the new digital world for format conversion, digital distribution and processing. We also offer digital camcorders and VTRs—including Betacam SX®, Digital Betacam® and HDCAM™ to meet your digital format requirements. In addition, we offer a full line of SD and HD studio and OB cameras to complete your broadcast solution. And we've built our solutions on open systems, such as MPEG-2, so you get increased interoperability and easy migration into the future.

BVP-900 Studio Camera

HDCAM HDW-700 Camcorder

They're all backed by Sony's service and support programs. So, don't be afraid to venture into new territory. Embark on a journey and discover the digital advantage Sony can offer. Call us at 1-800-635-SONY, ext. BC or visit www.sony.com/broadcast.

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HDCAM HDW-500 VTR
- Simultaneous HD/SD output
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HKPF/BKPF Digital Processing
- SD/HD in the same frame
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BVP-900 Camera
- 16:9 CCD imager
- 12-bit DSP
- Switchable 16:9 and 4:3

SONY

The Dawn Of Digital Summit Provides Forum For Many Voices

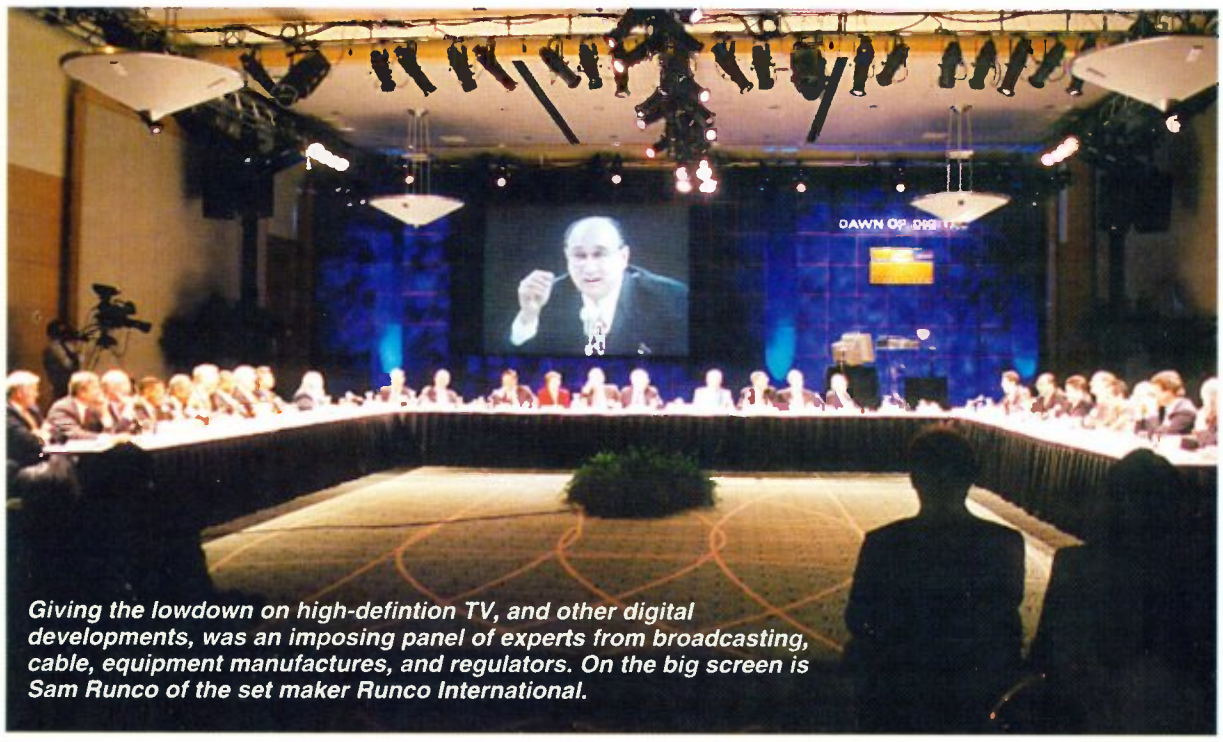
Industry leaders gather to celebrate and discuss the beginning of broadcasting's new era

By Ken Kerschbaumer

This is not the end. This is not even the beginning of the end. But it is, perhaps, the end of the beginning." —Winston Churchill, Nov. 10, 1942

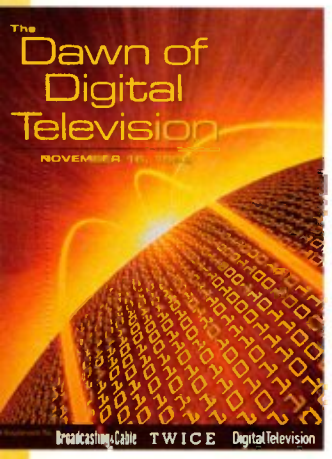
FCC Commissioner Susan Ness quoted Churchill during her comments at the "Dawn of Digital Summit" held on Monday, Nov. 16 at the Ronald Reagan International Trade Center in Washington, DC.

The event, hosted by the Broadcasting & Cable publishing group (Broadcasting & Cable, Digital Television and TWICE magazines), brought together sponsors, executives and politicians from the wide spectrum of companies and industry associations to discuss, celebrate and demonstrate DTV and HDTV technology.



Giving the lowdown on high-defintion TV, and other digital developments, was an imposing panel of experts from broadcasting, cable, equipment manufactures, and regulators. On the big screen is Sam Runco of the set maker Runco International.

The event was sponsored by a number of industry players: ABC, Chyron, DirecTV, Eastman Kodak, Faroudja Picture Plus, Harris Communications, NBC, Panasonic, PBS, RCA, Runco, Sarnoff, Sharp Electronics, Silicon Graphics, Sony, Tektronix and Zenith.



The audience and summit participants were a mix of broadcasters, consumer set and broadcast equipment manufacturers, lobbyists, retailers and cable and trade association executives.

The two-hour summit that preceded product demonstrations was chaired by former FCC Chairman Dick Wiley. The discussion, while celebrating the steps that led up to the official beginning of DTV and HDTV broadcasts, also touched on the issues still to be solved.

After quoting Churchill, Ness went on to say that the quote from Churchill, "Brings to mind the battles yet to be waged in the war for consumer eyeballs and minds, and, at times, spent in perhaps nefarious products that will be generated by digital television. So it's an exciting moment as we move from the boardroom, to the caucus room, to the lobbies, to the business rooms, and now also to the studios where we begin to see the creative side of digital television coming to the fore."

FCC Chairman Bill Kennard said that he believed the 42 stations that began DTV broadcasts earlier this month were a re-affirmation of the technology, particularly the smaller stations that converted to digital. "It demonstrates that they see the value of this technology to remain viable in the marketplace," he added.

"The [HDTV] baton is now being passed from the technical community to the creative and business-management communities."

—Joe Flaherty, CBS

CBS's Joe Flaherty and the ATSC's Robert

Chuck Sherman, Bill Simms and Charlie Steinberg

Kennard explained that there is a very valuable place for government in the implementation of DTV and HDTV, particularly with regards to helping broadcasters deal with potential obstacles. He mentioned a few obstacles specifically, including tower sighting issues, working with Canada and Mexico on interference issues and helping consumers understand the technology.

As an example of government's role working properly he pointed to the recent Firewire agreement (see cover story). He also made it pointedly clear that he believes the FCC's role in many of the issues should be limited. The business models of DTV and other issues will be left up to the industries to figure out, with government involvement limited to other issues.

"We in government will continue to monitor your progress," he said. "We will step in to remove barriers when we think it's appropriate. We will safeguard the public interest and continue to provide information to consumers about this transition. But ultimately it is up to you to define what the future of the medium should be.

"I think it's very exciting that we have so many business plans out there in the marketplace trying to garner consumer acceptance," he added. "That's not a threat—we should embrace that because we don't know what the killer app will be for digital. Ultimately, it will probably be a number of things."

The Power Of DTV

If there was a consistent theme among the comments from the speakers at the summit it was that the new era of DTV and HDTV broadcasts will present a number of new opportunities that will gain their own momentum.

"The evolution of digital is an unstoppable force. It involved all media, not only television."

—FCC Commissioner Susan Ness

Added Ness, "The evolution of digital is an unstoppable force. It involved all media, not only television. The consumers are going to benefit from new and better services in ways we can't even begin to imagine today. Cross industry involvement will bring us enhanced programming, new set-top devices and new ways for viewers to use, not only watch, television. We're ready to have an end to this beginning and I'm fascinated to see what comes next."

Broadcasters were the star of the event, with network and pioneer stations represented. With signals now on the

air the need for exciting new DTV content to drive set sales was a common theme among broadcasters.

"The technology is the easy part," said Sharon Rockefeller, president of WETA Washington. "The toughest part will be, and has always been, the content. The advent of digital broadcasting increases the sheer quantity of material thrust to the public. So we each have a responsibility to use this technology intelligently to bring our audiences television and services that will foster understanding and creativity."

"I think we should stop arguing about which directions are right and which directions are wrong."

—Tim Thorsteinson, president of Tektronix VND

Rockefeller also used the forum to announce that WETA would make a high-definition documentary of the Van Gogh exhibit now at Washington's National Gallery of Art. She added that the quality of HDTV is such that it actually raises copyright concerns on part of the Van Gogh estate.

PBS Chairman Ervin Duggan echoed Rockefeller by giving a demonstration of enhanced digital broadcasting, which includes ancillary video, audio and graphics along with a standard-definition program. PBS has been testing enhanced broadcasts at eight of its member stations, using Intel computers to receive the DTV broadcasts and store the ancillary information. The demonstration was of interactive content sent to test viewers earlier in the week during a Ken Burns documentary on Frank Lloyd Wright.

"We think it's the birth of not just a new kind of television but an entirely new medium," Duggan said.

Joe Flaherty, CBS Senior Vice President of technology, reiterated the belief that the challenge is now on the programming side.

"The [HDTV] baton is now being passed from the technical community to the creative and business-management communities," Flaherty said. "And along the way the technical community would like to note that it was OK on their watch. We scraped a few icebergs but we didn't hit any. [Now] the creative and business-management community must meet the challenge of building a stronger, higher-quality, more flexible—and, by the way, profitable—broadcasting service. And you will succeed."

A.H. Belo Vice President Mike McCarthy said that Belo is committed to HDTV to the tune of a $125 million investment across its 17 stations. But the station group still is looking for more programming.

"Our digital programming strategy is to run as much attractive 1080i-formatted programming as we can find," McCarthy said. "We want to use our digital channels as a means to bring our viewers into the HDTV world. But for the moment there is a real dearth of HDTV programming to run."

Tim Thorsteinson addresses the summit.

Susan Ness, FCC; Don West, Broadcasting & Cable; Richard Wiley, Wiley, Rein & Fielding; FCC chairman William Kennard; former FCC chairman James Quello

"I think it's very exciting that we have so many business plans out there in the marketplace trying to garner consumer acceptance."

—Bill Kennard, FCC Chairman

Sam Runco of Runco International; Robert Scaglione of Sharp, and Gary Shapiro of the Consumer Electronics Manufacturers Association

"Keep in mind that as these bumps in the road are hit we're facing an extraordinary time period here."

—Gary Shapiro, president of CEMA

"What the cable industry is doing and will continue to do is bring our customers the range and the quality of analog, digital and HDTV programming that our customers want."

—June Travis

June Travis of the National Cable Television Association

Trading Opinions

Trade organizations, including the National Association of Broadcasters (NAB), Maximum Service Television (MSTV), the National Cable Television Association (NCTA), the Consumer Electronics Manufacturers Association (CEMA) and the Television Bureau of Advertising (TVB) were also represented.

Chuck Sherman, NAB executive vice president, said that despite the early success of DTV there are still concerns at the station level.

"We're willing to cooperate and work through [concerns] with various organizations," he said. "Must carry is one that NAB is committed to and we're hoping that a voluntary agreement is forthcoming. But I must admit we're getting a little nervous that after years of voluntary meetings going on we're still waiting for the first agreement to be announced."

June Travis, NCTA executive vice president, addressed the cable side of the must-carry debate in her comments, and also made mention of the dirty word of the day—analog.

"Cable companies are in detailed discussions with the top-10 markets about carriage requirements, discussions that broadcast networks have said are constructive and promising," she explained. "The conversion from analog to digital is an evolutionary process and one that will vary from market to market and sometimes may be messy. But what the cable industry is doing and will continue to do is bring our customers the range and the quality of analog, digital and HDTV programming that our customers want."

But for Mike McCarthy, vice president of A.H. Belo Corp., owner of WFAA Dallas, which is broadcasting digitally today, the must-carry issue shows some of the larger ironies of the DTV technological advance.

"It's ironic that after this on-schedule start of this technical transformation of the American television standard, and that with expenditures projected well into the tens of millions, that broadcasters face the prospect of their signals not being carried to approximately 70% of our audience. Or, if carried, substantially downgraded to standard definition. These are vital issues for the future of local television."

The digital must-carry issue doesn't standalone in impeding and slowing down the conversion by consumers to DTV and HDTV. But Gary Shapiro, president of CEMA, reminded that the important thing to focus on is not the bumps but rather the endgame: HDTV.

"Keep in mind that as these bumps in the road are hit we're facing an extraordinary time period here," he offered. "We have to look at the endgame. The endgame is the next few years when all broadcasters, all cable providers, satellite providers and others will offer their programming in HDTV."

But Abe Rapinski, president of the TVB, warned that now is not the time to ease up on the gas in the drive to digital, bumps in the road or not.

"When will the consumer step to the line?," he asked. "There are sets in the store now and it's a question of how it's going to be promoted. We don't want to see this become another Beta. The consumer set manufacturers are going to have to step to the line. Now is not the time to be timid."

The Gear Makers

There were also a number of industry manufacturers on hand to discuss advances and challenges ahead. Tim Thorsteinson, president of Tektronix networking and video division, laid out his advice for making the transition to digital as smooth as possible.

"I think we should stop arguing about which directions are right and which directions are wrong," he stated. "The transition to digital must be practical, it must be economically sound for all involved and it must offer services that appeal to a diverse population. If we abide by these fundamentals the prospects are good for all of us."

One of those services that would appeal to customers according to Richard Ashman, president of Eastman Kodak motion imaging, is imagery that transcends current television. "Consumers who invest in HDTV are going to have high expectations for production and entertainment value. They will not only expect great football game imagery but they're going to expect visual poetry and dramatic content in commercials displayed on their digital and HDTV sets."

Joe Mack, Harris, Bob Seidel, CBS and Bruce Allan, Harris

"The consumer set manufacturers are going to have to step to the line. Now is not the time to be timid."

—Abe Rapinski, president of the TVB

Dick Wiley and Lynn Claudy, NAB

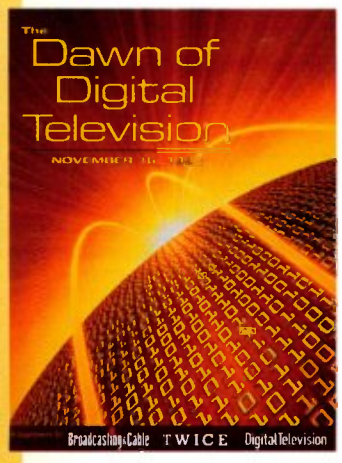
Erik Carlson, president of Silicon Graphics, however, reminded the audience that the digital tools needed for content creation have been in place for a few years. "While the dawn of digital from the consumer point of view is just happening, the dawn of digital from the production point of view is a few years old."

In addition, Charlie Steinberg, Sony Professional Products Group president, said that the production opportunities for HDTV equipment will extend beyond television. "There's not only a very exciting and important role in HDTV in all forms of broadcasting, but we also believe there's an exciting role in the production community," he offered. "Not only for the production of events for television, but in the production of motion pictures for the cinema as well."

And more than just improved pictures will be a number of other, here-to-fore undefined services, according to Ed Grebow, Chyron president. "The industry-wide adoption of digital and HD standards will not only give us prettier pictures but will also reshape television into a creative medium with unlimited potential."

For all of its opinions and statements, the summit was, above all things, a chance to bring the different visionaries and industry players to the same table, at the same time, to celebrate the steps that have led to the successful launch of DTV and HDTV services this month.

Bruce Allan, general manager of Harris Corp., best summed up the trip so far. "There's no question that DTV has created its share of challenges and, on more than one occasion, its share of headaches. Yet we've managed to tackle those challenges so successfully that our nation is actually ahead of schedule in the implementation of digital television." ■



Digital Dawns On Consumer Sets

Manufacturers display range of HDTV sets, converters, other consumer gear at summit

By Greg Tarr TWICE

Cognizant that an early start can mean the difference between first and second place in the race for market share of digital television sets, some of the consumer electronics industry's biggest companies demonstrated HDTVs and peripheral equipment at the Dawn Of Digital summit.

New or soon-to-arrive digital sets were demonstrated for analysts, broadcasters, press, and other interested parties by Panasonic, Runco, Samsung, Sony, Thomson (RCA and ProScan) and Zenith. Additionally, representatives of DirecTV, Faroudja, Sarnoff Labs and Terk Technologies showed forthcoming services and technologies under development for consumer digital TV systems.

"Our purpose in coming to the Dawn Of Digital event was in part to celebrate the arrival of digital television broadcasting, but more to show that Sharp is ready to deliver products that will attract consumers to the new medium," said Robert Scaglione, Sharp digital products group associate vice president. "Most of the products today are large and relatively expensive, but we recognize our responsibility to offer a breadth of products with a variety of sizes and price points, and we plan to do that soon."

NMT's high-definition production truck loaded with Sony HDTV gear is manned by David Niles of Colossalvision.

David Niles at the controls.

For its part, Sharp showed its first fully integrated HDTV receiver. The CRT-based 64-inch widescreen rear-projection set (SharpVision model 64LHP5000) will sell for $9,999 and will be available to retailers this month. It includes an NTSC tuner and signal processor to show analog broadcasts in the 480p digital format and will upconvert all other DTV formats to 1080i.

Also shown was a digital set-top tuner (TU-DTV1000, $1,995 suggested retail), which also will be available in December. The device receives all DTV formats and can be programmed to output images in 480i, 480p and 1080i formats. Connection to a monitor is made via component video (Y-Pb-Pr) and RGB horizontal and vertical sync outputs.

Panasonic demonstrated its combination HDTV-ready projection TV and set-top digital tuner. Both products are available on a limited basis for sale to consumers. The HDTV-ready projection set (PT-56WXF90) will produce scan rates to display the 1080i high-definition format in native form but will have to upconvert to 1080i the 720p HDTV format selected by the ABC and Fox networks.

The set offers a 56-inch 16:9 widescreen display and connects to the external nonproprietary set-top digital tuner (TU-DST50, $1,699.95 suggested retail) via component video (Y-Pb-Pr) connections.

Panasonic also showed its recent-

ly announced 34-inch 16:9 direct-view set that also will display 1080i in native form. The $5,000 set is the first in a new product series called Tau PureFlat, distinguished by a virtually flat glass widescreen picture tube. The set will be available in March or April of 1999 and also will require the set-top digital tuner to receive off-air signals.

Also shown as part of the Tau series was a 42-inch plasma display panel (PDP), which was hung from a wall like a framed picture. The screen, which was developed by Panasonic's U.S.-based Plasmaco research and development lab, displayed only a digital standard-definition 480p image, but a high-definition version is planned for next year, said Bill Mannion, Panasonic TV division general manager.

Panasonic also will be the first to offer an HDTV-capable D-VHS VCR that will connect with its digital sets via a proprietary variation of IEEE-1394 Firewire digital interface. Introduction of the deck, which will sell for under $1,000, was delayed for "several weeks" by problems with some integrated circuit chips and should be shipped by early next year, the company said.

Sony demonstrated two direct-view sets from its new Wega (pronounced "vega") television series. High-definition was shown in 1080i form on a 34-inch widescreen set (KW-34HD1). The HDTV, with built-in NTSC tuner and a DTV tuner mounted in the attached base, was to be available Nov. 20 at a $8,999 suggested price from select dealers with access to terrestrial DTV signals.

For comparison purposes, Sony showed its currently available 4:3 analog 36-inch XBR Wega set, which sells for $2,500. That set was connected to a DVD player and presented high-quality images that fooled some spectators into believing both sets were showing HDTV programming.

James Palumbo, Sony TV products marketing vice president, said Sony will "let consumers decide" whether HDTV or less-expensive SDTV digital sets are the wave of the future.

Mike McCarthy of Belo talks with Julian Shepard of Verner, Liipfert, Bernhard, McPherson & Hand.

Runco drew a crowd to its just-introduced three-chip digital light processing (DLP) front projector.

BROADCASTING & CABLE's Peggy Conlon, Joe Mack of Harris, Glen Reitmeier of Sarnoff and Bruce Allan and Wes Kimes of Harris

"Sony will 'let consumers decide' whether HDTV or less-expensive SDTV digital sets are the wave of the future."
—James Palumbo, Sony

Visitors take a test drive at the Chyron exhibit.

Samsung showed its just-launched HCH551W fully integrated HDTV receiver as the first product in the company's new Tantus digital series. The 55-inch widescreen rear-projection set includes both NTSC and DTV tuners and converts all signals for display in the 1080i format. The set is selling for $7,999.

Thomson, which soon will begin shipping demonstration models of its ProScan and RCA rear-screen HDTV projection sets, demonstrated its ProScan PS61000 ($7,999) HDTV receiver with built-in tuners for ATSC DTV, NTSC, Direct Digital Satellite and high-definition Direct Digital Satellite from DirecTV and USSB.

Also demonstrated was the RCA DTV100 set-top DTV tuner ($700) connected to the just-launched ProScan PS-36800 ($2,700) multimedia monitor, which will display images from PCs and analog TV in addition to 480p ATSC broadcasts.

Thomson's DTV sets and set-top decoder will be available for consumer purchase in early 1999.

Runco drew a crowd to its just-introduced three-chip digital light processing (DLP) front projector. The front projector (DLP-3VX) is capable of displaying screen sizes from five to 40 feet at unusually high brightness (3,000 lumens) and contrast levels. The projector is capable of displaying a 720p HDTV image in full resolution.

For demonstration purposes, the company showed a video supplied by ABC-TV to showcase the 720p format. A Panasonic D-5 recorder was used for the signal source. It is currently available at a $64,995 suggested retail price. A digital tuner is required for terrestrial broadcasts.

Runco also showcased a DTV-ready 42-inch plasma display panel, capable of 480p resolution, and its 58-inch widescreen HDTV-ready rear projector, Cinewide 5800 ($10,995). Both products are currently available.

Zenith offered a preview of its fully integrated HDTV receiver, model IQA64W10W. The CRT-based rear-projection set features a 64-inch widescreen display with built-in tuners for NTSC and ATSC signals. Digital broadcasts are converted and displayed in 1080i. Zenith plans to ship the set in early 1999 at a $13,000 suggested retail price.

Terk Technologies helped to make the demonstrations possible by temporarily outfitting the Ronald Reagan International Trade Center, with a TV-60 "digital antenna" that was used to collect off-air terrestrial broadcasts. Due to the directional sensitivity of digital broadcasting, several antennas were required to receive the digital transmissions from Washington's WETA-DT, WRC-DT and WUSA-DT.

The $400 antenna, available in early 1999, will be the least expensive in a series of planned Terk digital models. A step-up piece, which is awaiting patent clearances and was not shown at the event, will be offered at the same time.

The special diecast aluminum and stainless-steel device was billed as a "digital antenna," although company CEO Neil Terk acknowledged that all radio signals are, in fact, analog.

"The principles of the antenna are analog in nature, but this has been specially designed to minimize the effect of signal multipathing, which can be very detrimental to receiving a digital signal," Terk said.

The TV-60 uses a helical antenna design with a directional reflector. This is said to minimize multipath signal collection, a condition in which a broadcast signal is reflected off objects such as mountains, buildings and passing cars, causing a signal to echo in multiple directions. Each wave then takes a different path to the antenna, arriving fractions of a second before or after the primary signal.

In analog NTSC broadcasting, the condition causes ghosts or shadows in the picture, but in a digital receiver, the multipath condition can cause less-expensive equalizers or signal processors to overload. This results in the picture freezing or breaking up.

"The better a receiver's equalizer, the more expensive the TV set," Terk said. "In some lower-priced digital receivers, a special antenna will be necessary to minimize the multipath problem and make up the difference."

Terk said the step-up antenna, codenamed "Whiskers," will use an advanced log periodic design that is 20% more efficient than traditional log periodic or Yagi antennas. A price has not been determined.

Because of the directional sensitivity of digital TV receivers, Terk said some homes will have to use two or more antennas or a motorized antenna rotor to receive distant or weak signals and signals from various directions.

For more coverage of The Dawn Of Digital see the Dec. 7 issue of TWICE.

Studio Cameras Step Up For HDTV Demands

Japanese manufacturers to soon offer true 1080i CCDs while Philips rolls out 14-bit A-to-D technology

By Ken Kerschbaumer

If you've been keeping an eye on DTV and HDTV studio camera developments you better get your eye ready to do some serious roving.

While studio camera sales may be a little soft this year there's a slew of new developments on the horizon that will spike interest and excitement in the category.

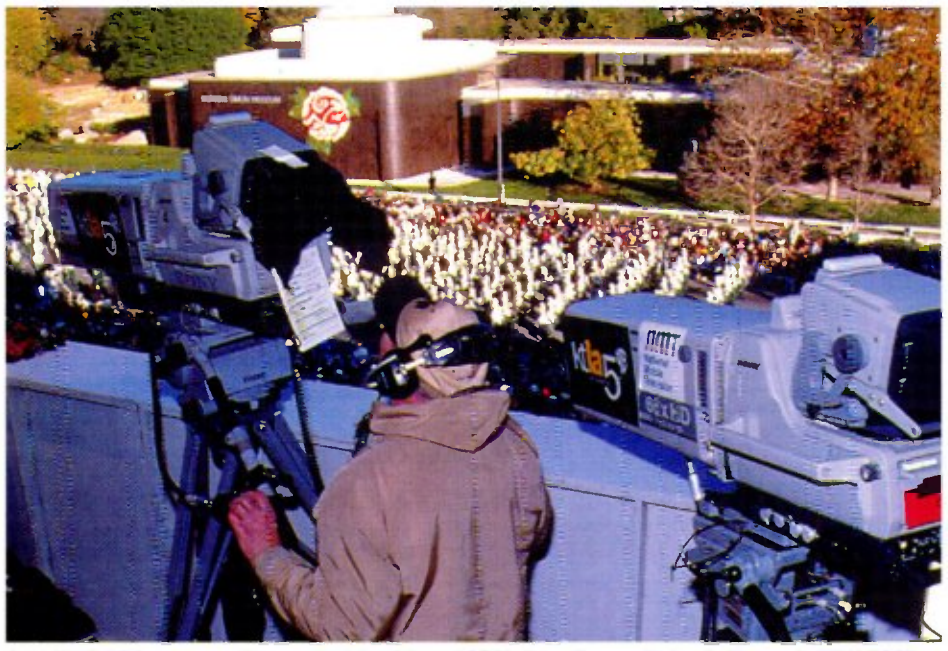
"1999 probably will be the year of production equipment sales," believes Larry Thorpe, Sony vice president of acquisition systems. "This year broadcasters were focused on transmitters, towers and things like that, and now that many of them are sort of ready for transmission they're starting to look around to work on getting program."

"The studio camera business as a whole has been affected by all the talk about DTV and I think the stations are faced with two challenges," believes Tony Delp, camera product manager for Hitachi. "First, they've been focusing on the transmission aspect of this and they've spent a lot of money on transmission. In turn, that's hurt budgets for production tools like cameras."

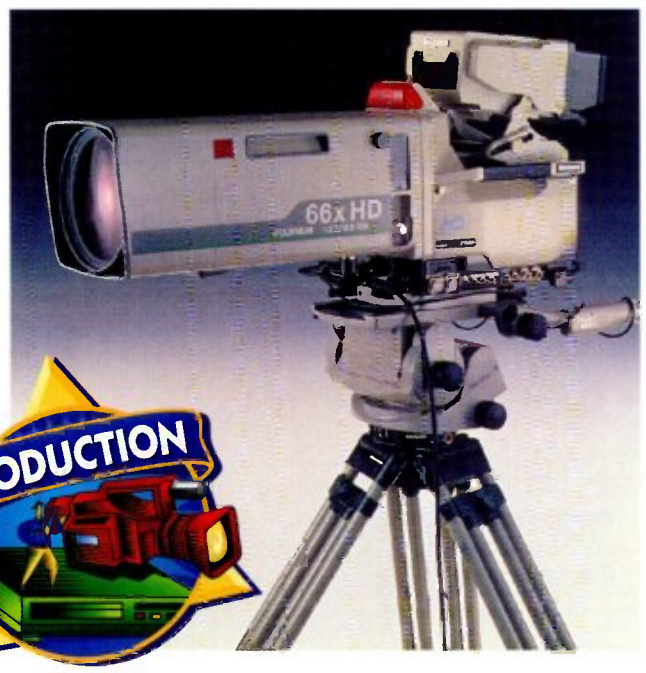
But despite current sales sagging as stations figure out what they want to do, the early days of 1999 show a lot of promise with regards to new studio cameras.

Helping get slow sales off the ground will be a number of new options. Topping the list are:

- 1080i cameras expected to be offered in the first quarter of 1999 by Hitachi, Ikegami, Panasonic and Sony. N The introduction of 14-bit A-to-D converter technology from Philips.
- A complete lineup of 480p gear from Sony at NAB and, for the patient, a complete lineup of 1080p/24 fps equipment as well (with delivery of the cameras and camcorders expected in late 1999).
- 720p cameras from Panasonic, Hitachi, Ikegami and Philips.



Sony HDC-700 camera will soon be joined by a 1080i sister lineup. Below is Ikegam's HDK-790D high definition studio camera.



Buying Advice

If you're in the market for a new studio camera the advice from manufacturers is to take a strong look at the HDTV cameras, even if you don't plan to do programming in HDTV for another few years.

Why? With today's cameras having an expected life of 10-12 years a standard definition camera purchased today could be expected to still be in operation come 2010. And upconverting might show its weaknesses by then to the (fingers crossed) hundreds of millions of viewers who have HDTV sets.

John Lynch, Ikegami assistant director of engineering, advises that a studio camera purchase should go from the top-down as far as downconverting. "Start at the best you can go and convert it to anything else you need," he says. "That usually leads to 1080i."

Manufacturers however also realize that today's budget realities, particularly with heavy allocations in transmission areas, might make the purchase of an HDTV camera difficult if not impossible. In addition, camera makers are also hearing from stations which need a new standard definition camera and have no plans for HDTV work, according to Thorpe. "They have no near-term plans for HDTV work but they do want to be able to shoot in 16:9," he adds. "There are a number of choices for those types of cameras."

The 4:3/16:9 switchability that Thorpe speaks of is something every camera manufacturer offers in both studio and portable cameras.

There are also the legions of stations who are happy with the cameras they have today. If you fall into this category what should you do? Burt Young, Philips camera marketing manager, says to seriously consider upconverting the picture from your current camera.

"If broadcasters have standard definition cameras that are great and don't have to be replaced then upconversion is a viable option," he explains. "You're better off taking no action then the wrong action."

Concerning upconversion, Delp adds, "That's an inexpensive way to assure yourself for the future and get your money's worth for the future of the camera."

Another "up" word that pops up frequently is upgradability. All camera manufacturers offer programs that will allow for standard definition cameras purchased today to be upgraded for HDTV use in the future. And anyone purchasing a camera today makes sure they have that option available to them.

"People are either making commitments now or waiting to see what's going to happen in the next few months," says Young. "And when people are making decisions they're making them based on upgradability."

Thorpe says there are some things that must be considered when buying a camera today that will be upgraded in the future. "Upgrading can hit you in a number of directions," he explains. "With the speed of related technologies everyone is concerned that what you buy today could be obsolete in a couple of years. That was a big factor in the design of our recent BVP series."

Thorpe says that HDTV will impact lenses, CCDs, DSP and the use of fiber connections from the camera head to the basestation heavily in the next few years.

Upgradability and switchability is something all camera manufacturers offer, so be sure to check with your favorite camera manufacturer about their specific features and upgrade path. One bit of advice they all offer is to make sure the camera you're considering has enough horsepower in terms of the analog-to-digital converter, whether it's 12 or 14-bit.

What To Expect

So what should those looking at new studio cameras expect to find? Expect a greater selection no matter what ATSC DTV or HDTV transmission standard you've chosen and also some new Digital Signal Processing (DSP) features and greater flexibility.

The contentious format arguments of earlier in the year seem to have receded into the background as everyone turns to the more important issue of getting their own facilities up and running.

In the meantime, as mentioned above, manufacturers have been working on new developments, particularly chip sets that will expand their product lines. Last NAB, for instance, the Philips LDK-2000 and 2000P 480p cameras garnered much attention. This year they'll be joined by a greater influx of 480p gear, including Sony's entry.

"We're watching 480p," offers Thorpe. "We're hearing a far more widespread signal from broadcasters and networks that progressive scan is probably where they should be moving and most will do it at the standard definition level. And we have embarked on development of a complete 480p system. But broadcasters are honestly apprehensive. It's expensive and even though they've talked about it very few have made the movement today to 480p."

But all manufacturers agree that 480p could find a very viable place in the market. Young explains. "For those mid to small markets 480p is a very practical solution for a DTV-type customer. It gives a 50% increase in perceived resolution plus it can fit into a 270 Mbps stream. It'll be very valuable to those markets."

Young sees the true value in that it will allow them to enter the DTV world fairly affordably. "They won't be the early adopters and it will give them a tool to jump onto the DTV bandwagon that's improved to the viewer without taking the whole station down," he adds.

Offers Delp, "480p is the easiest of all things to do and it does provide more vertical resolution, so for people not used to seeing a non-interlace picture they would think they have arrived. It's also better for line doubling needs."

Delp though does have his concerns as he wonders if the horizontal resolution will be adequate enough for the very large HDTV screens and sets that are expected to really give the medium momentum.

Panasonic however is taking a wait-and-see attitude on 480p, at least as it relates to studio cameras. In addition, Sturcke believes that 480p may go away when prices on 720p and 1080i equipment drops. Panasonic and other manufacturers indicate that in a couple of years the cost difference between 480p and its higher-resolution brothers may be negligible.

With regards to 1080i the big development is the introduction of 1080i CCDs from the Japanese manufacturers like Hitachi, Panasonic and Sony. To date Japanese CCDs have been 1035 lines, with some upconversion taking place external to the camera to bring the image to 1080 lines. That all changes this month and in early 1999.

Hitachi, for example, has just received its first prototype 1080i CCD chips at its plants in Japan. "Since last NAB we have not brought an HDTV camera into this country," offers Delp. "The reason we didn't is

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because they have 1035i chips in them and we were waiting until we could really get a production unit with 1080i." Delp says production of the cameras with the 1080i chip could begin as early as the middle of this month. He adds that delivery of the cameras should be available by NAB.

Panasonic's 1080i camera line, the AKHC-830 series studio camera and a handheld portable, should be available any day now, according to Sturcke. Availability of 1080i cameras will play an important part in driving HDTV camera sales.

"If someone is looking for a high-end camera I don't see the logic in buying a high-end standard definition camera," Sturcke believes. "There's security in purchasing a digital camera that has the ability to deliver HDTV plus the standard resolution needs of today."

Sony also will offer 1080i chips to purchasers of it's new generation HDTV cameras sometime in the early days of 1999. "We'll also have upgrade kits for those who invested in 1035 cameras and camcorders," adds Thorpe. The new 1080i cameras will have a designation of an A at the end of the old model number.

For example, the HDC-700 will be 1035 while the HDC-735A will be 1080i. "The 1080i chip bring us all up to the new standard that SMPTE created," explains Thorpe. "We all built equipment to the 1035 standard and it takes a couple of years to develop a new CCD so here we are."

The 1080i cameras will have a price premium (as will all DTV and HDTV equipment for the time being), somewhere in the neighborhood of 25 to 30% over standard cameras. Delp says that the main reason for the increase in cost is the expense of the CCDs.

The Hitachi SK3000 is the company's flagship high definition studio camera.

"The 2.2-million pixel CCD is a very expensive little animal and prices won't decline until that comes down in cost," he adds.

When it comes to progressive vs. interlace Philips has been a staunch advocate of progressive, but it also has the ability to offer 1080i version of its LDK900 720p camera that is in limited availability today.

"We believe that the progressive approach offers better resolution and it converts itself up and down much more cleanly," says Young. "But we don't want to lock ourselves out of the interlace market so we're positioning the camera to be flexible enough to address both sides of the market."

The 720p market seems to be the most interesting at this point in time. 480p seems to have struck a definite chord with broadcasters and manufacturers, as has 720p and 1080i. But one of the early knocks on 720p was the unavailability of equipment. And camera manufacturers seem a little hush-hush about it as well, with the Philips exception.

For example, Panasonic does offer a 720p camera but it isn't an official camera model. It's available on a case-by-case basis. But Sturcke wanted it made clear that it is available.

And Sony remains skeptical but is keeping a close eye on 720p. "We've embarked in a couple of programs which have certainly consumed our resources and we're taking our time making any decisions concerning 720p," explains Thorpe. "We're going to watch the marketplace a little more."

Thorpe says the reality today is that there is quite vigorous activity in 1080i but that the 720p broadcasters seem hesitant, but not from a transmission standpoint but rather production.

"They really aren't sure if 720p is going to make it as a production format," Thorpe comments. "Will there be a need for 720p production equipment or is it better to originate in 1080i and convert to 720p?"

Other Considerations

One non-traditionalist when it comes to the studio camera market is JVC, a manufacturer that doesn't offer a studio camera model but does have portable units that have found believers for studio operations.

David Walton, JVC marketing communications manager, says, "We've never pretended to address every facet of the broadcast industry. And if someone is interested in considering a portable camera in a studio configuration then there are a number of cameras to choose from. The real issue is first citing what recording format you're going to use."

Walton adds that JVC does have a number of studio accessories that will help convert the KY-D29U or KY-D29W (the widescreen version) for studio use, including studio viewfinders and multicore and triax camera control units.

Regarding HDTV cameras, JVC has offered its KH-100 portable camera 1080i portable camera for a couple of years but, at the current time, it is not outfitted for studio use according to Walton. He adds that JVC is working on.720p and 480p portable cameras that could be usable in the studio environment.

Of course, there is more to buying a camera then just resolution. There's also DSP and then consideration of the A-to-D converter. When it comes to DSP features and the like, things have been relatively quiet in recent months for most manufacturers.

"There haven't been any radical new advances," says Delp. "We've all added second skin tone detail to do two different people at the same time and we've added skin tone masking so we have painting control of the talents face. We're manipulating the picture color and detail wise really to the best of our ability. We're all getting better and better at refining what we already have."

Sony does have a new feature which it calls Skin Tone Auto Iris. "It allows you to use the skin tone detail circuitry to control the lens," explains Thorpe. "The camera can be put on auto iris, exposed for a face in a scene and then, regardless of what happens in the scene, the exposure of the face is held constant."

Young adds that the DSP features that manufacturers have mastered in the standard definition world have made the transition to HDTV quite well. When it comes to horsepower, there is some talk of 14-bit entering the picture, with Philips just taking delivery of its first 14-bit A-to-D converters that it hopes to have in cameras by the first quarter of 1999.

"We'll need 14 bit for 720p and 1080i A-to-D work and signal processing," explains Young. "Horsepower is the key. With the use of 14 bit we'll be able to put more in front of the 720p chip to keep the 600% highlight compression available and resolve more steps of gray."

Not all manufacturers are sold on the need for 14 bit at this time. Lynch wonders if the move to 14-bit is part of a numbers game. "Anything beyond 12-bit is sort of like the same situation in audio with regards to 16-bit or 32-bit," he offers. "Can anyone hear the difference? It's the same thing—anyone see the difference between 12 and 14-bit? Is it an issue if you're 54 or 54.3 dB?"

Adds Thorpe, "We'll be at 12 bit for a while. We see 14 bit on the horizon but we feel that 12 bit is doing an awfully good job and a couple of more bits help in theory but not in practice." He does admit that the extra bits will help lower the quantizing noise and exploit the dynamic range, but "12 bit does such a good job on current CCD technology that you really need a new CCD to take advantage of it." ■

DTVQUICKINFO

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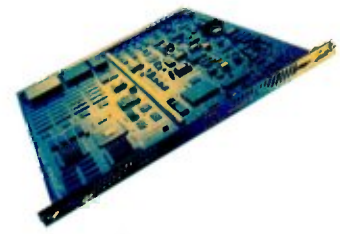

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CAMERA ACCESSORIES ROUNDUP

Anton/Bauer

Anton/Bauer's latest addition to its Logic Series InterActive battery system is the ProFormer professional Gold Mount battery. This new lightweight battery is designed specifically to replace OEM slide-in style batteries (e.g. NP types) with more than double the performance at an economical price. With a profile of only 1-1/2-inches (3.8 cm), and a weight less than 30 oz. (850 g.), the ProFormer battery complements the ergonomics of today's professional camcorders. ProFormer's 30-watt hour capacity delivers one hour continuous recording on a 25-watt camcorder—up to three times that of typical NP type slide-in batteries in normal use. ProFormer will also power a camcorder and a 25 watt on-camera light, through the PowerTap on every

Gold Mount, effectively and economically eliminating cumbersome battery belts. Anton/Bauer Gold Mounts are available for every professional and broadcast camcorder and are the standard battery format for DVCPRO.

Contact Anton/Bauer at (203) 929-1100.

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Arri

The ARRILUX 21/50 MINISUN is the smallest combination daylight luminaire that Arri has developed to date. Two daylight lamps of differing lamp intensity can be used. Both the 21 Watt lamp and the 50 Watt lamp can be operated from every DC power source from 12 V DC to 30 V DC (e.g. battery belt, car battery). Lamp exchange is quick and easy due to the bayonet lock. With the specifically designed power pack, the ARRILUX 21/50 MINISUN can be operated from the mains, and the 5 Ah battery belt included in the set can be charged. Simultaneous operation of the luminaire and charging of the battery is also possible. The lamphead can be separated from the housing with the integrated electronic ballast via an extender. The connecting cable can be attached to the lighthead from behind as well as from the side.

Also from Arri is the Daylight 18/12 Baby using the newest materials and optimizing the double skin housing ventilation to reduce size and weight. The Arri Daylight can be equipped alternately with 18kW or 12kW bulbs. This conversion possibility saves money and set-up time in areas of changing lighting needs. *Contact Arri at (914) 353-1400 or visit www.arri.com.*

■ For more information circle Reader Service #223

Canon

Canon's full-line of next-generation studio style HDTV lenses include the J20X7B Studio lens and the UJ65X9.5B Field Zoom. Both lenses incorporate HD-IF, an advanced version of Canon's Emmy-winning IF+ technology. The UJ20X7B achieves the shortest focusing distance in its class (0.6m) and wide 7mm focal length. The UJ65X9.5B Field Zoom features the world's longest zoom ratio for HDTV lenses—65X, a focal length of 9.5-620mm, (19-1240mm with built-in 2X extender). Both lenses feature Canon's exclusive Digital Zoom and Focus Servo system with 13-bit repeatability. Digital Servo Controls provide the precise focus control required by HD systems since the depth of field is almost half that of NTSC. *Contact Canon Broadcast (800) 321-4388 or visit www.usa.canon.com.*

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Century Precision Optics

The .55X reversible wide angle adapter and the .3X ultra fisheye are the newest members of Century's digital series lens adapters. This family of zoom accessories was created especially for digital camcorders with small lens fronts like the Sony VX-1000 and DSR-200 and the Panasonic AGE-Z1U. They also work with other small camcorders with 58mm front threads.

The Digital Series .55X Reversible Wide Angle Adapter is the first dual-purpose lens accessory. When attached to the lens front in one direction, the .55X performs like Century's other high-quality wide-angle adapters-offering a wider angle of view with minimal distortion. Used with the Sony DCR VX-1000, the .55X provides a horizontal viewing angle of 73 degrees (93 degrees when measured diagonally). When you remove the .55X, flip it around, and attach the other end to the lens front it becomes a fisheye adapter.

Also new is the .3X Ultra Fisheye Adapter which offers an extreme fisheye effect and a high degree of barrel distortion. It exaggerates depth by pulling nearby objects closer and causing distant objects to recede into the background. *Contact Century Precision Optics at (818) 766-3715 or visit www.centuryoptics.com.*

■ For more information circle Reader Service #225

Chapman/Leonard

Chapman/Leonard has released the Pedolly and Lencin pedestals. The Pedolly bridges the narrowing gap between broadcast and film production by swiftly transforming from a simulated three-point pedestal to a dolly ready for the dance floor or track. The pneumatic four-stage column offers a range of heights from a low mount height of 15.625 inches up to a maximum of 55 inches. The Lencin is a three-cornered base that keeps the same characteristics of the conventional pedestal with added rigidity, silent operation and improved turning capabilities. Additionally, the majority of the Lencin's components are interchangeable with the Pedolly's and the column range is the same.

Chapman/Leonard also offers the Super Peewee IV, a three-mode transmission that features conventional, crab and round steering capable of shifting while the dolly is moving or stationary, without the dolly operator's hands leaving the steering handle. Two modes are available to provide perfect steering geometry when reconfiguring the chassis to its various leg positions. *Contact Chapman/Leonard at (888) 883-6559.*

■ For more information circle Reader Service #226

Egripment

Egripment's RollAxis is a simple add-on section that complements all existing Egripment HotShots and HotHeads. The RollAxis adds a new dimension to the concept of remote camera control by providing the camera operator with more options and creative control. It offers complete 360-degree roll movement for cameras up to a maximum weight of 33.5 pounds. It includes a special joystick with thumb control.

Egripment's new crank wheels allow operators to pan and tilt an Egripment remote camera head. A new, fully adjustable drag system ensures that these new crank wheels have the right feel for the individual operator. They are fitted with a conveniently located reversing switch and speed control adjustment. The crank wheels are mounted in a solid, modern housing that can be positioned to any working angle desired. They can be used in combination with most Egripment remote camera heads. *Contact Egripment at (818) 787-6195.*

■ For more information circle Reader Service #227

Electrophysics

The Electrophysics AstroScope 9350 is an advanced night vision module for low-light imaging applications. Thanks to its modular design, the AstroScope 9350 converts camcorders) to optimized low-light imaging systems. Dark, moonlit or starlit nights can be imaged as bright, green high resolution scenes easily recorded by the camera's daylight sensor. The AstroScope 9350 can be used on different camera mounts delivering optimum performance for each configuration. *Contact Electrophysics at (800) 759-9577.*

■ For more information circle Reader Service #228

Frezzi Energy Systems

The NP1-3Pi allows camera operation from three independent NP-1 batteries at the same time. The unit mounts easily to your existing cameras' bracket just like a brick battery. Each NP1 is safely electronically isolated from each other to allow for balanced discharging and Intelligent Battery Monitoring keeps you informed on battery status. Also, the ability to utilize three NP-1 batteries at one time has very distinct advantages:
When a battery is low, it can be pulled and swapped with a fresh one while the other two batteries maintain the power to the camera. This unique feature will give the camera infinite run time.

By selecting one, two or three batteries the weight can be adjusted for each shoot depending on the situation requirements. This can ease the load of shouldering a 5.25 pound brick all the time. *Contact Frezzi at (800) 325-1030 or visit www.frezzi.com.*

■ For more information circle Reader Service #229

Fujinon

Fujinon's Broadcast & Communications Products Division has introduced its latest innovative product line, the AT2 family of ENG lenses. Fujinon's A10X4.8EVM/ERD, A15X8EVM/ERD and A20X8EVM lenses feature AT2, which combines the company's exclusive aspheric technology with a

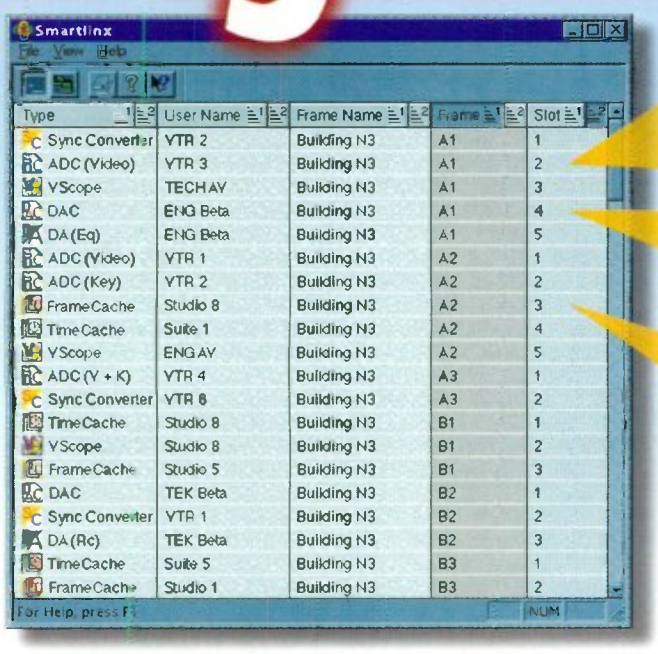
new inner focusing system to reduce the minimum object distance (MOD) of each lens. The A15X8EVM/ERD hand-held ENG zoom lens combines optical performance with Fujinon's AT2 technology, which reduces the MOD to 0.65 m. Fujinon's A15X8EVM/ERD also has ramping characteristics and a variable zoom grip and selectable speed, creating the smoothest possible zoom from 8 to 120 mm. In addition, the A15X8EVM/ERD has a 15X zoom ratio. *Contact Fujinon at (973) 633-5600.*

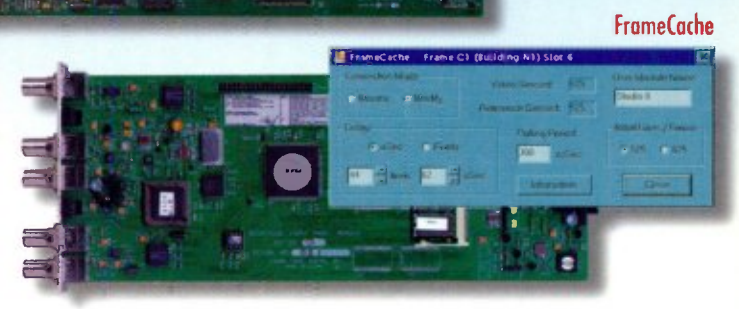
■ For more information circle Reader Service #230

Lee Filters

Lee Filters has released a glass series developed specifically for architectural and themed environments. The series offers an entirely new range of designer selected colors in dichroic glass and polyester, along with a framing system to attach filters to virtually any lighting fixture. The series includes dichroic glass filters, polyester filters, custom framing system and standard framing.
Lee Filters is also introducing Heat Shield, Acrylic Panels and Colourweb as part of its recent product offerings. The Heat Shield is used between a high temperature light source and color filters,

DigiLinx™





Modular Digital Systems

with SmartLinx control through Windows 95/98/NT

Control -

DigiLinx is the world's most advanced family of modular digital products. Each compact module features on board digitally calibrated trims and mode controls for precise and consistent digital and D-A/A-D processing.

Each module can be controlled remotely or locally. Up to 170 DigiLinx modules can be networked though our Host adapters to one or more PCs.

The SmartLinx Windows 95/98/NT control program maximizes the power of the DigiLinx family by providing centralized control and monitoring in a user friendly Windows environment. SmartLinx is also a gateway to linking DigiLinx functions to other devices, such as Sierra Video Systems routing switchers. This combination increases facility functionality and reduces overall operator requirements.

High density (up to 24 channels of A-D/D-A conversion in just 1RU) combined with the large selection of available functions makes DigiLinx ideal for the demanding mechanical rigors of field systems as well as the most sophisticated centralized video facilities.

Flexibility -

The DigiLinx family includes:

Frames - Table top 2 module, 1RU 6 module, 3RU 18 module

Analog to 10-bit serial ITU-601 converters
RGB/YUV, RGB+S/YUV+Alpha, Alpha Only,
Adjustable Phase sync to SDV

10-bit serial ITU-601 to RGB or YUV analog converters
RGB/YUV, RGB+S/YUV+Alpha, Alpha Only

OS-601 SDV to RGB converter module with On Screen color vectorscope and luminance display

DigiCache™ uncompressed 270 mbps SDV delay/storage modules

TimeCache - variable time delay up to 15 seconds
ImageCache - up to 500 frames of still image volatile storage
SlideCache - up to 12 frames of still image non-volatile, flash memory based, image storage
FrameCache - frame synchronizer with a unique clean video freeze feature
AniCache - animation record/playback up to 15 seconds
DropOutCache - drop out sensor, "good video" filler

4, 8, and 12 output Digital Video Equalizing DAs
4, 8, and 12 output Digital Video Reclocking DAs
4, 8, and 12 output Analog Video DAs

Dual SmartLinx RS232 adaptors

Local and Remote control panels

Sierra Video Systems is a leading manufacturer of ultra high reliability broadcast video and post production products with the best warranty and the shortest lead times in the industry. Link up with Sierra Video Systems for your digital future.

Sierra Video Systems, Inc.
P.O. Box 2462
Grass Valley, CA 95945

SIERRA VIDEO SYSTEMS
Your smart systems company

www.sierravideo.com

Tel: (530) 478-1000
Fax: (530) 478-1105
Email: info@sierravideo.com

More Information Circle 127

What do we really need in a video server?

Shared Central Storage is the key.

let's **connect everything**

through a fast Fibre Channel network,

then we can add storage when we need it.

but, what about transfer rates?

there is **no transfer rate**

we go ***direct to air***

from shared storage.

how many **channels?**

unlimited. we start with five playback channels

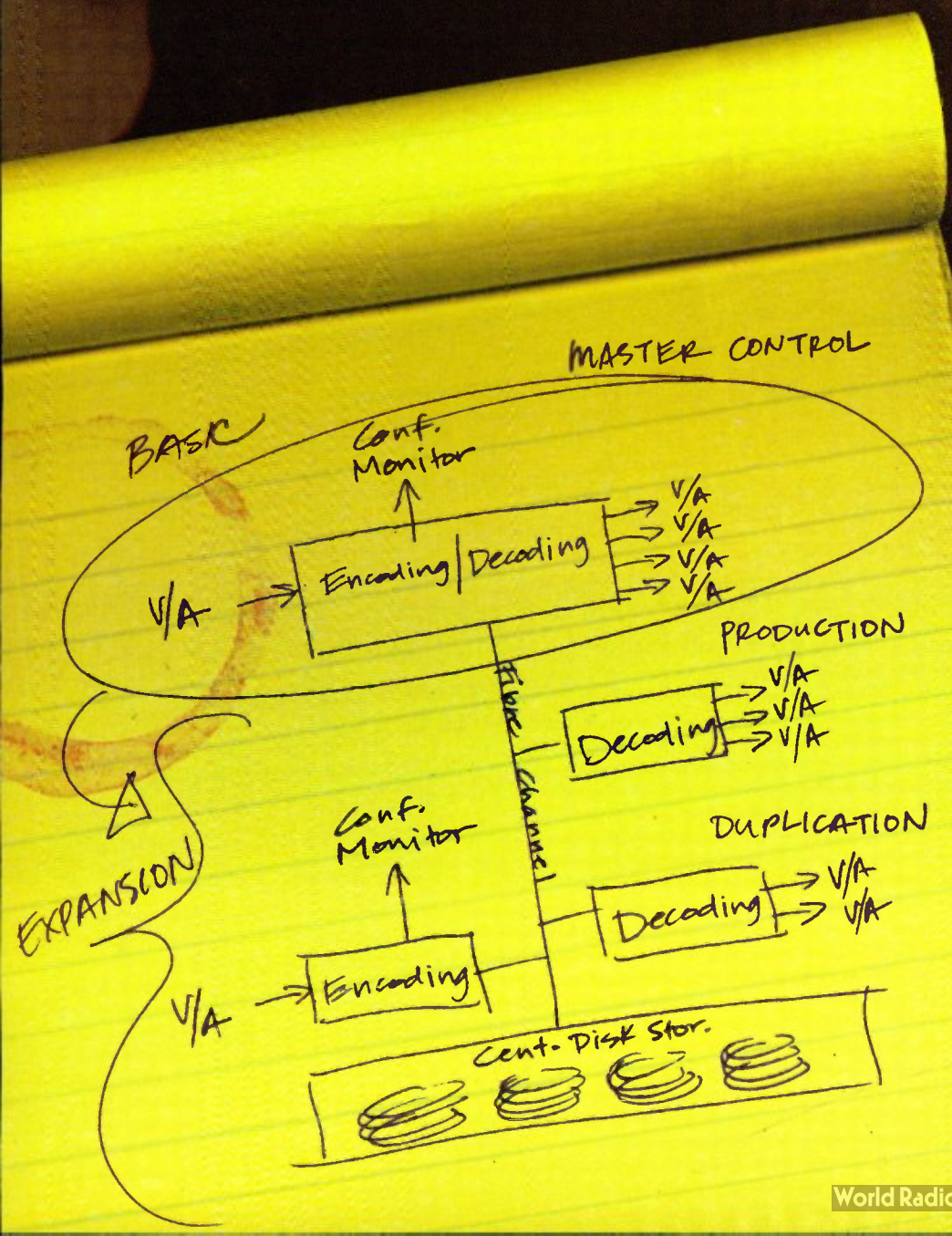
and one record channel per unit.

then tie the units together on a network.

we can build it as big as we want.

Right. A **modular design** with

no restrictions.



Brilliant

we gain the **flexibility**

of distributed processing using a

network-centric

What we

now,
how do we ensure **recording quality?**

let's build in a decoder for **confidence monitoring.**

Great. and a **full-resolution**
media browser
to instantly view any media we want.

Okay, what format?
MPEG
of course, It's **the DTV standard.**
It's government mandated.

but,
what about **our budget?**
It will **cost thousands less**
just by using off-the-shelf storage and
standard computer industry technologies.

so how do we make it happen?

call **Vela Broadcast**

architecture.

need is RapidAccess™

Rapid Access from Vela Broadcast is everything you need in a video server. From the quality of high-performance MPEG to the scalability and flexibility of a network-centric architecture. Now your server can grow with you, and at a cost that will be pleasantly surprising. For more information, contact Vela Broadcast at 1.800.231.1349 (outside the US, 1.801.464.1600) or visit us on the web at www.vela.com.

Vela Broadcast

More Information Circle 128

CAMERA ACCESSORIES ROUNDUP

extending the life of the gel. It absorbs the dangerous IR part of the spectrum and protects sensitive items from direct or indirect exposure. LEE's color-matched Acrylic Panels are available in seven technical colors: CTO, 1/2 CTO, .3ND, .6ND, .9ND and CTO plus .3ND and CTO plus .6ND. The Colourweb is a simple-to-use processing tool that will help users select the filter combination needed to obtain correctly balanced color prints from color negatives.
Contact Lee Filters at (818) 238-1220.

For more information circle Reader Service #231

Lowel

Lowel's GO Kits are smaller and more compact. They combine new GO cases with the newly designed Uni-stand (taller, with wider base and smaller collapsed length than the Omni stand). All of the GO Kits are small enough to travel as carry-on luggage. Of the eight GO Kits, four are ViP (Pro and V-light) combinations and four are Tota/Omni combinations. Designed for pros on the go, these compact kits go hand in hand with today's new breed of smaller, lighter cameras.

The new portable Lowel Dimmer comes in two models (LD-10 & LD-20) and has the following features: four storable, variable light level settings; storable, variable rate and intensity "flicker" function for special effects; optional wireless remote that can control up to 10 dimmer units; no filament hum during dimming; and DMX 512 lighting control protocol (Model LD-20 only). The dimmer quickly mounts to Lowel light stand strut and can easily be locked together in multiples. Suggested list prices upon December release are : LD-10 $345; LD-20 $375. *Contact Lowel at (800) 334-3426.*

For more information circle Reader Service #232

Miller Fluid Heads

Miller Fluid Heads latest ENG fluid head is the Miller DS-25. Designed specifically to match the weight, balance and price-performance of the new Sony DSR-300 DVCAM and lightweight DVCPRO camcorders, the DS-25 is made for news gathering. The four-position pan and tilt gives excellent resistance from a light touch to heavy drag suited to larger payloads. The DS-25 has a 100mm ball levelling base for compatibility to most standard tripods. Miller packages the DS-25 in a range of systems, tailored to suit both ends of the price/application spectrum.

The Miller Arrow 50 100mm ball levelling fluid head, with rear control illumination, now supports the industry's widest range of ENG/EFP configurations with an extended four-position counterbalance to complement its seven-position pan/tilt drag range. Regardless of choice in camera, tape or disk back, battery, lens, matte box, microphone or on-camera light configurations, the Arrow 50's selectable counterbalance, 70mm offset sliding plate and extended drag range ensures optimum support for payloads from light camcorder to configured EFP.

Miller Fluid Heads' DS-5 and DS-10 are complete, ready-to-go systems comprised of an alloy diecast fluid head with 75mm ball levelling, lightweight alloy tripod, detachable above ground spreader, rubber feet and pan handle. *Contact Miller Fluid Heads at (973) 857-8300.*

For more information circle Reader Service #233

O'Connor

The Ultimate DV and DVS fluid heads are full-featured, lightweight, and compact. Perfect for DVCam, DVCPRO, and other smaller format 3-CCD camcorders. The Ultimate DV & DVS fluid heads uses O'Connor's pan-and-tilt fluid drag system. Counterbalancing is also infinitely adjustable, which enables "tuning" of the head to precisely neutralize the camcorder's weight throughout the entire tilt range.

Based on O'Connor's Ultimate 2575 fluid head, the Ultimate 2060 fluid head offers the same features as its 2575B fluid head in a compact, lightweight package. The Ultimate 2060 has a new platform locking pin to hold the platform horizontal during camera changes.*Contact O'Connor Professional Camera Support Systems at (714) 979-3993 or visit www.ocon.com.*

For more information circle Reader Service #234

Sachtler

The new Sachtler monopod combines lightweight carbon fiber technology with quick and easy handling. A two-stage carbon fiber leg is either fitted with the Sachtler Touch & Go or a Betacam quick-release system. The Betacam quick release allows for direct connection of most ENG cameras without the tripod adapter plate.

Sachtler has also reacted to production trends for new camera motion with the introduction of a Dutch Head attachment that enables the camera to tilt the horizon. The Video 18 Dutch comes with a cross sliding plate with 60mm sliding range. This provides for precise camera control, allowing the camera's center of gravity to be aligned over the swiveling axis. The Video 18 Dutch can be used on top of Video 18 Plus/Sensor, Video 20 Plus/Sensor and Caddy fluid heads, as well as other Sachtler fluid heads incorporating the camera plate 16 quick release.

The new fluid head DV 12 Pro—designed for use with digital ENG cameras—comes with five-step fluid damping and a five-position counterbalance system. The fluid head DV 8 Pro is for lightweight digital cameras in documentary and industrial video applications. It also comes with the five-step fluid damping and a five-position counterbalance system (Plus style).*Contact Sachtler at (516) 867-4900.*

For more information circle Reader Service #235

Schneider Optics

Schneider Optics has introduced an expanded range of graduated color filters. These filters have been designed in colors that combine well with sky, trees, grass, earth-tones and skin-tones. The filters are available with hard- and soft-edge blends, in a variety of strengths. Current colors include amber, gold, coral, paradise blue, storm blue and sapphire blue, as well as neutral density and ND attentuators.

Schneider Optics has also engineered a significant improvement in motion picture image quality with its new line of Schneider B+W (Biermann + Weber) filters made from crystal-clear, water-white optical glass. The filters are designed to increase creative control during production and reduce reliance upon post-production correction of filter-related photographic flaws. *Contact Schneider Optics at (516) 761-5000.*

For more information circle Reader Service #236

Telemetrics

Telemetrics has released an enhanced line of triax and coax camera control systems that incorporate separate IFB channel and universal mounting provisions for non-docking and hip pack configurations. Other new features include external microphone selection switches and improved styling.

Telemetrics has also enhanced the operation of its Robotic Camera Trolley Systems with the addition of programmable presets. The trolley systems, which are available in linear, "H" track and vertical configurations, are designed for remote broadcasting and for studio applications where space is at a premium. The systems can be configured to meet virtually any production of broadcast studio application with custom track lengths and adjustable end-stops. The lightweight trolley systems can carry up to 100 pounds.
Contact Telemetrics at (201) 848-9818 or visit www.telemetricsinc.com.

For more information circle Reader Service #237

Unique Devices

Unique Devices' DIGI-CRANE is a video and film crane that features a smooth motion, Pentium-driven digital motor system for pan, tilt, and focus. The slip ring design in the head permits continuous motion in pan and tilt without cables that limit turning. The boom can be assembled at any length from 10 to 40 feet (in five-foot increments). Additional features include an A-to-B monitor switch and a press-to-talk switch on the zoom handle. It can be operated by a single person and packs in cases that can travel as checked baggage. *Contact Unique Devices at (512) 476-8861.*

For more information circle Reader Service #238

Vinten

The Vision 100 ENG pan-and-tilt head has been designed especially for digital camera combinations and one-piece camcorders. A highlight of the Vision 100 is its new Thin Film drag technology, which ensures consistent drag and constant performance especially in the toughest weather conditions from -40C to +60C. The Thin Film technology provides a seamless transition into whip pan and instant recovery to original drag settings so you stay in control with smooth movement at all times. Adding to this, its

new, illuminated digital readout display makes it easier for operators to make adjustments and provides repeatable balance settings for easier and rapid set-up. *For more information contact Vinten at (888)2-VINTEN or visit www.vinten.com*

For more information circle Reader Service #239

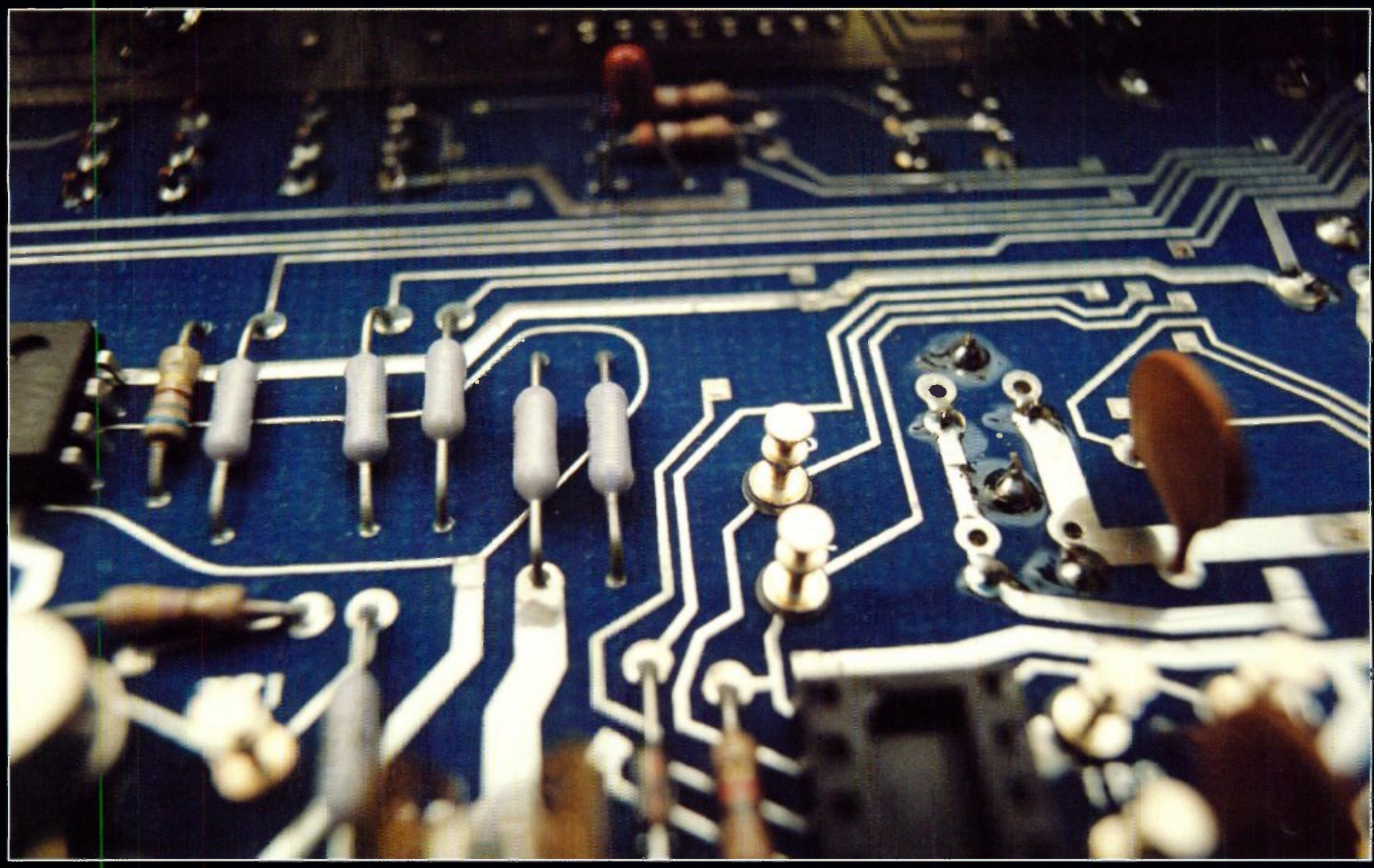
Westcott

Westcott has added six five-foot by six-foot Masterpiece Collapsible Two-In-One Illuminator Backgrounds to its line. The background consists of two complete five-foot by six-foot backgrounds combined on one steel frame. Each is composed of a low and high key color. The color combinations for the six backgrounds are the following: Storm Clouds and Gentian Blue; April Showers and Heather; Bracken Brown and Light Gray Splatter; Hazel Pastel and Athens; Costa Brava Blue and Canberra; Black and White.

As with the other Westcott Masterpiece Collapsible Illuminator Backgrounds, the new Two-In-One backgrounds collapse to a third of their open size and fit into a bag approximately 30 inches in diameter. Also, they can be used with the Westcott Background Stand. The suggested retail price of the new five-foot by six- foot Two-In-One backgrounds is $229.90.
Contact Westcott at (419) 243-7311 or visit www.fjwestcott.com.

For more information circle Reader Service #240

Manufacturer Solutions



Turn the page...
And begin finding the answers to questions about your facility's digital future

ADC
Barco
Columbine JDS
Evertz
JVC Professional Products
Louth Automation Systems
Microwave Radio Communications
NDS
NDTC
Philips Digital Video Systems
Sony Electronics

Your High Power Digital Solution for Today and Beyond

Providing Solutions

The VISIONARY™ DT UHF IOT transmitter.

VISIONARY™ DT series transmitters combine our extensive digital signal processing experience with proven IOT amplifier technology resulting in a world-class transmitter system. Utmost performance and redundancy within a small footprint is the mark of this series. Power levels of 12.5kW-100kW are available in air- as well as water-cooled configurations. Exceptional performance is derived from highly stable and low noise carrier generation, precise digital filtering and quadrature vector modulation techniques, and highly linear feedforward amplifiers. Since the 44MHz IF is compatible with analog, this unit can be configured as an analog transmitter easily converted for digital operation.

CERTIFIED ISO9001 CERTIFIED

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Broadcast Systems Division

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FAX 724-941-4603

More Information Circle 100

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Profile

The Broadcast Systems Division of ADC Telecommunications, Inc. is committed to providing the most innovative solutions to your DTV broadcasting needs. We recognize that the transition to digital broadcasting is a challenge presenting various aspects to consider. Whether your station is a top-ten network affiliate or a public TV station, we are prepared to create customized digital RF solutions for your specific application.

Our Parent Company

ADC Telecommunications, Inc. (NASDAQ: ADCT) is a leading global supplier of voice, video and data systems for telephone, cable television, Internet, broadcast, wireless and private communications networks. ADC's systems enable local access and high-speed transmission of communications services from providers to consumers and businesses over fiber optic, copper, coaxial and wireless media. Headquartered in Minneapolis, Minnesota, ADC has approximately 7,800 employees worldwide and annual sales of $1.3 billion. Additional information about ADC and its related business units, products, and technologies is available at www.adc.com

Philosophy

ADC Broadcast Systems Division's strong commitment to quality and customer satisfaction is the primary foundation on which our company was built. This philosophy, coupled with our expertise in RF transmission and signal processing, has been the cornerstone of our business. Our goal is to provide the highest level of product performance, system design/integration, and customer service to ensure complete satisfaction. We design and manufacture our products under a quality system that is ISO-9001 certified.

DTV Products

Our broad line of DTV Broadcast products exceeds the basic transmitter offerings of many other manufacturers. In addition to our line of UHF DTV Transmitters, we also produce the Digital Exciter Plus system and our patent-pending N+1 adjacent channel combiner technology.

DT800 and VISIONARY™ DT Series Transmitters

Our broad DTV transmitter line combines our extensive digital signal processing experience with the latest solid state and tube-type amplifier technology. These products are available in power levels ranging from 5W to 100kW (average). Whether your preference is solid state, diacrode, or IOT, we can provide a solution to meet your digital transmission needs.

DT1A 8VSB Modulator

The entire ADC digital product line uses the DT1A 8VSB modulator. This modulator accepts an ATSC digital bit stream and provides a fully ATSC compliant 8VSB output with built-in digital correction. Since we produce our own modulator, you gain the confidence of dealing with a single source for the complete system.

The Digital Exciter Plus System

If your plan includes converting to digital through the use of your existing transmitter, our Digital Exciter Plus System will accomplish that goal. In many cases, an existing UHF transmitter can be converted to a dual mode DTV/NTSC system. This system makes cost-effective digital broadcasting a reality!

The N+1 Adjacent Channel Combiner

The FCC has specified DTV channels that are upper adjacent to the original NTSC channel for several hundred stations across the nation. If this unique challenge has been presented to your station, ADC has an innovative solution eliminating the need for a second antenna and transmission line or the compromised performance of a "dual channel" transmitter.

DT1A 8VSB Modulator designed and built by ADC Broadcast Systems Division

More Information Circle 101

New Product Release

New High Definition Monitor - HDM 5049-Offers Real 16/9 Aspect Ratio Monitor for 19" Rack Use

BARCO introduces the HDM 5049 17" high definition monitor to the HD broadcast market. BARCO's new HD monitor supports all HDTV formats, including the highest resolution, non-interlaced standard. With its sleek 16/9 design, the HDM 5049 is 19" rack-mountable and occupies only eight rack units of height. Its compact size makes it the ideal HD monitor for today's crammed control and equipment rooms. The HDM 5049 can also be used as a display for BARCO's VIVALDI Multi-Image Display System.

Soren Pihlman, BARCO Communications Systems executive vice president and general manager, said, "U.S. broadcasters have an aggressive mandate to introduce HDTV to specified markets by May 1, 1999. While discussions are still ongoing as to the definition of true HDTV, we are preparing ourselves for that immense market." The BARCO high definition monitors are being used at the following national broadcasters: HBO Communications and HBO Studios, FOX, ABC, and their affiliates. According to Charles Cataldo, Vice President Broadcast Operations at Home Box Office, "our redesign has included BARCO HDTV monitoring within master control, especially because we will be launching HDTV services early in 1999."

RE 4221

BARCO introduces an All-In-One Digital Satellite News Gathering Encoder / Modulator BARCO introduces RE 4221 DVB-compliant Digital Satellite News Gathering encoder/modulator featuring 4:2:2/4:2:0 encoding, QPSK/8PSK/16QAM modulation, digital and analog video as well as audio interfaces - all included in a very compact 19", 2U chassis with front panel control. The design of the RE 4221 DSNG encoder makes for easy transportation and set-up for event broadcasting. The unit has low power consumption and both encodes and modulates the transport stream for output to a satellite upconverter. The encoder is designed to be compliant with the forthcoming DVB/DSNG standard.

The RE 4221 is designed specifically for Digital Satellite News Gathering and point-to-point contribution applications and has a single channel encoder with a built-in modulator that allows for efficient vehicle space usage. Front panel control, macro contact inputs and pre-stored configurations allow for quick set-up and reconfiguration of the encoder on-site.

The multiplexing capabilities of the RE 4221 DSNG Encoder allow the unit to be used in multiple program transport stream applications (MPTS) by cascading of two or more encoders. This allows for functional expansion while taking advantage of the 96 Mbit/s aggregate transport stream bandwidth available in the RE 4221 for satellite communications.

"UNO" Display Processor

"UNO" Display Processor Makes Any VGA Monitor a Broadcast Monitor BARCO's UNO reproduces digital video signals on a standard computer display (32 kHz), or on an analog RGB monitor (15 kHz). In contrast to simple SDI-to-VGA converters, UNO maintains the broadcast picture resolution, provides full color matching capabilities, and most significantly, adds real broadcast monitoring functionality to a standard computer display. Attractively priced, UNO offers a flexible and cost-effective alternative to using conventional broadcast monitors for viewing applications.

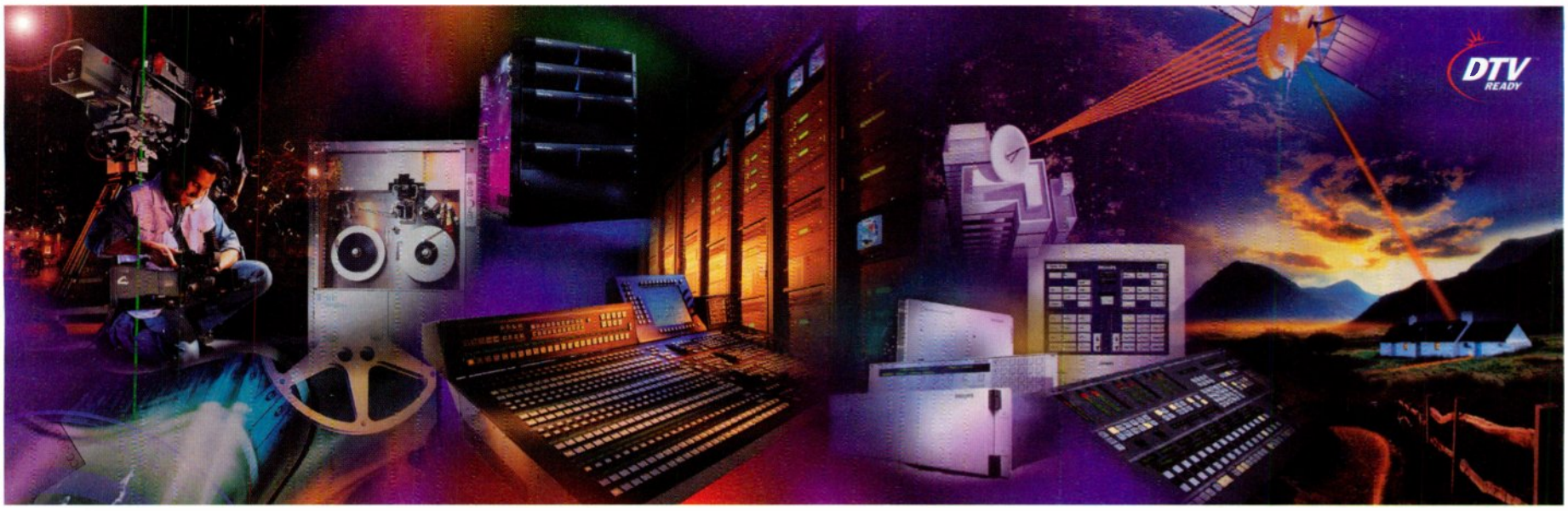
UNO is more than just a converter. It adds broadcast features to a VGA display, such as pulse cross, blue only, built-in Under Monitor Display, built-in tally, and automatic color alignment. In combination with UNO, every multi-scan monitor will display stable broadcast pictures, reducing eyestrain considerably.

UNO is ideal for all broadcast-viewing applications where mobility, flicker-free images, esthetic appearance and cost are of prime importance. Due to its compact, light-weight housing, the UNO can easily be moved to other locations and connected to any other multi-scan or analog RGB monitor. UNO allows the user to select the screen model and size for every different application: newsroom, studio floor, fly-away kit or video-to-film transfer. In addition, the life cycle of UNO is considerably longer than a conventional CRT monitor because retubing costs are no longer an issue.

Just like BARCO's VIVALDI, UNO features remote monitoring capabilities a conventional monitor cannot offer. BARCO's UNO display processor provides alarm generation in the event of signal loss, and enables computerized logging of signal presence. Such monitoring and reporting functions are especially significant in control room applications.

PHILIPS DIGITAL VIDEO SYSTEMS

From start to finish, Philips has DTV solutions that are ready today



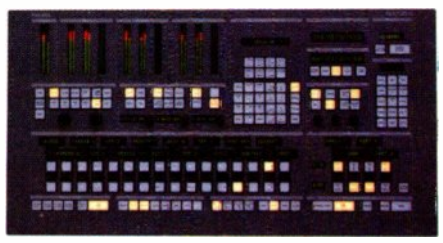
COMPANY PROFILE

Philips Digital Video Systems is a leading manufacturer of digital equipment and systems for the broadcast television and video production communities, and is a world leader in MPEG-2 compression and transmission systems. With a comprehensive line of products,

Philips' LDK2000 True Frame Progressive™ studio camera—a DTV Ready camera that uses today's digital infrastructure.

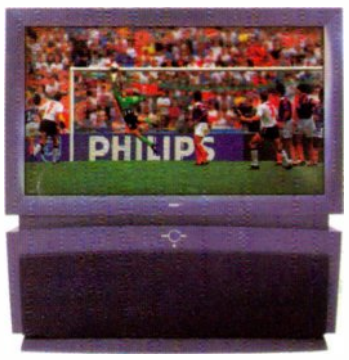
Philips technology covers every link in the digital chain from cameras to home receivers. They offer a multi-format approach to the new DTV standard that is tailor-made for every facility. The company is leading the field in high definition television technology systems, and has dedicated the efforts of the world's best engineers, researchers, and technicians to develop practical future-proof answers that are ready today. Philips' end-to-end applications are both expandable and multi-format friendly, so broadcasters can take the right steps—without breaking the bank.

The Philips Media Pool video server is a scalable system designed for today's and tomorrow's most demanding operations.



Like most of Philips' on-air products, the Saturn digital master control switcher is ready with DTV and HDTV solutions.

The Philips approach is simple—give broadcasters the best tools to become DTV Ready™ at their own pace. They have taken a global approach to the digitalization of the medium by developing a comprehensive set of digital tools and systems. The Philips Media Pool video server acts as the anchor of this evolutionary leap forward and Philips completes the picture with the Saturn digital master control switcher, routing systems, automation products, and digital compression and transmission systems.



No matter what the future holds, Philips is preparing solutions for broadcasters and consumers alike.

Philips Digital Video Systems is part of Philips Electronics of The Netherlands, one of the world's largest electronics companies. It is a global leader in electrical and lighting products, consumer and business electronics, home telephony products, personal care products, television picture tubes, computer monitors, and semiconductors. Philips employs over 260,000 people in more than 60 countries.

Research facilities are located in six countries, comprising one of the world's largest privately funded research institutions. It is the originator of more than 10,000 inventions and 65,000 patents. It is renowned for the invention of the Plumbicon camera tube, rotary-head shaver, audio cassette, charged-coupled device (CCD), laser video disc, compact disc (CD), DVD, and others.

Philips has received five Emmys for technological developments from the National Academy of Television Arts and Sciences. In the field of digital television, Philips has been a pioneer for years, participating in the development of the ATSC digital television standard and has been a member of the Grand Alliance since its inception.

DTV PRODUCTS

- Digital studio, EFP, and ENG cameras
- High definition film scanners and telecines
- Digital video servers
- Digital routing switchers and control systems
- Digital master control switchers
- Station automation systems
- Digital live production switchers
- Broadcast noise reduction products
- Digital compression and transmission systems
- Digital receivers

For more information on Philips' products and services call toll free 1-800-962-4287 or visit their web site at www.broadcast.philips.com.

PHILIPS

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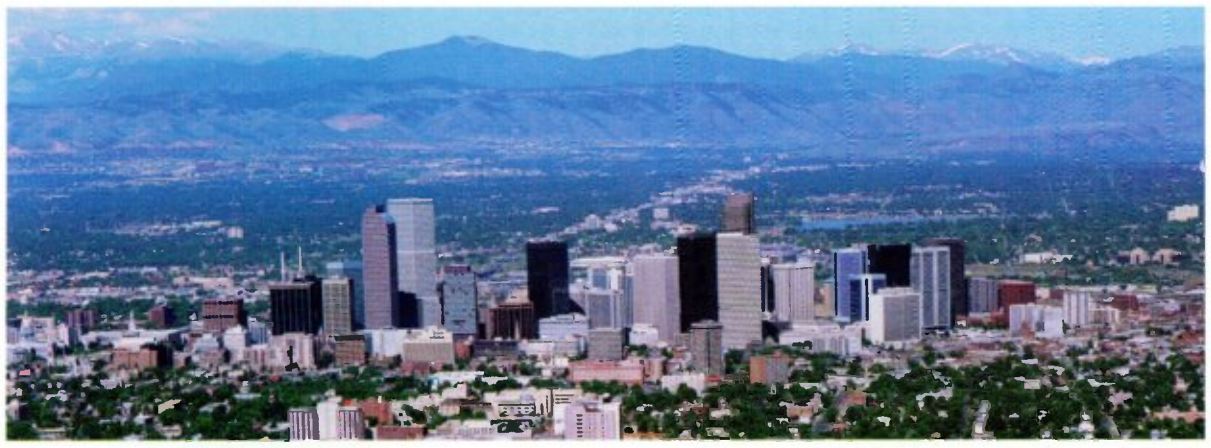
COLUMBINE JDS

World Wide Media Solutions



Columbine JDS is headquartered in Denver, Colorado

More than thirty years ago, Columbine JDS literally invented the industry of media software to manage and control the business processes of broadcasters. And today, CJDS remains one of the world's leading suppliers of software solutions for the industry. CJDS products automate and streamline business processes of television and radio stations, cable operators, broadcast and cable networks, direct-to-satellite television services, advertising agencies, and national sales reps. CJDS helps people in the business of media to buy, sell, and schedule advertising and programming, as well as to automate the process of airing programs and commercials. The advanced technologies offered through CJDS products not only allow customers to maximize revenues, they help broadcasts run more smoothly, and ultimately give viewers and listeners a superior quality presentation and better service overall.

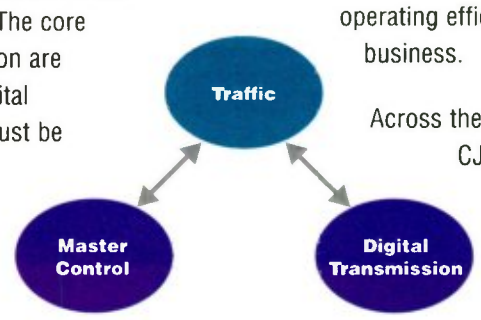
In the past decade, CJDS has had the opportunity to work with some of the world's digital media pioneers. As the television industry embarks on the transition to digital broadcasting, CJDS builds on that experience, leading the way by offering complete solutions that will not only make for a smooth transition, but will allow broadcasters to take advantage of all that digital has to offer.

Making the Move to Digital

CJDS sees the transition to digital broadcast as a complete station transition, not just a technology purchase. How carefully a station makes operational *as well as* technical decisions will determine its ability to take advantage of new digital opportunities.

If a station or network cannot schedule, track, and bill advertising, it cannot fully integrate DTV systems.

At NAB '98, CJDS introduced its product directions for the digital future, with integration as the fundamental guiding principle. The core components of the CJDS solution are Traffic, Master Control, and Digital Transmission — all of which must be integrated in every new digital station to realize efficiencies of operation, and flexibility of business direction. All parameters needed for the automation of master control and digital transmission are first defined and ultimately reconciled in traffic.



The solution begins with any of CJDS' standard traffic products or their next-generation **Paradigm** system. In the new digital station, traffic passes playlist information to both the master control and transmission operational areas. Through CJDS' **MCAS-III** (Master Control Automation) product line, all origination equipment is accurately controlled and as-run information is seamlessly passed back to traffic for automatic reconciliation. Likewise, with CJDS' PSIP (Program & System Information Protocol) transmission product, traffic passes similar information to the transmission area, where the CJDS PSIP coordinates all the digital transmission functions so that proper PSIP information tracks program information. PSIP is the only way new set-top boxes will be able to accurately decode incoming HDTV or DTV signals.

Integration between both master control and transmission automation is required for stations to be able to make last-minute changes in the HDTV and DTV environments. With the integrated CJDS equipment, all of these functions are addressed while providing the flexibility for stations to grow and take advantage of new business opportunities.

CJDS is the only company that addresses the station as a whole. And to complement the master control and transmission products, the company has launched **Material Manager**, to manage materials from their point of entry at the station through every step of the station's broadcast process.

The Complete Package

The "total solution philosophy" of CJDS doesn't stop with the installation. All CJDS products are supported by one of the largest support networks in the broadcast industry, staffed by people with the experience and know-how to keep the systems running smoothly. Which isn't surprising — when you consider that the people at CJDS are experts in all facets of providing solutions for the media industry. In fact, the company also offers consulting services with unique capabilities to solve problems and advise clients in their pursuit of increased operating efficiency in today's challenging business.

Across the country and around the world, CJDS systems are helping the broadcasting industry maximize operating efficiencies. The shift to digital involves major investments by networks and local stations. CJDS is ready to provide the systems to realize the full potential of digital so you get the most from your investment.

For more information on CJDS products and services contact us at:

Columbine JDS Systems, Inc.
1999 Broadway, Suite 4000
Denver, CO 80202-3050
Tel: 303.237.4000
Fax: 303.237.0085
www.cjds.com

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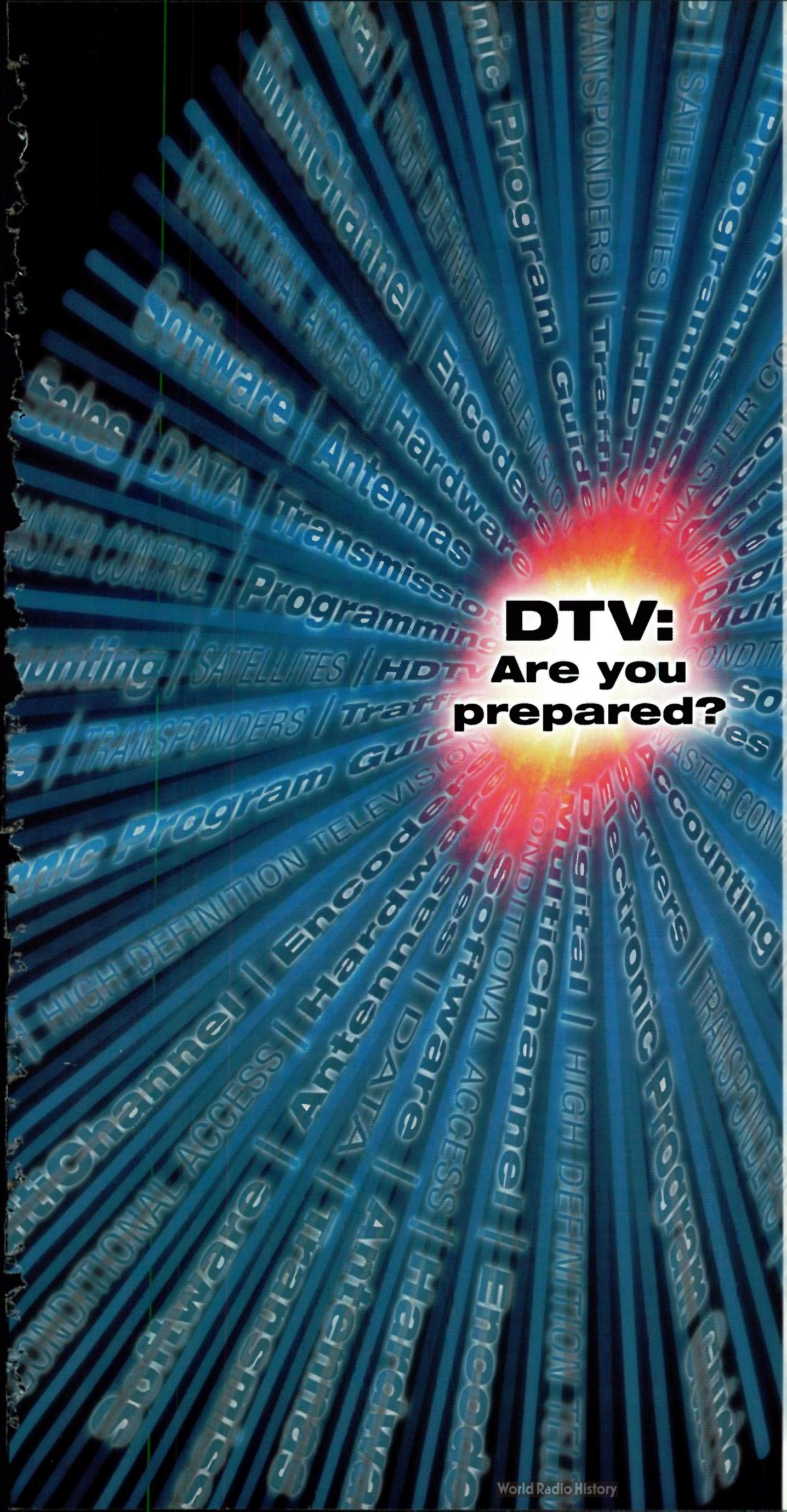

There's No Time to Lose.

Choose the most essential element for a digital television implementation.

- ❑ antenna
- ❑ multiplexer
- ❑ preconditioner
- ❑ routers
- ❑ programming
- ☑ a plan
- ❑ encoder
- ❑ transmitter
- ❑ cameras
- ❑ software
- ❑ additional staff

That's right, before anything else, before you spend a single dollar on new equipment or new programming or additional personnel, you're going to need a solid plan—a blueprint that allows you to establish goals, evaluate alternative solutions, and helps you make the wisest use of your budget dollars.

Columbine JDS has a team of experts with years of experience in digital television and multichannel broadcasting. And we've got the solutions for the digital world, including software for:

- ***Digital Transmission Management***
- ***Video Server Control***
- ***Multichannel Master Control Automation***
- ***Multichannel Program Management***
- ***Multichannel Sales and Traffic***

We're ready to help. So, before you do anything else, call and ask about our DTV products and services.

CJDS

COLUMBINE JDS

Solutions for the digital world

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EVERTZ HDTV SOLUTIONS NOW AVAILABLE!

HDTV LOGO INSERTER
Model HD9525LG

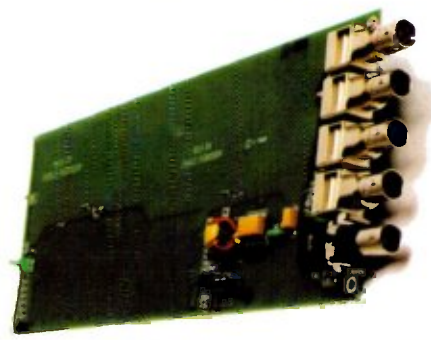
System used for NASA Space Shuttle Launch October 29th, 1998

The Evertz HD9525LG Logo Inserter system is a complete package that will key one or many static/animated "bugs" over full bandwidth HDTV program video signal. Logos are stored in flash memory and may be downloaded to the system.

HDTV GRATICULE GENERATOR
Model HD9590

The HD9590 Graticule Generator is a multi format digital video graticule generator. The HD9590 keys various alignment markers over a source video picture to facilitate film transfer, post production and quality control measurements relating to picture location for various film aspect ratios, safe action and title areas as well as picture center. Model HD9590 also allows for multiple user defined pre-stores that can be re-called and re-defined at anytime plus many more features...

DISTRIBUTION AMPLIFIER
HD 1.5 Gb/s



The Evertz 1.5Gb/s HDTV DA is one of the first high bit rate products to be introduced and working at NAB '98. The DAs are featured in a 1RU frame that houses 3 cards that each have one input and four outputs or a 3RU frame that houses 15 modules. The HD DA's are 1.5Gb/s DAs with automatic input equalization, transparent to all serial data rates (270Mb/s to 1.5Gb/s). This 1 RU frame features fixed dual power supply's and the 3RU frame features hot swappable cards and dual power supplies. Evertz also offers a true reclocking DA as well as fibre optic Das.

HDTV 12 x 1 ROUTER

The X-HD9500 series HDTV video router routes 1.5Gb/s serial digital signals. The unit can be controlled from the front panel controls, via an optional remote control panel, or through GPI controls.

The unit is a 1RU frame which accepts and outputs SMPTE 292M signals. The output video signal is switched to the desired input based on the genlock input timing.

DIGITAL INTRODUCTIONS FOR 1998

DOWNSTREAM KEYER
Model 9525

The 9525DSK Downstream Keyer is a high-end digital video linear keyer. The 9525DSK Downstream Keyer system provides an advanced fully digital keyer that is ideal for character generation and can be ordered as a 9525LG to provide logo generation as well.
The Evertz 9525DSK Downstream Keyer system features 12 bit processing for character generation, bug keying, side-by-side comparisons, letter boxing, wipes, fades, safe area/safe title, center graticule & cursors and more...

GRATICULE GENERATOR
Model 9590

The 9590 Graticule Generator is an easy to use, one rack unit, dual standard serial digital video graticule generator that keys various alignment markers over a source video picture to facilitate film transfer, post production and quality control measurements relating to picture location for various film aspect ratios, safe action and title areas as well as picture center, programmable horizontal/vertical letterbox. The 9590 Graticule Generator is very versatile in that the user can choose from the many factory programmed presets or define their own, allowing for multiple user defined pre-stores that can be re-called and re-defined at any time.

TELECINE KEYER
Model 9580

The Evertz 9580 Telecine Keyer system provides the telecine suite with a multi-function keyer that provides many functions not found in any other single product. The Evertz 9580 Telecine Keyer is a fully digital keyer that was designed with film post-production applications in mind.

HDTV SOLUTIONS FOR 1999

HDTV ANCILLARY DATA ENCODER
Model HD9570

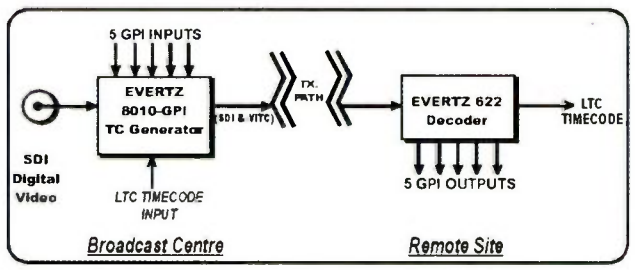
The Evertz HD9570 ANC. Data Encoder provides the solution for high bit rate data handling requirements such as closed captioning, Source ID, Time code, VITC and other Meta Data application requirements for HDTV.

Please contact Evertz for up-to-date information.

- **HDTV Reclocking DA**
- **HDTV Monitoring DA**
- **HDTV D to A Convertor**
- **EIA 708 Translation**

See many more HDTV solutions at the EVERTZ NAB99 Booth (#L21332)

REMOTE GPI TRANSMISSION SYSTEM VIA VITC



Evertz offers a system to encode and decode General Purpose Inputs (GPI's or Contact Closures) via VITC. The generator will generate time code in VITC and will encode the status 5 GPI's in the user bits. This system can be utilized for remote control and remote signaling applications where time code transmission may or may not also be necessary. The full complement of analog and serial digital generators and decoders are available. This system can be used for internal plant as well as remote transmission applications. Integrated with the plant automation system, master control can now extend it's control to remote affiliate sites. Recent applications have been for providing signaling affiliates/remote broadcast centers on imminent commercial slots and simple machine control. The encoder allows the insertion of VITC optionally into the first few lines of active video for specific applications requiring signal over a compressed transmission path (MPEG).

EVERTZ
3465 Mainway, Burlington, Ontario, Canada. L7M 1A9
Tel: (905) 335-3700 Fax: (905) 335-3573
Http://www.evertz.com
e-mail sales@evertz.com

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HDTV LOGO INSERTER... DONE!

HDTV PRODUCTS DONE

- HDTV Logo Inserter
- HDTV DA's
- HDTV 1.5 Gb/s 12 x 1 Router
- Graticule Generator

NEW FOR JAN' 99

- HDTV ANC Data Encoder
- HDTV Monitoring DownConverter
- EIA 608 / 708 Translation
- HDTV D to A

and more...

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JVC DEVELOPS PRACTICAL PRODUCTS FOR THE DIGITAL FUTURE

JVC is actively involved in developing and providing practical, productive and economical solutions that address the challenges of DTV and HDTV. By developing a wide range of digital and HDTV products, including switchable cameras, robust DIGITAL-S and W-VHS videotape formats, DiviCam encoding, D-VHS recording, and D-ILA projection, JVC is demonstrating an end-to-end strategy for the digital future.

SHOOTING IN HDTV

The industry's leading producers of HDTV programming have purchased and relied on JVC's true 1080i widescreen camera, the KH-100. Available today, the KH-100 produces breathtaking HDTV images and is compatible with today's popular 1080i recording formats. The KH-100 is ideal for a variety of applications in the broadcast, corporate, medical and scientific fields because of its clear, sharp, noise-free 16x9 pictures. Light and portable, the KH-100 is capable of shooting in a variety of different lighting situations.

JVC is developing a suite of cameras capable of shooting in both standard and high-definition. At NAB 1998, JVC launched its newest digital camera, the KY-D29W. This digital signal processing camera is switchable from its native 16x9 aspect ratio to traditional 4x3, and offers the ultimate flexibility in widescreen image capture to broadcasters and production houses.

JVC's DY-90 DIGITAL-S camcorder is a lightweight (15.4 pounds/7kg.) fully-digital 3-chip field camcorder perfect for DTV acquisition. Offering digital signal processing and 2/3-inch 768x986-pixel IT CCDs, the DY-90 delivers superior sensitivity and outstanding low light performance. The DY-90 records for up to 2 hours using JVC's robust 50 Mbps DIGITAL-S 4:2:2 tape format. Four channels of independently-editable audio further enhances this product's functionality.

DIGITAL RECORDING

JVC DIGITAL-S offers the best digital recording value to broadcasters today. It delivers high end picture quality as a result of 4:2:2 sampling and perceptually-lossless 3.3:1 compression. JVC's suite of DIGITAL-S recorders and players sport advanced features and performance previously only available in the most expensive VTRs.

JVC's most dramatic announcement made at NAB 1998 was the introduction of 100 Mbps extensions to DIGITAL-S which will enable the format to scale up to true HDTV recording in both 720P and 1080i, as well as 480/60P.

D-9

As the industry marches toward high definition, JVC's popular W-VHS analog HDTV format meets a variety of production needs including theatrical presentation, HDTV-quality distribution, and trade show product displays. W-VHS is the economical way to get HDTV recording and playback today.

In the non-linear realm, JVC's TimeGate MW-S1000 offers the best value in real-time rendering, non-linear editing. TimeGate boasts virtually-transparent, high-quality 2D and 3D effects, graphics and chromakey, all in real time. Feature-for-feature, TimeGate beats the competition by generating multi-layered effects in real time instead of frame-by-frame. TimeGate runs in Windows NT with a 270 Mbps data rate and uses a Movie II bus that simultaneously supports 4 independent video streams, It's fully compatible with JVC's DIGITAL-S products for end-to-end digital production.

DELIVERING DTV IMAGES

In order to broadcast DTV/HDTV programming, television stations need a mechanism to encode programs shot in a wide variety of digital formats, especially 1080i and 720P, and to recapture this data-rich content in the home.

Worldwide, JVC has strategically aligned itself with DiviCom, Inc., working together to develop encoders that enable broadcasters to bring HDTV directly into the home.

For recording high-definition digital signals in the home, JVC has developed a high-definition D-VHS HD-mode recorder. Based on the VHS-sized recording cassette, the D-VHS format is capable of recording all 18 DTV standards, including HDTV. The D-VHS format is uniquely capable of delivering high definition programming to TV sets and set-top boxes, with one D-VHS cassette capable of storing a 3-1/2-hour HDTV movie.

PRESENTING DTV

Finally, viewers can expect to view digital and high-definition programming from the comfort of their easy chairs via JVC's revolutionary D-ILA projectors and 16x9 high-def monitors.

JVC has developed a revolutionary Direct-Drive Image Light Amplifier™ (D-ILA), based on ILA technology developed for large screen theatrical projection by subsidiary Hughes-JVC. This new technology makes possible small, compact projectors that bring theater-quality HDTV images into the home.

JVC's unique end-to-end strategy is proof of its commitment to providing practical, productive and economical solutions that address real world challenges. This has always been, and will continue to be, the hallmark of JVC.

There's strength in numbers.

4:2:2

3.3:1

16:9

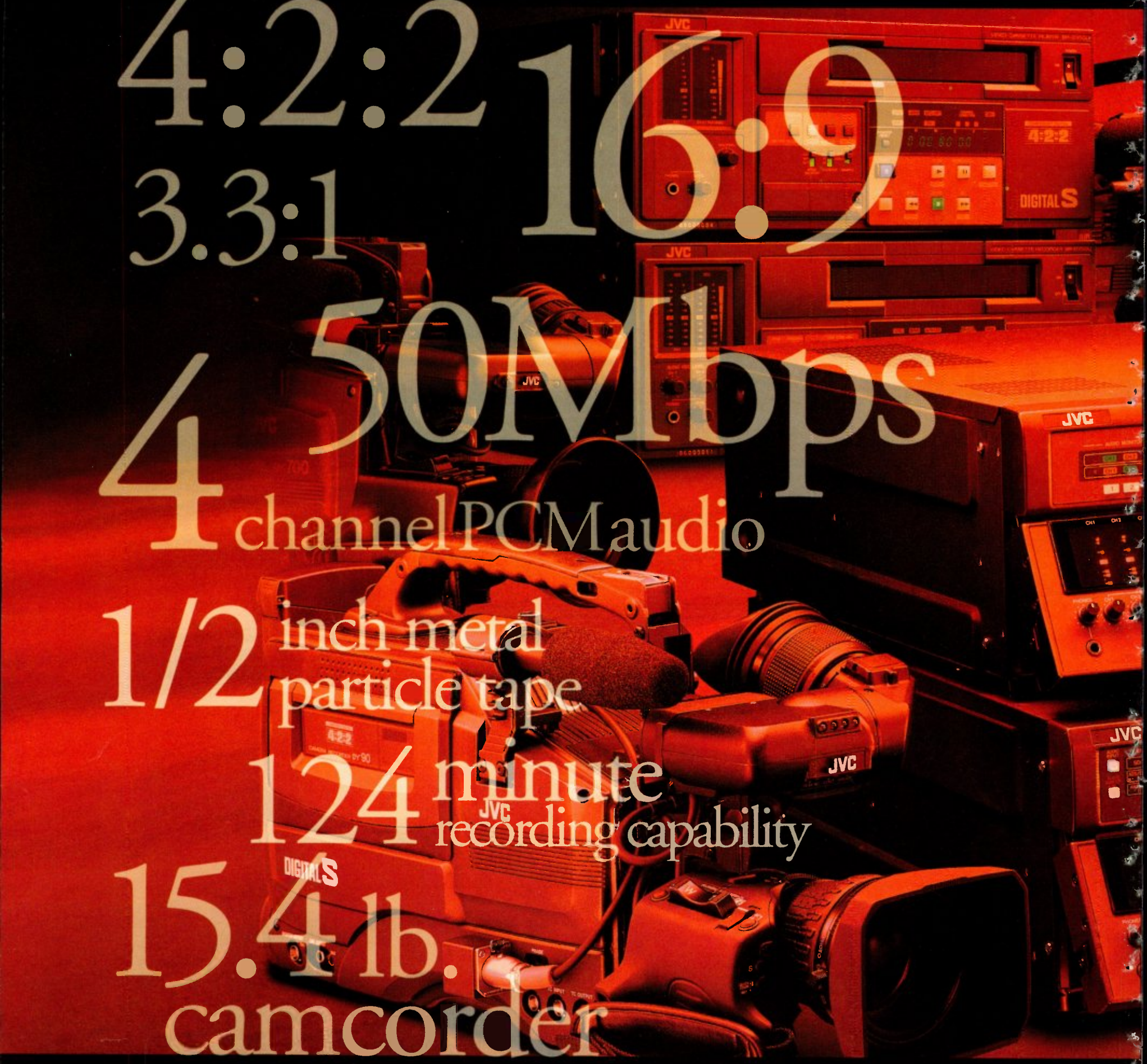
4 50Mbps

4 channel PCM audio

1/2 inch metal particle tape

124 minute JVC recording capability

15.4 lb. camcorder



Look into JVC's impressive DIGITAL-S lineup, and you'll see a tape format that's designed with an obsession for quality and has the numbers to back it up. The remarkable image quality of DIGITAL-S is the combined result of superior 4:2:2 sampling, a 50 Mbps video data rate and perceptually lossless 3.3:1 compression—all recorded on robust half-inch metal particle tape. As a result, DIGITAL-S is attracting impressive numbers in the broadcast and post production communities where DTV innovators are choosing DIGITAL-S for acquisition, editing and spooling to servers and non-linear editing systems.

The quality you need today. DIGITAL-S delivers quality comparable to digital formats costing much more. Enhanced features like 4-channel PCM audio and video pre-read open up a world of creative possibilities, while at the same time the format allows you to migrate to digital and HDTV gradually and maintain backward compatibility with your existing equipment and tape library.

The capacity you'll need tomorrow for 720P and 1080i. Data capacity will be critical to the DTV and HDTV future. JVC is developing 100 Mbps product extensions using the very

DIGITAL-S

The reasons are becoming clearer than ever.

same high-capacity half-inch tape of today. These extensions will make possible switchable 720/60P and 1080i high-definition recording and playback, as well as 480/60P recording and playback. And despite these dramatic advances in technology, JVC is committed to ensuring that the recordings you make with today's DIGITAL-S won't become obsolete in the future.

There's a great deal more to DIGITAL-S. Which is why we'll leave you with one last number:
Call 1-800-JVC-5825 today to receive our new brochure.

JVC
DIGITAL BROADCAST SYSTEMS GROUP

D-9

www.digital-s.com

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A Decade of vision and we're still Looking Ahead

10

Corporate Profile

Celebrating its ten year anniversary, Louth Automation has grown from OEM supplier of Video Cassette Preparation and Management tools to the global leader in On Air Broadcast Automation Systems. A privately held California corporation, Louth remains focused on complex software control solutions in the technically dynamic world of television broadcast.

Louth continues fast-paced growth led by its pioneering work with video file server manufacturers and developing customer oriented feature sets. Paying close attention to fundamental issues and detailed solutions, few argue that Louth's performance sets the standard that others strive to attain. Louth customers range from national Network Origination to local market Call Letter stations to complex multinational Satellite Uplink facil - ties. Though initial installations centered in the United States, numerous installations in Europe, Asia, Latin America, and Canada show the Louth standard is welcomed everywhere.

Leveraging a wide spectrum user base and expertise in mission critical controls, Louth continues to expand into other related markets where data management, connectivity, and real time audio/video stream control are the challenge.

Based in the Silicon Valley, Louth Automation is an international company with operations in Paris and London and plans for additional international expansion. Using premium distributors & system integrators, Louth products & services are truly world-class.

Mission Statement

Louth Automation is committed to providing industry-leading, high-value, quality products and services for broadcast facilities requiring the acquisition, management, repurposing, delivery, and verification of broadcast media. Louth Automation achieves the highest levels of sustained customer satisfaction through consultative selling and dependable, pro-active customer support, using customer-friendly business practices.

Louth employees are key to our success. We recruit, train, and retain talented team members b offering interesting, challenging career opportunities to competent, self-motivated individuals who are competitively compensated and have the tools necessary to become accountable to our customers, both internal and external.

DTV Solutions

Along with the advent of DTV comes the opportunity for multi-channel broadcasting, whether simply simulcasting or carving out the DTV spectrum into multiple channels targeting specific niche local markets, with a minimal addition of new equipment and no increase in personnel. Louth Automation is uniquely positioned to aid in this transition. With the ability to control from one to hundreds of channels and over 120 device drivers, Louth provides the necessary tools to leverage current equipment and personnel resources across several channels.

Louth Automation recently released the Digital Television Communications Protocol (DTCP), offered free to the broadcast industry. DTCP standardizes communication among devices for DTV, such as up/down and standards converters, multiplexers, encoders, and access controllers. DTCP is a comprehensive set of instructions that resolves the fundamental difficulty of manufacturers, automation providers, and end users integrating conflicting protocols in digital television. Instead of struggling to match up a myriad of proprietary protocols, end users can select equipment and automation on the basis of their features. Manufacturers can incorporate DTCP to make their products more attractive to a growing number of broadcasters using automation.

DTCP joins a family of Louth protocols which includes the Video Disk Communication Protocol (VDCP), the Video Archive Communication Protocol (VACP), and Satellite Systems Communication Protocol (SSCP). The VDCP is widely used by video disk manufacturers The Louth communication protocols provide device communication standards in an industry with continually evolving technologies, multi-channel requirements and operational challenges.

Products and Services

From controlling satellite dishes and receivers, to automating the record process, providing the mechanism to prepare all content for airing, whether video tape or video server based, to controlling dozens of devices across multiple playlists, the existing family of Louth products provides the capabilities necessary to automate all aspects of the on-air operation from program acquisition to on-air playout. Add to that the adoption of Louth's Digital Television Communications Protocol (DTCP) and all the components necessary to air current analog programming and support digital television broadcast requirements are in place

Louth offers a complete line of NT based Media Preparation and Management products along with the industry leading ADC-100 Master Control Automation system. A pioneer in applying Object Oriented Programming, Louth systems provide a unique blend of extendibility of legacy equipme t, ease of integration for next generation devices, and scalability for the future.

An exciting new product from Louth is Global Media Transfer or GMT, an add-on option to Louth NT and DOS systems. GMT is designed to manage the process of exchanging video material in a manner that is truly reflective of the issues and demands of broadcasting. GMT is designed to operate in the realtime world of baseband/601 video, but it is equally capable of handling non-realtime file transfers via SCSI, Fibre Channel, SDTI, ATM and other technologies. GMT is scalable to system requirements and is implemented to manage network bandwidth issues, thereby eliminating contention. GMT works with LAN, WAN, and even worldwide device connections so that transfers can be made across a broad base of systems. GMT manages scheduling of transfers intelligently so that material is moved in plenty of time for use without overloadin resources. In addition, GMT is a closed loop system where transfer errors are detected and handled. Integrated user feedback and as run logging of transferred event provide human interface to oversee this automatic process.

To meet the market deman s for professional expertise in system design, on site commissioning, factory and on site training, and project management, Louth Automation provides extensive offerings that target all levels of customer capability and system architecture.

Commitment to Service

Automation is not just a product purchase, it is a long term working relationship. Our extended service offerings are available, even prior to purchase. Automation System Consulting puts you on the right path from the beginning. Once you're a Louth customer, our extensive Customer Support department takes over, preparing you both for the physical and operational installation. Our Support department features professional Project Management, Factory Training Seminars, On Site Training, and professional Field Support Engineers. A cost-effective support agreement keeps you up to date with improvements, software releases. And 24 hour Help Line access. Louth Factory Training Seminars have become increasingly popular. To accommodate requests we have recently built a spacious new training facility in Palo Alto, CA. These actions underscore our unwavering commitment to our customers' total success. And our partnership.

LOUTH
AUTOMATION

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we now uninterrupt this program....

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CALIFORNIA MICROWAVE
MICROWAVE RADIO COMMUNICATIONS

MRC offers the television industry more proven approaches for wireless digital video transport solutions.


TwinStream™


DMR18


SDM-2020 Modems


DAR20/34/45


MediaMux

Comprehensive Video Transport Solutions

At Microwave Radio Communications, we understand that our customers require more than microwave radio and antenna products. They require proven, reliable solutions that work day after day, year after year.

As the US television industry starts its transition to digital television, MRC is leading the way with the industry's leading assortment of digital video and digital-ready microwave systems, plus multiplexers, video compression products, and a proven history of interfacing into complex video transport networks.

MRC's digital products include the DAR20, DAR45, DMR18, MediaMux, and TwinStream. The DAR20 offers dedicated 19.39 Mbps ATSC transport stream STLs, while the DAR45 offers DS3 (44.736 Mbps) interconnections. The DMR18 offers analog or digital video capability at 18 GHz; and the MediaMux provides video compression and ATM multiplexing in a compact, economical configuration.

MRC's Innovative TwinStream Dual-Carrier Studio-to-Transmitter Links

MRC designed the TwinStream dual-carrier microwave system to accommodate an analog NTSC signal plus a 19.39 Mbps ATSC transport stream, within a single STL channel. Without compressing the traditional analog signal, television stations can now place two program channels on a single STL, overcoming the spectrum scarcity issues.

California Microwave's Digital Video Initiative

Today, while many of the equipment elements in the total DTV production and transmission chain are still being developed, MRC and the EF Data unit of California Microwave are delivering proven "digital video transport solutions." When you're planning your conversion to microwave or satellite digital video transport, contact your local MRC or EF Data representative to discuss your requirements.

MRC's broad range of product solutions at NAB 98.

CALIFORNIA MICROWAVE
MICROWAVE RADIO COMMUNICATIONS

www.cm-mrc.com

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The Easiest Path to a Two-Channel STL

MRC's TwinStream™

With the new MRC TwinStream dual-carrier STL, it's easy to place NTSC and ATSC STLs on the same microwave path. The TwinStream radio provides two carriers, one analog and one digital, within a single 25 MHz STL frequency. Unlike other 2-channel approaches, there's less cost and complexity because you don't compress the NTSC channel and you don't increase tower loading. To learn more about the MRC TwinStream and our other digital video transport solutions, call your local MRC representative, or MRC directly at 1-800-490-5700.

CALIFORNIA MICROWAVE
MICROWAVE RADIO COMMUNICATIONS

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NDS World Headquarters.

BUILDING THE SOLUTIONS THAT BUILD SUCCESS

As a result of its long history, NDS has an impressive list of digital technology firsts:

- **First analog smart-card based conditional access system**
- **First MPEG-2 encoder**
- **First digital conditional access system — VideoGuard™**
- **First MPEG-2 MP@ML encoder**
- **First MPEG-2 4:2:2P@ML encoder**

Additionally, NDS was involved in the first work regarding extended definition and high definition television with the MAC standard, and sold its first high definition upconverters in 1991. Recently, the company's experience has been utilized in developing solutions for the new ATSC high definition technology which is currently evolving in the U.S. broadcasting industry.

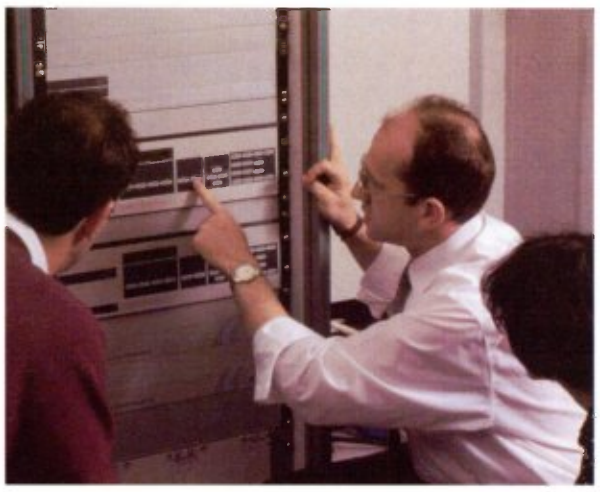
COMPANY PROFILE

Headquartered in Newport Beach, CA, NDS Americas is a subsidiary of News Technology Group. As a global leader in the design, production and integration of MPEG-2, DVB and ATSC end-to-end digital broadcasting, NDS specializes in providing solutions for small, medium and large broadcasters. Originally part of the Independent Broadcasting Authority (IBA) in the United Kingdom and subsequently the Advanced Products Division of NTL, the company was purchased by News Corporation in 1995 and became known as Digi Media Vision (DMV). In 1997 DMV joined with News Datacom and News Digital Systems to form NDS.

As a worldwide technology leader NDS plays a major role in developing international standards for the digital broadcasting arena, providing technology and market know-how to implement standards such as MPEG-2, DVB, ATSC, SMPTE and DTTV. The company also makes a major commitment to R&D, with over 700 of its more than 1,350 employees dedicated to its pioneering development work at research centers in Israel, the U.S. and the U.K.

WORLDWIDE RESOURCES LOCAL SUPPORT

NDS Americas was established in 1996 as a wholly-owned subsidiary of NDS Ltd. The company has over 100 people dedicated to the sales, marketing and technical support of digital broadcasting solutions throughout the United States, Canada and Latin America. A customer support facility was recently opened in Lake Forest, CA to provide local product support for all NDS products.



NDS service and support is never more than a phone call away.

AN EXPERIENCED MANAGEMENT TEAM

NDS Americas has built a strong personnel infrastructure, anchored by people who not only understand the technologies being provided but also the industries into which the products are being sold.

DR. DOV RUBIN — Vice President and General Manager, NDS Americas. Prior to NDS, Dr. Rubin founded News Datacom Research Ltd., to provide conditional access systems for the pay television industry. In 1997 News Datacom became part of the NDS worldwide family of companies. Rubin holds a Ph.D. in medicine and computer engineering from the University of Southern California.

PATRICK BOHANA — Vice President Sales and Marketing, NDS Americas. Bohana is responsible for all sales, marketing. Prior to joining he spent more than 25 years in the cable and satellite industry with such industry leaders as Scientific-Atlanta, TV/COM, and Comsat.

BARRY HOBBS — Director of Engineering and Field Services, NDS Americas. As such, Hobbs ensures that NDS technology and products are the latest and most capable to give NDS customers their competitive advantage. With more than 20 years of experience with technology leaders such as Scientific-Atlanta and RCA, he has extensive knowledge of MPEG processing and satellite transmission technologies and was involved in the design of the Primestar analog and Orbit digital DTH systems.

With NDS end-to-end digital broadcast solutions, broadcasters around the world capture the excitement of major events.

A WINNING PHILOSOPHY

As a worldwide company, NDS has been providing high-performance solutions for small, medium and large broadcasters for more than 30 years. Our strength is optimizing these solutions to meet the individual needs of system providers across diverse market segments including contribution, distribution, private networks and direct-to-home systems for satellite, cable, MMDS and digital terrestrial applications. We are dedicated to open systems and compatibility with international standards — including MPEG-2, DVB and ATSC — meaning added flexibility for customers. NDS can create an end-to-end system or provide specific products for both existing and planned systems.

THE PRODUCTS THAT SHAPE THE FUTURE OF DIGITAL BROADCASTING

NDS offers a wide range of products meeting international broadcast standards. To complement its MPEG-2/DVB compliant encoders, multiplexers, modulators and receivers, we developed our Director control system to provide both network management and receiver control functionality in one easy-to-use software system. And we've recently introduced a complete line of ATSC encoders, which meet the most prevalent Table 3 formats (480p, 720p, and 1080i). NDS can bring you the network interfacing products necessary to carry all of these digital signals over terrestrial systems, providing ATM, G.703 and DS3 interfaces as required.

For more information call NDS Americas or go to www.ndsworld.com on the worldwide web.

More Information Circle 121

Here's to the leaders of the digital television revolution.

From individual stations to groups such as Cox Broadcasting, Fox Television Stations, Imes Communications, Scripps-Howard, and Tribune Broadcasting, NDS salutes the leaders in the digital revolution. Leaders, because they've chosen an ATSC solution designed to help keep them on top well into the next century.

Whether it's high definition encoding or multicasting, network splicing or ad insertion, full system control or traffic interfaces, NDS has the solutions today for every digital resolution.

Over the last decade NDS has pioneered the development of end-to-end MPEG, DVB and ATSC solutions. But our success depends on customers like these, who are looking to the future and making the right choices today. To them we say, "Thanks," and to you we say, "Join the revolution!"

NDS
WORLD LEADER • WORLD VISION

NDS Americas Inc.
3501 Jamboree Road Suite 200, Newport Beach, CA 92660
949.725.2542 www.ndsworld.com

More Information Circle 122

National Digital Television Center, Inc. (NDTC)

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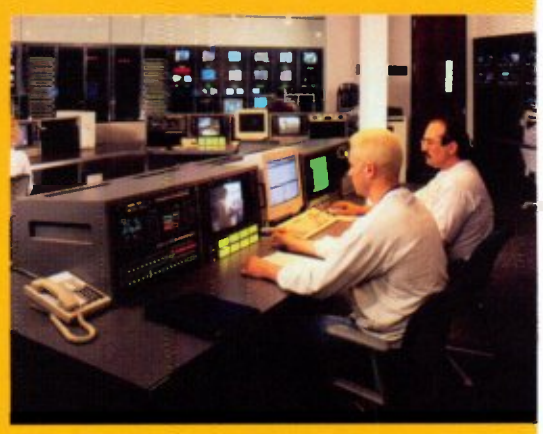

For More Information Contact:

Kathy Standage
303.486.3809/303.486.3890
(fax)/standage.kathy@tci.com

More Information Circle 123

Company Profile

It only makes sense that television production at its highest level would be found in the Mile High City, right?

Introducing TCI's National Digital Television Center, Inc. (NDTC, Inc.) The most technologically advanced primary origination, production, post-production, and digital compression facilities you'll ever see, all in one incredible complex in Denver, Colorado.

Construction began in the fall of 1993 within the existing shell of an industrial building and the current building contains over 275,000 square feet of completely renovated space. An additional 75,000 square feet will be added by year end.

For customer support and convenience, the NDTC operates facilities in New York, Hollywood, Hong Kong and will open a new multi-faceted operation in Los Angeles by summer of 1998. In addition, a customer, dual expandable digital mobile production truck has recently been added to the NDTC's production arsenal.

Services Offered

Production

Studios - the NDTC offers full studio and location production services. Over 20,000 square feet of production space is available in Denver, including four studios, ranging in size from 100'x 65' to 60' x 40'. All are equipped with the latest in digital technology and equipment. Studio space is also available in the LA and Hollywood locations.

Post Production - NDTC operates two large digital post rooms, 5 Avid non-linear rooms, 5 analog post rooms and 2 Panasonic Postboxes. 3D graphics systems are available for graphic and animation production as well as a full service audio recording studio with separate Foley studio, Midi and original music capabilities.

Mobile Digital Production Truck - based in Hollywood, CA, is the absolute latest in advanced remote digital audio/video production services, all in a travel-ready, 51 foot long expandable tractor/trailer. The truck contains the latest in video, audio, recording, graphics and communication equipment.

Network Origination

Satellite Services - The NDTC has the largest uplink facility on the planet, providing satellite support to over 500 audio and video services. Our Network Response Center (NRC) provides the most reliable communications and monitoring services you'll find anywhere. The NRC staff accepts incoming trouble calls, takes responsibility for each case, communicates with the operational areas where the problem resides, and follows through until the trouble is resolved.

Traffic Services - Log preparation, program and tape coordination, library maintenance, interstitial scheduling, ad sales reporting and billing are part of the wide range of traffic services that the NDTC provides. Additionally, we can utilize one of several different automated traffic systems that best suits clients' requirements.

Channel Origination - NDTC's Channel Origination and Operations offers more than master control rooms. A complete range of exclusive services designed to meet the needs of your network are why Encore, Animal Planet, Ovation, Primestar, FoxNet, Your Choice TV, BBC America, Discovery and others already rely on the NDTC.

Closed Captioning - the newest service offered by the NDTC is a full service operation offering broadcast-qualified "real-time" (live) and "off-line" (pre-taped) captioning. Included in the full array of broadcast captioning services are multi-lingual captioning, subtitling, digital interface encoding and direct in-line connectivity to the NDTC client broadcasting operations.

NDTC uplink site in Denver, CO

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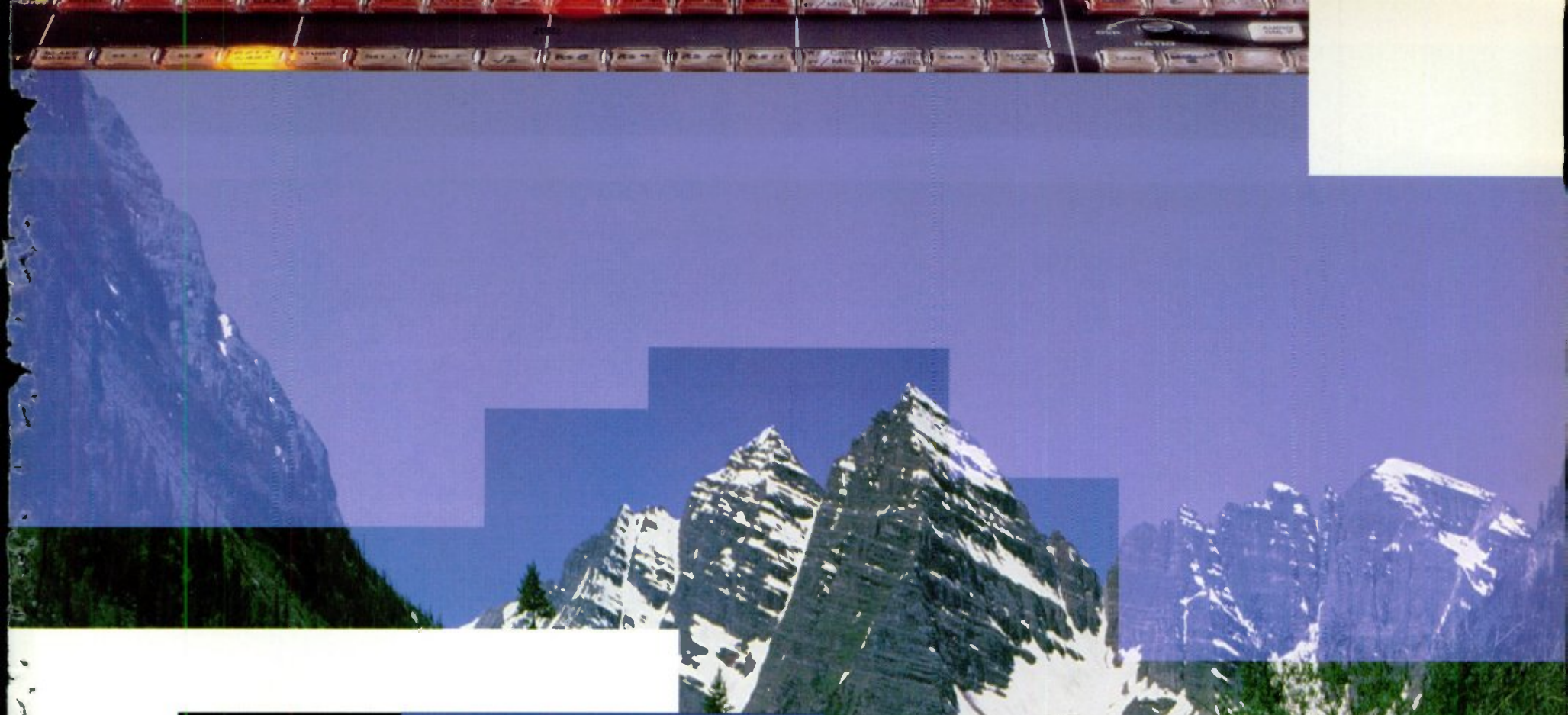
NDTC National Digital Television Center



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All new.

All state-of-the-art.

All under one roof.

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Find room to work.

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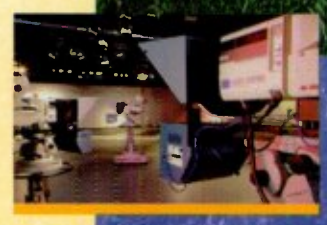

And rooms to work wonders in.

- Digital, Analog, and Avid non-linear edit suites
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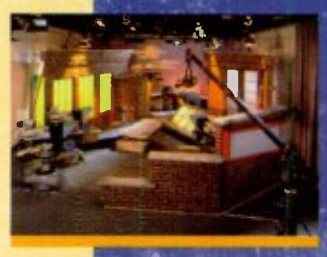

Discover capability with flexibility.

- Services available A to Z or ala carte
- The broadest range of production services available in the industry, including ***full service closed captioning***
- What you need and when you need it.

Are you game?

TCI's National Digital Television Center is perfectly suited to game shows, talk shows, host segments...you name it. No, we're not Hollywood, but hey, that's the good news.

Call Kathy Standage at 303-486-3809,
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SONY ELECTRONICS INC.

DIGITAL TECHNOLOGY IS BECOMING DIGITAL REALITY.

Sony has moved beyond possibilties and prototypes—to make digital technology a practical reality in worldwide applications.

With new products and systems that interoperate in an open network system, Sony serves SDTV and HDTV format applications from acquisition through emission – and does it all within an MPEG-2 environment, the industry standard backbone of DTV broadcasting.

Sony's standards-based approach enables the creation of fully digital programs, incorporating content from around the world in many different formats. These are digital soultions for the real world – and Sony's broadcast products are putting them to work.

FLY FISHING IN BELIZE

Sportsman's Challenge videographer Robert Breland goes anywhere and everywhere to capture fly fishing for ESPN's sportsfishing segments. Recently, while wading through waist-high water, Breland used Sony's Betacam SX® DNW-9 camcorder to cover fly fishing from the salt flats in Belize, Indonesia.

"I've used Sony's Betacam SX camcorder in salt air, rain, freezing rain, salt condensation and dew, and I have never had to dry out the camera," said Breland, photographer for SCI Productions. "Beyond the incredible ruggedness of the camcorder, the slower tape speed and wider tape make maintenance much easier and less frequent."

DNW-9WS

COVERING THE POPE IN CUBA

Chief photographer Bert Asmus of KENS-TV discovered how so little in the way of production equipment could mean so much with Sony's DNW-9WS camcorder and DNW-A220 Portable Field Editor.

DNW-A220

"Everywhere I looked, I saw television crews from all over the world unpacking their large crates containing editing machines. All I had was Sony's DNW-9WS camcorder in one hand, and, over my shoulder in a black canvas bag, Sony's DNW-A220 Portable Field Editor," said Asmus. "However, while everyone else was unpacking their crates, I was up and running. Especially important was the editor's ability to play both digital and analog Betacam® tapes as we needed to edit pool video of the Pope recorded on analog Betacam tape."

dtv™ READY


DNW-90WS

ACQUISITION FROM CAVES IN TRINIDAD

A demanding environment where Sony's Betacam SX camcorder performed, was in the jungles of Trinidad, where under extremely low light, the Betacam SX camcorder captured vampire bats for a nature show. "We were shooting in caves and an abandoned ice factory with available lights and flashlights," said Neil Rettig, videographer for Neil Rettig Productions. "We were thrilled with the image quality that Sony's Betacam SX camcorder was able to deliver under such low-light conditions."

HDCAM™ FOR ACQUISITION

For Randall Dark, president and CEO of HD Vision, portability offered a key benefit for immediate production.

"Now that we can work in digital HD and be independent of a fixed power source and a fixed


HDW-700

VTR, our clients have an entirely new creative opportunity," said Dark. "We are making plans to shoot a documentary in the Sahara Desert, where I am confident the Sony camcorder will perform well in very harsh conditions. This will revolutionize the long-form production process."

MPEG-2 FOR DTV

According to Tom Daniels, director of engineering and operations for KTVT-TV, the station's transition to high definition transmission and compatibility with the existing Betacam SP® infrastructure were key benefits that led to the purchase of the Betacam SX products.

SONY MPEG-2 SOLUTIONS:

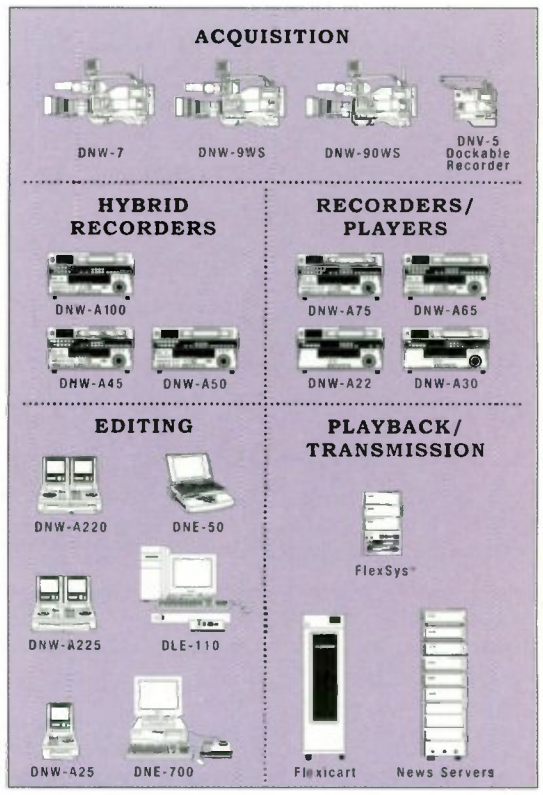
ALL DIGITAL

ALL MPEG

ALL DTV-READY

"We plan to transmit full 1080i high definition starting on May 1, 1999," said Daniels. "The Betacam SX format with its MPEG-2 4:2:2 P@ML compression scheme provides us with a robust signal that can withstand the rigors of the editing process, giving us a clean signal to upconvert to HD transmission."

WHEN EVERYTHING WORKS TOGETHER, NEWS TRAVELS FAST.



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SONY

Post Pros Begin Hunt For DTV Business Opportunities

Post-production community has always shown resiliency in the face of technological change

By Ed Eberle

On Sunday, November 1, 1998 a new era in American television broadcasting began. In one seismic slip of technology and consciousness, America's broadcasting infrastructure shifted, as the nation began a government-mandated transition to a digital television standard.

The implementation of the DTV standard signals the end of the industrial age of television and marks the beginning of the digital age; an age that opens a new window on the world of television production, post and distribution, and extends the meaning of word like programming, content, purpose and creativity.

It's pretty clear how broadcasters will be impacted by the change in technology. But how will the post-production market handle it?

Historically, the post-production industry has shown not only a remarkable resiliency in accommodating rapidly changing formats, and technologies, but an equally noteworthy ability to re-capitalize and reinvent itself every time the body of knowledge has taken a turn around the bend.

An increasingly demanding client base that now sees the world as a digital oyster finds within it the raw materials to create multi-purposed products for broadcast television, DVD, multimedia, CD-Rom, film, the Internet and the game world. That community of creatives, along with manufacturers who have fueled the trip to the outside edge of the envelope, have not only challenged post production creatively, but forced a period of unprecedented expansion and capital investments in million dollar boxes, talent, powerful software and sprawling infrastructures.

On the other hand, specialized desktop tools priced at one tenth the cost of high-octane black boxes have lowered the capital barrier of entering the business and thrown it open to a wider audience of creative personalities, some with, and some without, connections to the technical or creative legacies of the past. Digital tools have incubated the re-birth of the hybrid editorial boutique and they in turn house, and define talents with arcane and fluid specialization's that were unheard of just a few years ago.

Virtual editing is a reality. The Internet has become an entertainment venue that actually steals viewers from both broadcast and cable TV. Technical virtuosity and epic direction along with effects-driven films and commercial spots have realigned the traditional relationships between editors, scientists technicians engineers and artists so that talents once considered backroom magicians now lay claim to creative fiefdoms of their own. In the modern post-production environment, if it can be imagined and you have the budget it can be done. What was true last year is less true today, and even Moore's Law is straining at the seams to contain innovation within an 18-month development cycle.

A look inside one of Laser Pacific's rooms. Laser Pacific VP Leon Silverman says that today's post facility is one part radio studio and one part TV station—minus the wires to the transmitter.

Defining Post

For at least 15 years, the video post-production facility has been the essential link between production and distribution, spawning the talents and technologies that have helped shape our picture of the future. How we define post production today, in the early light of the digital revolution might very well determine what that future holds for post production tomorrow.

Dean Winkler, President of Post Perfect in New York says it's taken the industry quite a while to shed its association with the business models of the past.

"Successful post-production facilities have had to look carefully at their mindset to get this far in such a volatile industry. That means letting go of hourly charges, taking ownership of client problems, becoming project-based creative partners and putting greater value on talent. That's a significant change in how we do business and no doubt we'll build out on that model in the future."

There's no doubt that the post business as it was on November 1, 1998 had significantly changed from the business many of the early settlers pioneered in the '70s and '80s. "It was hard not to make money 10 or 12 years ago," says David Case, president of Production Masters in Pittsburgh. "Today we've become a technology and talent-driven business. If we all have the same boxes and the capital barrier to entry has been reduced tenfold then what distinguishes you from the guy down the street is service, a certain amount of horsepower, and who you put in the drivers seat."

Case says he believes that post continues to evolve as client expectations become greater, but not everyone is destined to come out ahead. "Surveys indicate the most successful companies are either very small and targeted or very big and offer a thick menu. Not everyone can keep up, and it's the guys in the middle that are disappearing."

The roots of today's facility model, like the 4:3 aspect ratio, NTSC and AM Radio, can be traced to the industrial age of American entertainment communications, when the machine was king and every advance, no matter how small was hailed as a giant leap forward.

The world view that kept the industry tied to the legacies of that past changed suddenly with the introduction of nonlinear editing and sparked the first of a series of technological revolutions that would continue to drive the industry to the edge of the Millenium. Executive Vice President of Laser Pacific in Los Angeles, Leon Silverman, describes today's facility as "one part radio studio, one part TV station. We've snipped the wires to the transmitter, traded most of our analog stuff for digital," he says. "But instead of really understanding the power of integrated general purpose computers and software, we still have a digital radio station based on the TV broadcast facility model."

Silverman says Laser Pacific began coming to terms with change around the time the Newtek Video Toaster appeared on the scene. "It told us three things: connectivity, storage and large general purpose computers would be central to the industry's future and desktop technologies would soon begin cutting into the facility pie."

Sure enough, by the early '80s facilities began losing services like offline, as creative offline editorial companies sprang up and prospered. The larger facilities retained the technological firepower and the offline houses became their online clients.

"The rise of nonlinear editing and compositing have transformed the business and continue to do so," says Mike Elliot President of Mad River Post in Los Angeles." What began as a ripple with the introduction of the Avid has turned into a tidal wave that has swept over all of the assumptions of how this business works. Everything's changed by working digitally and outside of that massive facility model—how you bid a job, how you cut it and even the creative and business relationships you develop with clients."

The revolution sparked by Avid has given birth to any number of creative offline facilities. Northern Lights in New York opened less than three years ago and its principles remain unconcerned with the issues driving their larger predecessors. "We are a creative editorial and content creation company and we're less involved with the technology," offers partner Mark Littman. " In an innovative atmosphere things work out and for now we'll let the big guys worry about things like Hi-Def work because that's not who we are. Our EDLs work no matter what, and when we need outside service we can go outside for finishing and deliver what our clients want."

Nathan Byrne co-owner/editor at Post Millenium, New York, agrees that the trend toward posting at small editorial design houses will continue and says that the "end of the mechanical age" in post is about accessibility and new ideas. "It's more creative and flexible and it's open to new talent because of the reduced costs of digital equipment. In the past we had to learn new machines and methodologies," he explains. "Now mechanical control of our machines is obsolete and our tools are all software based. And for a generation that grew up with computers, learning new software is not such a big deal."

Philosopher, catcher and undisputed King of the twisted phrase Yogi Berra, would be quick to remind us that "the future ain't what it used to be," but it is certainly where we will all be spending the rest of our lives and a good deal of our fortune. And long before the transition officially began on Nov. 1, post-production professionals were discussing the shape of that future from NAB to ITS and in the coffee room down the hall.

"I'll bet everyone in this business has at least one conversation every day about their plans for the future," says Ron Burdett, president of Sunset Post, Los Angeles. " But the truth is the future will be a little different for each of us. We can't be the post-production facilities we were." He adds, "What we do hasn't and won't change all that much. How we do it, has and will change dramatically. We've become something different—digital studios. And that's what this transition is all about: the integration of all media in digital formats from origination through post and distribution. And it's from all those ones and zeros that we will eventually build a picture of our industry's future." ■

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Post Equipment Makers Look To Bring Customers Safely To HDTV's Shores

Industry faces some rough challenges, but manufacturers are confident they can offer solutions

By Edmond M. Rosenthal

The troubled waters of technological change never seem to calm down for post-production facilities. Some professionals might have entertained a thought that the water would be safe for a while after converting from analog to digital, but the prospect of HDTV is now churning up a lot more than a ripple.

Despite all the potential upheaval HDTV may cause, Mark Gray, chairman and CEO of Pluto Technologies, advises facilities to remain calm and look toward the long-term payoff.

"Any change is characterized by confusion," he asserts. "But by what we know is going on in the market, HDTV is not only going to be important but it will be a favorable change. It will allow facilities to offer the higher end of their services to customers. It will raise the bar and make the market less commoditized."

Gray predicts this high-end work will start with film graphics and effects. Then, he adds, live sports productions in HD will drive advertisers to follow suit in order to have a comparable visual impact.

"For post-production facilities it will be pretty traumatic at the tools level," offers Bob Barnshaw, product line manager for NT products at Media 100. Production professionals will be looking to take out "life insurance" on their productions, he says, meaning there might be more shooting in film, for both standard definition and HDTV work. Post facilities, therefor, will need playback devices that handle work for both DTV and HDTV, he notes, with smaller facilities perhaps focusing only on standard definition 16:9.

Media 100 nonlinear editing systems (above) and Discreet Logic's Smoke (right) are both capable of handling 16:9 post-production needs, with the Smoke operating on the SGI Octane and the Media 100 on the Mac or PC.

Higher Challenges

Manufacturers are also being challenged by HDTV needs and their successes and failures will greatly impact the speed with which post-production facilities can ready themselves for HD work.

"The technical challenge of higher resolution makes for a more complex box," holds John Pannaman, vice president of engineering at Quantel. "A huge amount of processing will be needed but the creative content of post-production can't change. The computer solution is to change the software."

Much has been written about the different HDTV transmission standards and the challenge it puts on broadcasters, but post-production professionals are also going to be affected. Sandra Buckingham, product marketing manager, advanced systems, at Discreet Logic, points out that manufacturers, like Discreet, realize the importance in offering resolution flexible products.

"In North America things have settled down in formats since the Big Four networks announced their standards," she offers. "It made no difference to us because our products support all of the ATV formats that have been defined. But our customers needed to know in order to plan their networking and storage requirements."

In future-proofing, she adds, more facilities are realizing the importance of creating a high-resolution, uncompressed master, which can be redistributed in any future format. She notes this is possible now in editing with Discreet Logic's Fire editing system and with its Inferno for compositing and effects.

"In the approach we've taken," she elaborates, "both of them support HD resolution and, in the Inferno, also film resolution at no increased cost. Our customers only have to buy the additional hardware that will allow them to sustain the increased bandwidth." This amounts to more disk arrays for the additional storage capacity and more CPUs to handle the processing requirements.

Facilities can buy Fire and Inferno in HD configurations so that they don't need additional CPUs or storage or they can buy them in simpler video resolution configurations, later acquiring the additional components when HD work comes along. In effects, the company's Flame supports HD, being resolution-independent. Smoke, a creative editor for the SGI Octane platform, supports 16:9 and has high-quality up-resing, Buckingham states.

At Avid, Peter Fasciano, corporate fellow, advanced development, believes that the new demands on quality production will increase the need for offline capabilities. "We don't see our role in the offline area diminishing. With HDTV, offline's reduction of costs goes from optional to critical," he adds.

Fasciano says online systems at Avid like Symphony and Digital Studio (DS) have made finishing more affordable but that with HDTV the line between online and offline becomes even more acute, with online meaning a premium price. Avid's online systems are essentially digital but not HD—yet. He proposes interfacing Media Composer with an online system, stating, "You have all the metadata necessary to drive an online event and minimize the cost."

At last year's NAB exhibition, Avid showed a prototype of an online HD editor, still in development, compressed roughly at 4:1, running on Windows NT and compatible with Panasonic's HD-D5 format.

"The big thing," he asserts "is the development of systems that are resolution independent. At the last NAB we showed a system that was resolution-independent, scalable from standard definition to high definition, and running from disks, uncompressed in realtime. We're still determining how best to position it."

HD Challenges

Barnshaw says Media 100 nonlinear editing systems can be used for some 16:9 applications today. This requires a 16:9 monitor and involves stretching the Media 100 signal to that aspect ratio in order to preview it on the monitor. The key glitch toward nonlinear editing in HD, he notes, is the high cost of HD codecs. Media 100 currently uses a widely available and relatively inexpensive M-JPEG codec but he notes HD codecs cost several thousand dollars.

"Any product using an HD codec," he warns, "would be exorbitantly expensive at a time when people don't know what standard will be most broadly accepted. There may be some resolution-independent codecs coming out, but they would be very expensive. So it's still not defined as to what editing tool facilities will want for HD post. At next NAB we'll probably see the market narrow down in terms of standards acceptance. We still need to know whether the customers of post facilities will want compressed or uncompressed images. Compression will be used for delivery but it still isn't known whether post facilities will initiate the compression process."

A key question in adding more resolution to support HD, Barnshaw says, is what the manufacturer should do to support interlace scan vs. progressive scan. The sharing of information poses still another question, he asserts.

"Right now," he elaborates, "serial digital interface is the conduit for sharing information between playback devices and production tools. If you're working with film or HD, you're going to need greater bandwidth. You also need support for multiple types of compression. We'll develop interfaces to handle connections to those conduits as component manufacturers develop them."

Moving into a higher resolution has a major impact on speed, according to Pannaman of Quantel. He holds that, in building dedicated hardware, Quantel can put in more power to handle the speed. He states, "It's almost a law of physics that if you make a piece of hardware for a specific task the computer power necessary to perform a function on a specific image is inherent in how you design the hardware. The ability to do it is in a chip or a card as opposed to writing a piece of software."

He notes Quantel has been making strides toward delivering an affordable product to smaller facilities. A recent development has been reducing the cost of equipment for 601 work. The same cost-reduction techniques, he adds, will be used in handling resolutions up to HD.

Beyond 1080

Meanwhile, Quantel has been developing a new networking infrastructure called Clipnet, based on gigabit ethernet and, inherently resolution-independent, allowing the handling of resolutions beyond 1080i. In terms of future-proofing, he offers, "We can put some understanding of HD into a machine that is 601 today but

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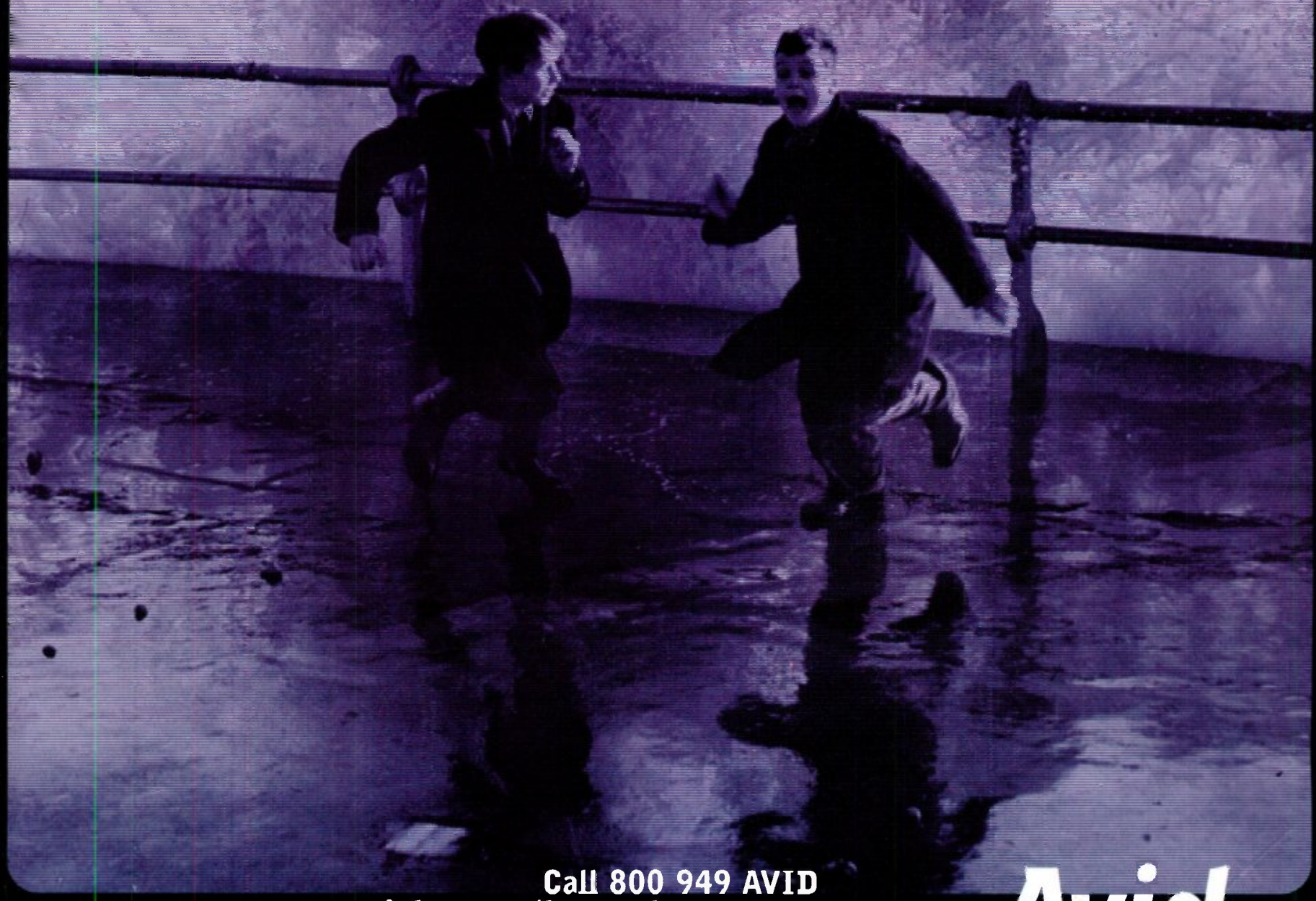

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can receive HD resolutions and convert those images to 601 to use them in a 601 production. On the same network, you can put multiple HD machines and 601 machines, and they can share material."

Pannaman says Clipnet will be available in early 1999. He notes cost hasn't been determined yet. The incremental cost per machine, though, is based on "absolutely normal gigabit ethernet technology," he says.

Discussing Pluto's digital disk recorders, Gray comments, "We've tried to make all of our equipment switchable and upgradable to HDTV. For example, all of it is switchable or upgradable to either the Panasonic HD D-5 high-definition recording format or the Sony HDCAM format. This gives them the added dimension of random access."

The question of moving into HD, he holds, is not a matter of the facility's size but a question of who the facility's customers are and what they want. He points to operations like Peachtree Post in Atlanta and smaller facilities in New York now servicing the format. He notes an HD editing suite costs no more than what a D-1 suite did five years ago.

"High-definition is well within the means of any facility that has the market demand," he asserts.

Uncertainties over standards shouldn't hold facilities back from moving into HD, he adds. "I can't remember a year during the past 30 years when there hasn't been an argument over formats and standards," he contends.

Quantel's John Pannaman says the key to meeting the demands of HDTV lies in the chip or card, not the software. Pictured here is Quantel's Editbox.

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Quantel ■ **RS#246**
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Going Tapeless

Meanwhile, he's not predicting a shift to completely tapeless facilities. "We'll see hybrid facilities for at least the next equipment generation or two," Gray says. "Tape, though is going to be increasingly relegated to input and output. With the assets of a facility being relegated to a hierarchy of storage from disk to data tape to the various formats of video tape, the facility's customers will bring in the various formats of video tape and the video and audio data will be processed on disk. Then this can be either stored on a data tape and/or be given back in finished form on any videotape format."

Avid's Fasciano holds, "The rumors of the death of tape have been greatly exaggerated. It offers attractive price and performance for acquisition, archiving and distribution."

He adds that, with HD, the landscape will be more complex, with the need to reconcile different formats for the release of standards such as 1080i or 720p. He comments, "This is all the more reason that resolution-independence is becoming more important. Post-production companies are going to want to ensure that their material remains in a pristine digital form in order to accommodate several release formats. This will be a major issue in commercial release. Scan conversions are going to be critical. Several companies are pursuing that area with high-quality scan conversion equipment."

Fasciano advises keeping in mind that, during the next five years, some 80 percent of the production done for digital TV will be in standard definition. He comments, "High-definition will remain, for the near term, a small fraction of the total broadcast day. Standard definition tools will have a minimal online role in high definition, but offlining need not take place in a high-definition space in order to be effective." ■

STL Makers Weigh DTV Options

Co-location, ability to get second STL frequency assignment often dictate choice for broadcasters

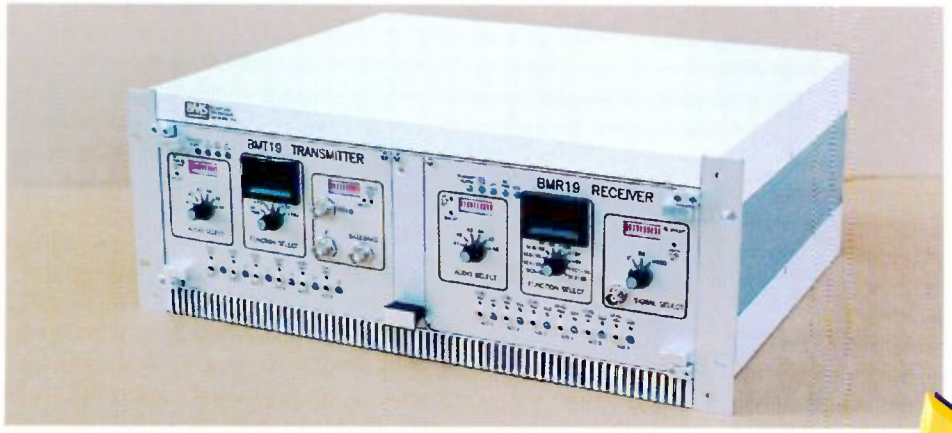
By Edmond M. Rosenthal

With more than 1,000 studio-to-transmitter links (STLs) needing to be upgraded to digital by the year 2002, stations are being forced to decide among a number of options. Chief factors affecting their choices are whether they can get a second frequency assignment for the STL and whether the studio is co-located with the transmitter.

The fact that most studios aren't co-located means that most stations will have to transmit two signals to the transmitter. Meanwhile, the fact that most stations can't get a second frequency assignment narrows the choices even more.

The transition to digital still isn't easy with a second frequency, but its easier and less costly than using only one microwave channel, according to David Thomas, director of sales and marketing at Nucomm, Inc. He notes the single-channel proposition means multiplexing or combining the 19.39 megabit-per-second ATSC signal with the NTSC signal.

Before the signals can be combined, he elaborates, the NTSC signal must be converted to a digital signal and compressed. Several manufacturers have encoders to encode these signals, he adds, with prices ranging from $30,000 to $80,000 and higher.



Broadcast Microwave Services is exploring DS-3 fiber lines for STLs.

Microwave Radio Communications' TwinStream STL

Short-Term Solution

A short-term solution offered by Thomas is just getting a temporary fiber link for the HD signal. At several thousand dollars a month, he says, it helps with the immediate cash flow problem, but in the long term it's more costly. He adds, "As things break down, you have to worry about service providers following through on their commitments. And broadcasting people like to have everything under their own control so that they can get it fixed in a heartbeat."

Nucomm has been proposing a multiplexing system called Dual Digital STL, which already has been built for some CBS-owned stations. With an MPEG-2 encoder for analog and HD encoder for digital at the studio, it involves doing a digital modulation and microwaving the combined signals to the transmitter site. The signals are then split at the tower and sent out to their respective transmitters. Thomas notes this requires a brand new microwave system and costs more than $150,000.

A less costly, temporary solution, he says is converting the NTSC signal at the transmitter. While an encoder is still required, the station can continue to use its old microwave system. "They may not be able to do this," he cautions, "if their high-definition satellite feed from the network comes directly into the studio. That scenario would not work because they would need to process the signal at the studio. And even if they can do this, they don't have that much control over the signal."

Nucomm offers still another system to combine the signals, called Dual Stream STL. Here the analog NTSC signal is not converted to digital but instead combined with the HD signal and microwaved out. This eliminates the MPEG-2 encoder cost, and two of these encoders comprise more than 50 percent of the overall system cost, Thomas notes. Dual Stream rates well in the latency issue, he points out. There isn't the delay inherent in digital systems because the signal isn't digitized, he explains.

While Dual Stream can cost 30-45 percent less than Dual Digital STL, he notes, it doesn't offer as much flexibility for the future, such as the addition of channels. Also, it is limited to three audio channels on the analog system, while many stations currently use four to six audio channels.

MRC Alternatives

Microwave Radio Communications is now offering alternatives to the original scheme it came up with two years ago. This approach, according to Dan Shine, director of technical services, is encoding the existing signal with its audio channels and combining it with the HD signal, putting them into a 45 megabit bit stream. Encoding for the video is MPEG-2. While this equipment is in the field and will be used by many, he notes, it involves high-cost, complexity and reliability problems in the encoding of the NTSC signal.

For those with available frequency spectrum, another approach is using a second link at 13 or 18 GHz for the NTSC signal.

But Microwave Radio's most recent

PBS Exploring 4-FSK Modem Solution For STLs

PBS, always an innovator when it comes to mind-expanding programming is also looking to expand DTV technology. The network's engineering transmission subcommittee is currently talking with four manufacturers interested in developing a 4-FSK modem for STLs.

Gil Maxwell, chief technical officer for Maine Public Broadcasting Corporation (MPBC) and chairman of the PBS engineering transmission subcommittee, indicates that the four companies are Microwave Radio, Nucomm, RF Technologies, and Hitachi. Maxwell explains that bandwidth conservation is not a concern at this time and that the task of rebuilding the PBS microwave infrastructure while trying to stay on the air is a formidable challenge.

Money and time are the guiding forces behind this subcommittee's quest for new approach to ST's especially for PBS systems covering large rural areas like Maine. "The purpose of the RFI was that we wanted to have manufacturers check my subcommittee's assumptions," explains Maxwell. "We did this because the solutions being offered from the data world were not applicable to what we did. They did not fit the PBS operational mode."

Maxwell says that the manufacturers wanted to use QAM and that would be an attractive option if PBS was starting from new. "To use QAM, we would have to replace all our existing radios," he says. "All the solutions proposed so far assumed separate analog video and ATSC data streams as well." In late May, according to Maxwell, Hitachi participated in an 8-FSK demonstration at MPBC studios in Bangor, ME. Using a Hitachi 16x9 camera and a Hitachi MPEG-2 codec, a three-hop microwave transmission down to MPBC's facilities in Waterville, and then back to Bangor went off without a hitch.

"We got perfect pictures. After reconfiguring the existing microwave system we yanked out the video modulators and the audio subcarriers. We used the Hitachi 8-FSK modem which they built for NHK at 45 Mbps," Maxwell says. "We use very long hops here. Our sites are identical in nature to those found in other rural states."

Maxwell says the test wasn't the first of its type in the country but that the number one concern for manufacturers is bandwidth conservation. "We told them that we don't care about that," he explains. "We have 25 Mbps of bandwidth that has already been allocated by the FCC. We want to be able to walk into our studios and slam dunk our microwave systems. 4-FSK allows us to get our digital microwave system up and running in 15 minutes. Our solution augments, rather than replaces the existing microwave system."

Maxwell says that PBS has 400 or so STLs nationwide and that approximately 80%, won't work under the proposed modulation schemes that began rolling out two years ago. Maxwell also believes that many PBS stations will not have enough funds or time to separate out the analog and digital channels.

"Here at MPBC, our analog channel will be one of our digital channels. We will feed the ATSC signal through a converter box at the transmitter site and out it goes in NTSC," Maxwell says.—*Peter J. Brown*

approach, TwinStream offers the cost advantage of putting both signals on the same microwave carrier, leaving the NTSC signal as analog and combining it with the HD signal. Both signals are put into the same 25 MHz RF channel. Shine says many of the major networks have embraced this approach. In the hostile RF environment of Los Angeles, KCBS-TV, KABC-TV and KTLA all have TwinStream beta sites.

Shine says there is room for all three approaches. While his company's original scheme costs about $130,000, it offers the benefits of a digital NTSC signal. TwinStream gets both signals to the transmitter at a cost of $50,000 for transmission equipment. For those with a second channel assignment, the cost also is about $50,000, he says.

A Moot Point?

As for co-location, it's a moot issue for most stations. Lisa Hobbs, marketing manager at NDS Americas, Inc., reports that, of the eight stations NDS was currently working with, only one is co-located. This station, she points out, only recently decided to co-locate the studio and transmitter. One reason was to allow the use of the same STL to get both signals to their transmitters. The other involved a tariff issue with the local telephone company, where it was

Nucomm is proposing a multiplexing system called Dual Digital STL.

significantly less expensive to lease a line to carry 270 megabits than to lease one to carry 19.39 megabits per second.

This station, Hobbs notes, opted to send a 270 megabit uncompressed digital signal from the studio to the transmitter, doing the compression at the transmitter, where the encoder is located. She points out this approach is economically prohibitive for most stations and also difficult because not all stations have a person at the transmitter site.

An alternative being explored at NDS, at the request of some customers, is Microwave Radio's TwinStream solution. Meanwhile, Hobbs says, some network affiliates are considering the option of running DS-3 fiber lines from the studio to the transmitter. A positive aspect is that, with 19.39 megabits, the DS-3 standard provides 45 megabits per second of bandwidth.

"If you digitize the current analog signal," she continues, "you can run it at a 20-22 megabit bit rate and multiplex both signals, running them through the same DS-3 link." Until recently, there had been a drawback to this approach. When two signals were multiplexed and the multiplex stream was changed there was a momentary glitch in the multiplex stream, causing a brief outage. Hobbs says this problem has been resolved by NDS but may still be prevalent in other vendors' solutions. The DS-3 approach has no other problems to her knowledge, but she adds, "We're still in a testing mode."

A DS-3 approach also is being explored by Broadcast Microwave Services, Inc., according to Graham Bunney, president. He reports, "We've been doing product development all year on STL products and now have an STL that is basically analog but can be converted to digital, using 16 QAM modulation to transmit a DS-3 signal." He notes this was being tested and was expected to be ready for use by year-end.

The approach uses off-the-shelf product and combines existing technologies from other companies, he notes, and will have full redundancy available as well as duplex configurations.

"There will be some markets that don't want the DS-3 signal," Bunney asserts, "because of the cost of converting the analog signal to digital. Some stations don't want to go to the expense of MPEG encoders. An alternative that we're investigating is combining the analog and digital signals into one carrier." He says his company has done this in military programs at a cost comparable to the DS3 approach but would want to bring the cost down before offering it to broadcasters. ■

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Microwave Radio Communications ■ RS#249

NDS ■ RS#250

Nucomm ■ RS#251

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Canadians First Live DTV Broadcast A Success

The Canadian Association of Broadcasters (CAB) convention and exhibition in Vancouver was the site of the first live DTV transmission in Canada on Nov. 1.

LeBlanc and Larcan performed the low-power DTV transmission of the 720p programming. The transmitter was provided by Larcan and installed at Roger's Broadcast transmission site on Mount Seymour. The signal was beamed to the Vancouver Trade and Convention Center using Scala Electronics broadcast and receive antennas. Sony provided sets and HD material and Leitch provided a transcoder and DTV test signal generator. The HDTV encoder was provided by Tiernan.

FCC Sets Fee For Digital Subscription Services

Television stations that plan on offering digital subscription services to viewers will be required to pay a 5% fee on their gross revenue from those digital services beginning this month, according to a new public interest obligation issued by the FCC.

Broadcasters have been attracted to the concept of offering multiplexed pay-per-view programming as a way to offset the cost of the conversion to digital, but they've also been aware that such services are open to fees in keeping with the 1996 Telecommunications Act. The purpose of the fee is to prevent broadcasters (who are receiving digital spectrum at no charge) from gaining an unfair advantage over wireless operators (who pay for their spectrum).

The fees will be imposed on anything other than free, over-the-air broadcasts. Among the potential services affected are digital audio services, data subscription services, internet service and other to-be-determined offerings.

Dennis Wharton, spokesman for the National Association of Broadcasters (NAB) told Broadcasting & Cable magazine that he was disappointed with the move and that a "lower fee would have provided a greater incentive for broadcasters to provide the kind of services envisioned by Congress."

The FCC also required digital broadcast satellite providers to set aside 4% of channel capactity for public interest programming.

DTV Tech Talk

Inside HDTV Switcher Development: The Grass Valley Model 110-HD Switcher

Over the years the name Grass Valley has become synonymous with production switchers. Since the introduction of the original Grass Valley Model 100 switcher in 1984 the Grass Valley Group switcher product line has been an industry leader. In fact, when it was announced a few years ago that Grass Valley was ending the 300 switcher product line many in the sports production community, which had standardized on the 300, wondered "What next?"

Today the industry faces the DTV and HDTV challenge and at NAB a number of production switchers were introduced to handle HDTV production. We decided to invite Peter Symes, Tektronix VND Manager of advanced technology, to discuss the development of the first Grass Valley HD production switcher—the Model 110-HD. The following article discussed the challenges, the successes and the reasons Tektronix developed the Model 110-HD switcher.

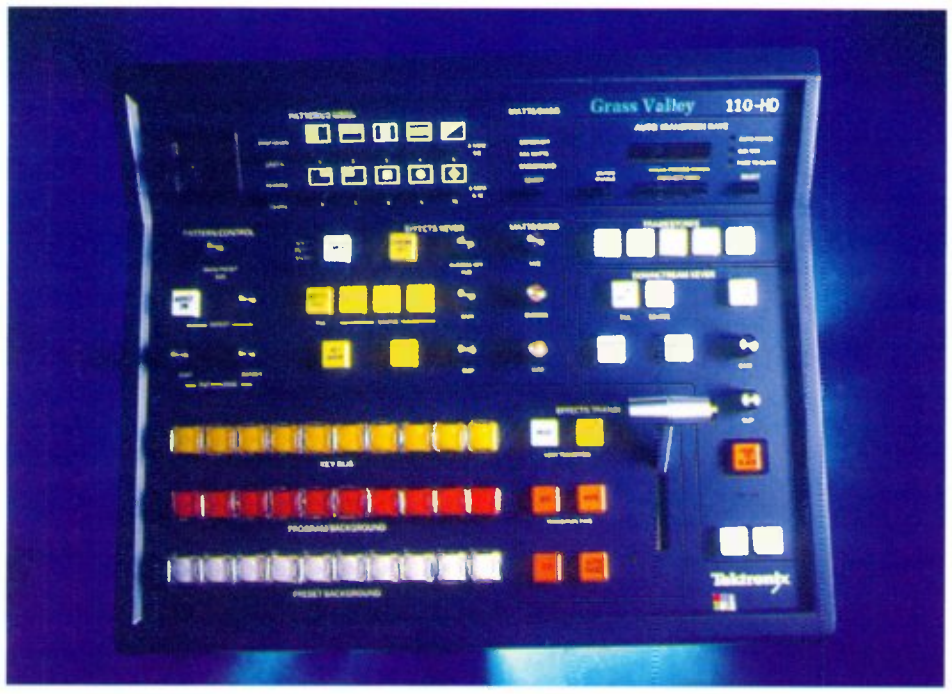
The decision to design a high-definition production switcher was easy for us. Production switchers have formed the centerpiece of the Tektronix Grass Valley product line for many years. The more difficult decision was whether to make it a large or small switcher.

For the market, Tektronix wanted to make the statement that we intend to be a major player in the move to HDTV. We recognized that the major market for high-definition production equipment is some time away—broadcasters have to face the costs of getting on air with DTV before they can contemplate large-scale production in HDTV, and much of the early high-definition material will be film-originated.

Internally, we needed to experiment with the handling of the high-speed digital signals and to evolve building blocks that would form the basis of future product lines. Above all, we wanted to design a product that would be useful to the industry, not just an engineering exercise.

These efforts resulted in a high-definition version of the Model 110. The switcher is small and includes or supports all of the processing elements that were design requirements. It offers a level of capability for small-scale production, long-form editing and film transfer.

The operator and editor interfaces were already designed, allowing the design effort to be focused on the technological challenges of HDTV. The choice of the 110-HD also allowed us to make an important point in the marketplace: HDTV does not have to be prohibitively expensive. HDTV equipment is expensive and even though the price differential will decrease, it will inevitably cost more than the standard-definition equivalent for some time. However, other manufacturers and we do not believe that every piece of HDTV equipment has to cost multiple hundreds of thousands of dollars. In bringing the 110-HD to market at $65,000 we were able to offer useful functionality at a sensible price.



The measure of success is not just the measured return loss, but also the maximum possible cable length that can be used between the serial transmitter and receiver.

HDTV Challenges

Technically, there were two major challenges in the design of HDTV equipment, both related to speed. First, the HD serial interface operates at 1.485 Gb/s, microwaves on coax. The second major challenge is in the parallel-processing domain, where luminance samples and the interleaved CB/CR color difference samples each has a rate of 74.25 mega-samples/sec. Both serial and parallel rates are 5.5 times the rates used for 601 component video.

For the serial interface, new application-specific integrates circuits (ASICs) are needed to receive, de-scramble and frame the input serial bitstream to generate parallel data, and to generate the serial bitstream at the output of the equipment. These functions are critical to all types of high-definition equipment and the engineering team designing the router products undertook this work. Because there would be no products without this interface we could not afford to rely on a single manufacturer. The team worked with several vendors and the prototype router module incorporated examples of three different input circuits.

While the IC manufacturers were developing their products, our design team tackled the other issue—how to connect the serial signals. At these frequencies every part of the signal path has to be treated as a transmission line, and every deviation from a close impedance match results in reflections. The ratio of signal to reflection, known as return loss, is critical to efficient operation of the interface. The SMPTE standard calls for 15 dB return loss up to 1.5 Gb/s, a value that is very difficult to achieve through complex interconnections. The 110-HD uses a captive circuit board that makes this easier.

For the router, however, users have the same requirements for HDTV equipment as for any other mission-critical broadcast equipment. Maintenance should be by replacing circuit modules from the front. This means there should be no active components except on the plug-in modules. So, the signal has to transit the input connector, through the module connector, and reach the input IC, all without active components while maintaining good return loss—quite a challenge.

Measuring Success

The measure of success is not just the measured return loss, but also the maximum possible cable length that can be used between the serial transmitter and receiver. When the high-definition serial interface was proposed, it was thought by many that coax lengths in excess of 30 meters would be impossible—longer lengths would require fiber connections.

Fiber is a viable option for long links in the television plant, but it is more expensive and much less convenient than coax for general interconnection. Careful attention to the input circuitry yielded designs that would work reliably with cable lengths of 100 meters or more.

For the parallel processor there were fewer unknowns. Processing at 75 MHz is certainly possible, but perhaps even more difficulty in achieving a cost-effective solution that offered fast time-to-market. In a high-definition switcher, pixel data arrives every 13 nanoseconds and, in general, each pixel requires similar processing. Despite the advances in digital signal processors (DSPs) and reduced instruction-set computing (RISC) processing, pipeline processing is the most attractive approach. Custom ASICs offer excellent density but involve high initial expense and long lead times.

Also, there is a dilemma when designing ASICs for specialist equipment. Small ASICs offering simple functions can be produced at reasonable cost, and can be used in relatively high volume, but offer only minimal benefits. Large ASICs with complex functionality provide the required density, but have long lead times and usually cannot be used in sufficient numbers to justify the initial expense.

Our design teams experimented with an approach that was new to the Grass Valley product line—the use of field programmable gate arrays (FPGAs). These are large "off the shelf" ASICs: the equipment designer writes microcode instructions, loaded during power-up, that determine the actual functionality. Recent developments have led to the availability of very large arrays that operate at relatively high speed. There was some (well-justified) skepticism about the claims of some manufacturers, but a few components were found to offer very useful combinations of size and speed. Eventually the substantial issues involved in using the devices at 75 MHz were solved, and FPGAs provide the core processing for both the 110-HD production switcher and the M2100-HD master control switcher.

Overall, the 110-HD project was an unqualified success for us. The product was brought to market in a very short time and was well received in the marketplace. The 110-HD production switcher provides useful functionality and demonstrates that not all HDTV products are "rich man's toys." Key engineering problems were solved, opening the way to design of the mainstream high-definition products that users will need in the years to come. ■

Two Aspect Ratios

Continued from page 1

some of each side. That fits (pun intended). It fills the NTSC screen, but this solution does steal picture information from viewers and alters the viewing experience.

The opposite extreme is to shoot 16:9 with free-of-action side flaps. To then ready the program for broadcast, the network cuts equal amounts from both sides and presents it as a 4:3 picture while the full picture, with restored sides, remains the original 16:9 image. This scheme works but demands that almost 25 percent of the total picture area becomes an "action no-man's-land" for both talent and crew. Action and talent must be 4:3 safe, and crew, equipment and any other action must remain outside an additional 16:9 safe action area. That can be problematic for DPs who can comfortably compose for only one of those formats. And in keeping with making things more complicated than they need to be, the networks like this idea the best.

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One of the problems of cropping 16:9 images from the side for 4:3 use is that it infringes on side-to-side picture integrity.

The Producers

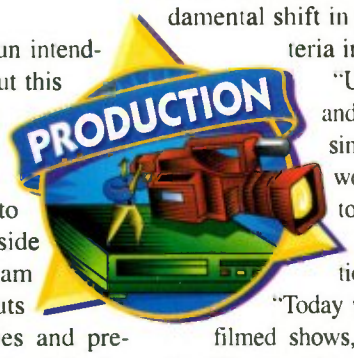
So what does the production community think?

"There is no ideal solution that will completely satisfy everyone," says John Sprung, director of technology for Paramount. Sprung suggests a compromise in which the 4:3 needs remain dominant by shooting with a 1:33:1 ground-glass and adjusting for the widescreen 16:9 picture, a 1:78:1 image, by cutting a little off the top and bottom of the picture and doing a dynamic tilt and scan in post-production.

Sprung says this compromise preserves side-to-side picture integrity and means production personnel have to worry only about gravity. Sprung adds that this solution works better not only in composing the image but also editorially.

"In the language of film and dramatic composition, threats traditionally come from outside the frame and cuts are very often driven by entrances and exits which also happen side to side," he explains. "The empty sides format can be a problem for drama editors who are building stories where tension, in the form of action and threats, build outside the frame and then swoop in to attack the hero."

Ed Lammi, executive vice president of Production for Columbia Tri-Star Television, says that Columbia has made a fundamental shift in production and post criteria in preparation for 16:9.



"Until last season we shot and composed for 4:3 and simply protected 16:9. Now we ask our DPs and operators to compose for the 4:3 frame but pay close attention to 16:9," Lammi says. "Today we do 16:9 transfer of our filmed shows, both dramas and comedies. We off- and online 16:9 pictures, and then when we are finished, we excerpt, or blow up, the 4:3 picture and deliver that 4:3 to our network, syndicators and international buyers."

Springtime for 16:9

Lammi says the commitment to the future of digital television means, "Every digital beta master in our vault is a 16:9 master. That allows us two things: First, if a buyer wants a 16:9 digital copy, we just dub it and avoid any expensive and repetitive work in reformatting. Second, it's a good overall rehearsal for 16:9, because when it's time to transfer that negative to HD, everyone, both viewers and industry craftspeople, will be used to the framing, editing and transfers processes and it will save us all a lot of trouble."

Lammi adds that he is not overly concerned about aesthetic compromises in excerpting the 4:3 image from the 16:9 frame. "We've found that in television things move faster than in feature production, and that may subtly affect the aesthetic. But to my eye you can comfortably excerpt an NTSC picture from a widescreen image and maintain the compositional integrity of the 16:9 picture. The 16:9 shows more of the picture and more of the scene, but our tests indicate that action and talent are not always in the center of the frame in the 4:3 excerpt. Camera movement and action change side-to-side framing constantly, and viewers tend to focus their attention and follow faces and dialogue. And with modern framing being more fluid, most action is happening within the frame either way."

Network Perspective

Charles Jablonski, vice president of Broadcast and Network Engineering at NBC, says that creatives will play a major role in deciding how to best meet the needs of both 16:9 and 4:3.

"This is still a business driven by creatives, and creatives in both program production and commercials will have an awful lot to say about what happens during the transition," he explains. "For years, theatrical film has been shot as 16:9, and at the same time it was 4:3 protected. Everyone has known that 16:9 was coming, so most people are already in that habit and have made appropriate adjustments where necessary."

Jablonski adds, "Television's filmed material—dramas, some comedies and movies of the week—will all be shot 16:9 and archived as 16:9, but it will be protected with a 4:3 TV safe action area. During the transition to widescreen, the 16:9 version will be cut from side to side to fit NTSC. But I don't think the sides would contain essential action that would be central to the 4:3 picture. That doesn't mean that what is eliminated from each side is boring or wasted imagery. In fact, except for static shots, you will always see what's happening outside the frame as the camera moves to follow action and establish location."

As for the network's commercial requirements, Jablonski believes that, because not all consumers will be DTV ready for a number of years, advertisers will try experimenting with the look and feel of commercials in a number of formats.

"It would be nice to be able to get everything a certain way," he says, "but during this transition, the networks will not require advertisers to conform [to] a specific format or do anything other than adhere to regular broadcast standards.

"In fact, I anticipate that some of our big advertisers will be asking us to try new things along with them, and I'm sure we'll be happy to accommodate them," he adds. "There will be a lot of experimenting by all segments of the industry for the next few years, and we'll all have to feel our way along during the transition."

Jablonski says that some advertisers like Procter and Gamble plan on making two different versions of some commercials. "They will shoot a little extra footage, make an NTSC commercial and in post do a widescreen HD upconvert. Commercials are the most expensive broadcast product on the air, and the added costs in posting two spots is minor considering the relative cost of production and airtime. So for the transition they can live comfortably in both worlds."

NEVER FORGET—Maxell Corp. recently replicated 100,000 CD-ROMs for an educational project for the Survivors of the Shoah Visual History Foundation. Started by Steven Spielberg, the Foundation is dedicated to collecting video testimonials of the Holocaust from survivors. More than 49,000 testimonials have been recorded to date. The CD-ROM, Survivors: Testimonies of the Holocaust, looks at the lives and experiences of four survivors and is available to schools. Pictured above with Steven Spielberg (fifth from left) are Maxell representatives Pat Byrne (second from left), Tim Purnell (third from left), Tom McCarthy (second from right) and John Selvaggio (far right).

The Archives

The residual value of archived programs shot originally in 4:3 will be an important consideration when determining the future value of creative assets in the international broadcast marketplace. How will programs we grew up with or programs that lasted a short season or two be treated in the widescreen world?

The majority of programs deemed worthy for resale, but not major hits, would probably go through an up-conversion process. Hits, on the other hand, would likely be transferred to preserve image quality. Programs shot on film will have an advantage since it's possible to reconstruct the original film frame and go from 480i back to 480p and enjoy almost twice the resolution. Videotaped programs, with no way of correctly re-interlacing the material, will remain at their original resolutions.

Sprung says there are all sorts of enhancement tricks that can be put to work on these images. "Just as colorists have become an integral part of what we do in post, conversionists will suddenly have an honored place at the transition table and will be sought out for their skills in fooling the eye, and we'll see a lot of well-done fakery," he offers.

He adds, "Given the low quality of initial consumer sets, the up-conversion process might be a matter of a little bit worse [quality] for a lot less money for the networks."

For a perennial favorite like *I Love Lucy*, Lammi says format may not make much difference at all. "*I Love Lucy* sells because of what it is, not because of what it can become through an electronic conversion process. Shows like *Lucy* were shot in 4:3, they are black and white and they are still funny. That's what makes them sell." He adds, "I think there are many classic programs like *I Love Lucy* that will continue to live in their comfortably familiar 4:3 world while they continue to sell through in the new widescreen marketplace."

But a show like *I Love Lucy* may be a perfect example of how HDTV will bring new life to old programs. With every episode shot on film, *I Love Lucy* can take full advantage of the greater resolution offered by HDTV and will be seen in a way it has never been able to be seen before. ■

Firewire Agreement

Continued from page 1

Jim Bonan, vice president of business development at Sony Electronics. "With 1394, we got the bandwidth we needed and it was also small and inexpensive."

Bonan points out that "i.Link" is Sony's choice as a name for IEEE 1394 for a number of reasons including that it is immediately more consumer-friendly. Sony prefers to avoid using the term "fire" in conjunction with any consumer electronics hardware.

Terminology aside, Bonan emphasizes that the objective was to find a way to get the HD decoder in the TV set to do the necessary work with the compressed, yet decrypted, HD stream passing out of the set-top box. Bonan describes any HD cable or satellite box with an HD chip as, "obscenely expensive."

Copy Protection

Despite the success of the two industries agreeing on a physical spec the issue of copy protection for programming sent through the Firewire remains.

The clearest examples of the uncertainty surrounding the soundness of the recent agreement is best shown in two letters sent to Chairman Kennard. The first letter is from Consumer Electronics Manufacturers Association (CEMA) and the National Cable Television Association (NCTA).

"We are pleased to report that our industries are working together to jointly resolve these technological hurdles," says the CEMA/NCTA letter. At the same time, the IEEE 1394-related letter sent to FCC Chairman Kennard by CEMA and the NCTA also indicates that copy protection issues remain.

The letter from CEMA and the NCTA was quickly followed up by a letter from the National Association of Broadcasters (NAB) and the Association for Maximum Service Television (MSTV) to Kennard on Nov. 10. Its tone was less conciliatory, in keeping with the battlelines that appear to be deepening between industry segments concerning DTV.

"Accordingly, the commission should rigorously oversee the implementation process to insure that the American public will enjoy the benefits of the new standard. Otherwise, there will be an indefinite continuation of the lamentable situation we face over the next 12 months with DTV sets unable to work with digital cable to receive DTV programs broadcasters will be transmitting. [This is] a predicament that will not only discourage set sales, but will also discourage cable carriage of DTV signals," says the NAB/MSTV letter.

In neither letter is there any mention of digital mustcarry. And when you open a mainstream consumer magazine like the November issue of "Popular Science" and read that, "DTV won't be available on cable TV until some technical and political wrinkles are ironed out" (p.76), you know the pressure is on.

Solving the issue of how cable viewers will be able to receive DTV programming while letting content providers rest easy knowing that the programming is copy protected sufficiently may go a long way toward releasing pressure.

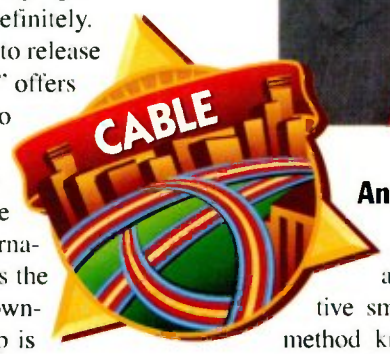
Topping the list of proposals to bring a copy protection system to Firewire is 5C, the Digital Transmission Content Protection (DTCP) method developed by Hitachi, Intel, Matsushita, Sony and Toshiba. It's a process that picked up considerable speed a year ago and hit full stride back in February, according to Bonan, when the five companies proposed DTCP to the Copy Protection Technical Working Group (CPTWG) for review and evaluation.

The CPTWG had been wrestling with various technical solutions involving digital content and copy protection issues for years. In June, 5C was given added momentum when the five companies announced the creation of the Digital Transmission Licensing Administrator (DTLA), an independent licensing authority.

While nobody questions the validity of the copy protection-related or intellectual property-related concerns of Hollywood as well as other content providers entering the digital age, 1394/5C was not evolving in a vacuum. Several industry contacts describe it as an expensive solution with its rapid implementation overshadowed by a high degree of complexity. As a result, 1394/5C has had its technical component bound up in a political envelope. Thus, while the hard work of the CPTWG and the backers of 1394/5C is not to be overlooked, questions remain.

Does the successful rollout of DTV over cable hinge on the acceptance and universal implementation of 1394/5C? Perhaps. Is this more a work in progress, than a done deal? Definitely.

"We want people to release a lot of HD content," offers Bonan. "We also don't have a whole lot of time to establish HD. And we don't have an alternative today that meets the needs of content owners. So the next step is to integrate 5C into the 1394 interface chips."



Bonan discounts the belief that 5C is an expensive proposition. "We would not be pursuing it if we thought it was too expensive," he adds.

Not Buying It

As with any solution to a problem that is proposed by manufacturers there are bound to be others who disagree. According to Indianapolis-based Thomson Consumer Electronics, the largest TV set manufacturer in the U.S. market, many companies do not support 5C.

"Some copy protection schemes have better press agents than other schemes. This is like killing a fly with a sledge hammer," says Thomson spokesperson David H. Arland. "Among our chief concerns, 5C is not optimized for protecting copies and it embeds the keys to the system in the product. You can bet that this will be hacked."

Arland believes that one alternative solution that is feasible and should be considered is encrypting digital content once it is on the tape. According to Arland, a weakness in the 5C proposal is that if someone hacked the keys and could make a copy then they're in the clear, allowing infinite copies to be generated downstream. Given the superb quality of digital copies, a better, lower-cost solution needs to be identified, believes Arland.

"The consumer will want a product that is affordable, while Hollywood wants a product that protects content," Arland says. "The cost of licensing is a concern. 5C is a two-way process, and we're not certain that it's necessary. As it stands now, 5C permits someone to push a button in Hollywood and deactivate a consumer's VCR. The CEMA/NCTA announcement is important, but the next important question is how to protect digital content travelling over that wire."

"i.Link lets you have multiple video streams on a single bus. We identified its critical importance to cable a year or so ago. With 1394, we got the bandwidth we needed and it was also small and inexpensive."

—Jim Bonan, vice president of business development, Sony Electronics

Another Alternative

In mid-November, Thomson and Zenith announced an alternative smart card-based copy protection method known as Extended Conditional Access (XCA) which prevents multiple copy generation downstream by a decryption loop within the display device. Another plus, according to its creators, is that any deactivation mechanism and the potential consumer-related headaches that come with it are avoided altogether.

CEMA's engineering group and the CPTWG are aware of the XCA proposal, according to Arland.

"Our hope is that it will be given a fair hearing and the concerns we have raised will be discussed, and that the right choices will be made for the consumer and the content community including Hollywood," Arland adds.

However, 5C has some strong supporters in the cable TV sector.

"We are quite annoyed by this situation," says David Beddow, executive vice president of Tele-Communications Inc. " This is not a cable issue. We are concerned with protecting the transmission, not issues of how the content is stored. Copy protection is an MPAA studio issue. Cable is quite willing to go along with this solution."

While 1394/5C and XCA were taking shape, other things were happening as well. In May, as Scientific-Atlanta and Mitsubishi were demonstrating HDTV signals passing through an S-A Explorer 2000 at the NCTA Cable show (using an IEEE 1394 MPEG-2Lynx chipset designed by Texas Instruments) Sony and seven other consumer manufacturers, including Grundig, Hitachi, Matsushita, Philips, Sharp, Thomson and Toshiba, issued a joint mission statement in support of a Home Audio/Video Interoperability (HAVi) core specification.

HAVi underscored the role of 1394 as one (albeit not the only) viable solution for connecting digital AV appliances. Earlier in the year, Sony began rolling out its own Home Networking Module (HNM), an example of middleware or software that runs between an operating system and an application. It allows i.Link-equipped digital appliances to be networked together. The list of HNM licensees includes TCI as of late July, and Microsoft which signed an agreement with Sony involving HNM and Windows CE in early April.

"When equipped with the Home Networking Module and i.LINK digital interface, our set-top devices will be able to do more than just pass through HDTV signals," said TCI's Beddow. "All digital signals, including HDTV and interactive services, can be connected to other appliances such as DTV sets and digital video recorders by using the digital interface, which also supports a newly developed digital copy protection solution.

"The set-top devices will also be able to control and be controlled by a variety of other i.LINK equipped digital AV electronics appliances. In this way, they can serve as a value-added gateway for a wide range of innovative digital-based interactive services for the home network environment," Beddow adds.

As for Sony's realtime operating system for set-top boxes, known as Aperios, a Sony spokesperson tells us that "Aperios remains a viable concept, but it's just that—a concept. Aperios is a realtime OS

for set-top boxes so there might be a connection in the future, but the details have to be worked out."

HAVi, Sony's HNM and Aperios are not included here as mere distractions, but as necessary background for any discussion of 1394/5C. It can get confusing. Why? Whereas IEEE 1394 is a standard, 1394/5C is not.

And are greater global market forces at work here as well? Are the four Japanese consumer electronic companies that joined with Intel to formulate 5C facing resistance from European and even Korean interests are seeking to implement an incompatible set of objectives? This is not some spontaneous observation, but an additional undercurrent that cannot go unnoticed even when collective agreements such as HAVi suggest that a greater sense of harmony prevails.

"How quickly Firewire gets adopted is very important. QAM would have been badly eroded if no other immediate solution had been found. That would have been bad for everybody in the long term."

—Bill Wall, chief scientist and technical director, Scientific-Atlanta

Some Help

Still, for all the unresolved issues there are those that are happy with the NCTA/CEMA agreement.

"We are very encouraged at the level of cooperation between the NCTA and CEMA, between the cable industry and the consumer electronics industry," says Dr. Paul Moroney, vice president of Advanced Technology at General Instrument Corp. in San Diego. "GI is eager to get more involved with the 1394 copy protection issue, as we understand that there are issues of complexity to address. We feel that we can help refine the solutions that CEMA and the NCTA are seeking to finalize.

"GI has already been directly involved in copy protection for other digital interfaces, and can contribute towards a final resolution," Moroney adds.

Adding to the pressure is that the cable TV industry is anxiously watching other wired and wireless developments as well, with names like SDTV and mPhase (see box below). And all this comes as the DBS industry looks as if it is preparing its most successful quarter on record with, among other things, EchoStar Communications Corp. advertising its DISH Network hardware at no cost to consumers after rebate.

"Early in 1998 we became aware that the consumer electronics sector had no plans for a cable connection in digital TV sets," says Don Dulchinos, director of business development at Cable Labs. He indicates that as part of the cable TV industry's OpenCable initiative, Firewire was identified as a practical end-to-end solution by early 1998.

As far as digital interfaces are concerned, IEEE 1394 sits alone at the top of the list for cable, at least for now. For example, nobody contacted for this article was keen on any Ethernet-based or USB-based alternatives.

"I suppose you could use Ethernet, but it would be difficult. Firewire guarantees synchronous delivery," Bill Wall, chief scientist and technical director at Scientific-Atlanta, says. "Allowing the TV decompressor to handle the bitstream permits us to deploy lower-cost set-top boxes. At the same time, we want to overlay graphics with the video content. It all comes down to who controls the screen."

Wall adds that the real issue is the development of a mix of associated upper level protocols to support functionality.

"The bus is the same," he says. "It's what software layers or protocols go on top of it. Firewire goes a long way to providing a solution."

Wall believes that by the time the first 100,000 DTV sets are installed in homes nationwide, two to three million advanced digital set-top boxes will be in the marketplace. A DTV with an IEEE 1394 digital interface is not expected to appear in CE showrooms before the end of 1999.

"How quickly Firewire gets adopted is very important. QAM would have been badly eroded if no other immediate solution had been found. That would have been bad for everybody in the long term," Wall adds. "We would be making a real mistake if two modulation techniques were allowed to be out there for cable. SDTV will be the predominant mode on the broadcasting side for some time to come. Right now, there are a million digital STB's out there using QAM technology, and these units are not open to a VSB solution."

Achieving the adoption of IEEE 1394 on a fast-track basis is not the challenge. That happened on an ad hoc basis months ago. As for any fast-track adoption of 1394/5C, XCA's appearance indicates that this is an unlikely scenario indeed.

In summary, infrastructure alone is no longer the name of the game in the cable TV sector. Work is well underway on a half-dozen or so interfaces in addition to IEEE 1394 that are critical to the future of cable TV. Absent these interfaces, and setting aside second-set issues for the moment, more than 60% of American homes are potentially waiting for the outcome of this drive to approve and implement a set of cable TV-related interfaces. Finding a way to send a digital television signal to a set-top box and then on to a DTV set is not as easy as it seems. It may not be the same as building a bridge over the Grand Canyon, but then again, it might. ■

Firewire Not Alone As mPhase And Foxcom Offer Innovations

As the cable TV industry sorts out its wired priorities, other wires are worth watching as well for HDTV delivery. mPhase Technologies, Inc. is definitely the fast-tracker when it comes to pushing the twisted pair envelope.

mPhase is moving aggressively ahead with its plans for the large-scale deployment of its Traverser Digital Video and Data Delivery System (DVDDS). According to David L. Klimek, director of engineering at mPhase in Norwalk, CT, 1000 Traverser DVDDS units will be installed for Hart Telephone customers in Hartwell, GA in 1999.

"This series of multi-channel, multi-subscriber tests will also address internal wiring issues and spectral compatibility with other wireline technologies," Klimek says.

Klimek indicates that the maximum capacity of the Traverser is in excess of 80 channels for the DS-3 (45 Mbps) version. A planned version 2.0, which is using an SONET OC-3 (155 Mbps) interface, will feature more than 275 channels.

"Aside from 'video over IP' such as ImagicTV, no one else is competing with us to deliver 5 Mpbs MPEG-2 entertainment quality digital video while simultaneously providing 1Mbps of Internet access on one twisted pair telephone line," says Klimek. "We are addressing NEBS, UL, and FCC compliance issues."

The system has hot-swappable modules in addition to full automatic switch-over redundancy. Any failure that would affect more than 20 subscribers is automatically switched to a standby module, according to Klimek.

A Digital Loop Carrier (DLC) version of the product is also planned which will allow telco's to reach more of their residential and business customers with digital video, high-bandwidth Internet access, or both, adds Klimek.

mPhase has been tapping the resources of the Georgia Research Alliance which includes the Georgia Tech Research Institute (GTRI) and the Georgia Center for Advanced Telecommunications Technology (GCATT).

"GTRI and GCATT remain convinced that the technologies under development by the mPhase team have tremendous commercial potential," reports Dr. Ronald A. Bohlander, GTRI's project manager in Atlanta.

And then there is Foxcom's Satellite Distribution TV system (SDTV).

Jerusalem-based Foxcom is focused on developing the telecom services market for Multiple Dwelling Units (MDUs), luring MDUs away from cable TV operators in the process. Companies such as RCN, DualStar and Optel, to name just three (along with the RBOCs), are looking at offering multiple services including video and Internet services to MDU's at a competitive rate. Foxcom is one of several vendors.

It's SDTV uses a single DBS dish with a stacked low noise block converter (LNB) and pipes it to subscribers via an HFC distribution system.

A single SDTV transmitter can accommodate almost 200 subscribers throughout a building.

"We're less expensive than coax in large complexes with two or three TV outlets in each unit. We've tested it up to 60 Mbps with no bit rate errors or degradation. We see no problem handling HDTV," says Mor Allon, Foxcom's vice president for business development. "We can provide up to 2.4 GHz."

The ability of companies like RCN to select and win over attractive, upscale MDU properties, which are awash in premium service subscribers, does not sit well with cable TV operators. Will a growing number of property owners and managers jump ship due to a perceived DTV (or HDTV) gap on the cable TV menu? Only time will tell.

—Peter J. Brown

The Alphabet Soup of Digital TV Standards For Set-Top Boxes

By Mark Kirstein and Gerry Kaufhold

In recent months much has been made of how cable systems will get their signals into the newest digital television sets.

According to the Cahners In-Stat study, more than 90% of cable subscribers will be connected to a legacy system through the end of 1999. In those cases the easiest way to deliver a local broadcaster's digital signal is to simply assign a channel and retransmit the VSB signal through the coax. A VSB modulated signal can be sent down an analog cable system side-by-side with traditional analog NTSC modulated signals, with the existing analog cable infrastructure untouched."

However, passing the modulated signal through an analog system places an increased burden on the DTV set's receiver, which must detect the VSB signal and decode it into the high-resolution display. The DTV set also has to be able to convert traditional NTSC signals into high-resolution. This adds cost to the DTV set and makes consumer electronics companies responsible for "making the connection."

The second type of system is transmitting a digital TV broadcast signal through a newly built digital cable system. Complications arise because the Advanced Television Standards Committee (ATSC) chose a modulation method called 8 VSB and the Open Cable Initiative is calling for 64/256 QAM. As is the case with analog cable TV systems, it is technically possible to assign a few specific 6 MHz channels and retransmit the local 8 VSB signals. But this is not convenient and it wastes bandwidth.

The cable industry has proposed that they obtain the digital "bit stream" of a local DTV broadcast and then mix it into the MPEG-2 Transport Streams of their digital cable delivery system. Once at the set-top box at a subscriber's residence the set-top box would be able to figure out it was receiving an HDTV data stream and it would not decode the signal, it would pass it through to a digital connector on the TV set.

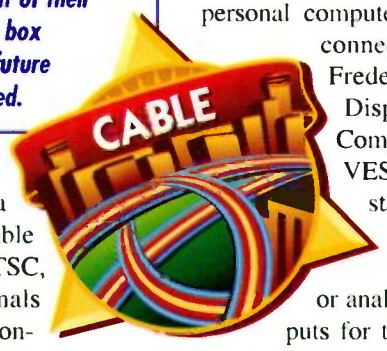
The Consumer Electronics Manufacturers Association (CEMA), has developed several standards to support HDTV "pass through" in Digital Cable TV systems. "EIA standard 679 permits the entire digital cable signal to be decoded inside the TV set," according to George Hanover, vice president of engineering for CEMA. "This standard uses the National Renewable Security Standard, or NRSS, to permit individual cable operators to control subscriber authorization without the need for a separate set-top box."

However, Cable Labs, a cable industry standards setting body, has been working for nearly a decade on its Open Cable standard for set-top boxes.

Meetings between CEMA and Open Cable participants have resulted in four approved standards.

Cahners IN-STAT GROUP

The Cahners In-Stat Group, a sister organization of Digital Television magazine, recently undertook a study to sort through some of the issues and terms concerning the relationship between the DTV set and the cable box. The study was completed by Mark Kirstein, senior director of the Convergence Research Team at Cahners In-Stat Group and Gerry Kaufhold, principal analyst for the DTV Market Research Service at Cahners In-Stat Group. Kirstein has been a keynote speaker at the international IEEE-1394 developer's conference while Kaufhold is a former broadcast Chief Engineer and MPEG chip developer. The following primer is the result of their first report tracking set-top box issues and we'll bring you future updates as they're completed.



EIA 770 provides a method for advanced cable set-top boxes to decode NTSC, DTV and HDTV signals inside the box, and then connect to a DTV set using analog component video outputs. This solution results in the most expensive set-top boxes, because of the extra circuitry required to do the decoding.

"We've seen a great deal of interest in our STi 7000 multi-format HDTV decoder," says John Rossi with ST Microelectronics, the world's top supplier of MPEG-2 decoders. "Set-top box companies and TV set manufacturers will be using component analog video as an interface while the industry wrestles with a digital pass through like IEEE-1394," Rossi adds.

EIA 771 provides for a Radio Frequency or RF connector similar to today's ubiquitous channel 3 or channel 4 output. The digital cable TV system's QAM signal is decoded and then re-modulated in the VSB format. EIA 771 could be used to output HDTV to a DTV set, Digital VCR or other device.

The standard contains RF output specs, on-screen display capabilities and recommendations concerning the input to the remodulator. A companion standard, EIA 772, defines a monitor mode for the interface.

Decoding and then remodulating the entire VSB signal not only adds cost to a set-top box, but raises other questions. A TV station will use an HDTV exciter that costs tens of thousands of dollars to encode their VSB signal at the absolute best possible quality. How well a low-cost chip set solution will replicate this VSB encoding step remains to be seen.

Enter IEEE 1394 or FireWire

The most commonly mentioned connection that permits a digital cable set-top box to pass through an HDTV broadcast signal is IEEE 1394.

EIA 775 is the CEMA standard that addresses IEEE 1394. The Open Cable specifications already include an IEEE 1394 interface definition.

Computers could also get into the picture. A personal computer equipped with an HDTV tuner card, or a digital cable interface, could act as a smart tuner and control center to enhance a consumer's Digital TV viewing experience. The computer industry's Video Electronics Standards Association, or VESA, has defined their own VESA PC Theater Interconnectivity Standard. "This specification defines a single multi-pin Molex connector that permits a personal computer to use three kinds of connections," remarks John Frederick of the Consumer Display Group at Compaq Computer and chairman of the VESA working group. "Our standard describes how to use IEEE 1394, the Universal Serial Bus (USB), or analog component video outputs for the connection to a DTV set or RGB outputs that are compatible with a computer monitor."

IEEE 1394, Set-Top Boxes and Digital TV Sets

IEEE 1394 appears to be on the road map for nearly all digital set-top boxes. However, there are still significant issues to be resolved. One of the key issues is "video overlay." An important value-added function of a set-top box is video overlay. These include interactive program listings, channel designations and the user interface itself.

The first generation of set-top boxes simply pass digital video through the set-top box onto the IEEE 1394 interface and into the Digital TV. There is currently no method in place for adding the video overlay over IEEE 1394.

Set-top box manufacturers are highly motivated to maintain the maximum value in their set-top boxes. Since the video overlay is a critical element, they will need to solve this problem. If the digital video were transferred in decoded video format, adding the video overlay may be achievable using semiconductors inside the set-top box. There are several potential solutions, but none appear to be anywhere close to implementation.

Some of the possibilities include:

■ Sending decoded digital video over IEEE 1394.

This method puts the burden inside the set-top box, where up to 8 Megabytes of memory may be needed to fully decode and add overlays to a 1080i HDTV signal.

But data protocols are not in place, and the bandwidth required for 1080i HDTV would significantly exceed the 400 Megabits per second (Mbps) currently available with IEEE 1394.

■ Using two isochronous digital channels; one for video and one for overlay.

By using isochronous channels, all of the information is synchronized inside the set-top box. Two streams of information are continuously fed to the DTV set. The TV set simply mixes the signals and applies them to the display. This method moves most of the burden and processing power into the cable TV headend. The digital cable system would transmit pre-mixed signals, which would be passed through a pair of IEEE 1394 digital serial connections.

■ Sending overlay data on an asynchronous digital channel.

This method passes through the Digital TV broadcast signal on IEEE 1394, but then sends On-Screen Display (OSD) information to the microprocessor inside the DTV set. The microprocessor manages the synchronization of the OSD and the video. This method will only work if there is a universally agreed upon standard for the microprocessor to decode the OSD instructions.

Such a software interface is known as an Applications Programming Interface (API). Microsoft, Java, PowerTV and OpenTV have offerings for APIs.

■ Sending overlay data on the analog interface.

This method can be implemented using slightly modified analog cable TV set-top boxes, so it may have some cost advantages. However, it requires that the component analog video inputs of a DTV be made available the exact same way on all TV sets, which may not be acceptable to DTV manufacturers.

In all but the first case, the DTV set would have to combine two discrete data channels (the overlay plus the video content) into a single video stream. Such capability may not even be in the best interests of the TV manufacturer, who most likely will want to be able to provide their own proprietary innovations as a way to differentiate their TV sets on the market.

We are not aware of any DTV models that can accommodate any of these alternatives.

Alternatives

Another alternative is to forgo a digital interface (IEEE 1394) and simply interface between set-top boxes with composite analog video signals. Several set-top box manufacturers are considering this alternative. Thus, for IEEE 1394, the video overlay issue could be a major factor.

Ultimately, the decisions about interfacing set-top boxes to DTV sets is driven by business concerns. Right now, the market for DTV sets is new enough that nobody has yet figured out which features and benefits will turn into profitable revenue streams. Experimentation should be the order of the day.

In the meantime, we'll continue researching this issue and continue providing updates to keep you abreast of the trends. As we find significant turning points, we'll report them here. ■

Product Review

Pro-Bel Gemini Router

Pro-Bel recently introduced a range of compact 16x2 routing switchers called Gemini. Housed in a 1RU frame, the router is available in four basic versions: analog video, stereo analog audio, serial digital video and AES/EBU digital audio. Mixed format frames are also provided for flexibility, including SDI and stereo analog audio, SDI and AES/EBU digital audio and analog video and stereo analog audio. Multiple-level Gemini systems can be constructed by linking frames together and, as each frame has an integral front-mounted control panel with two-level breakaway, external controllers are unnecessary for most applications. Each frame is also fitted with external control ports, enabling easy integration with Pro-Bel's controllers. *Contact Pro-Bel at +44 (0) 118-986-6123 or visit www.pro-bel.com.*

For more information circle Reader Service #252

Puffin Designs Commotion 1.6

Puffin Designs has released Commotion 1.6, a free upgrade to version 1.5. The upgrade offers a number of new features, including cartoon fill (providing a more

complete fill of line art), wiggle brush for the AutoPaint toolset in the Tool Option palette, new composite dialogue (revamped to make the compositing tool easier to use and add new transfer modes) and rotospline tool enhancements, including the ability to lock a rotospline and resize rotospline nodes. *Contact Puffin Designs at (415) 331-4560 or visit www.puffindesigns.com.*

For more information circle Reader Service #253

Arri Arrilaser

Arri has launched Arrilaser, the result of a collaborative effort between Arri and the Fraunhofer Society, the largest European contract research organization. The result is a digital film recorder using solid-state lasers, combining reliability with superior performance in picture quality and high-volume output, according to Arri. The use of solid-state lasers means a longer guaranteed operating life and lower consumption than gas lasers. It also allows for three second-per-frame recording, reducing cost-per-frame levels and improving efficiency when high volumes of digital material are output to film. User-friendly features for easy film handling include choice of 1,000 or 2,000-foot magazine, autofeed and film cut-off mechanism, fast forward mode and separate storage and take up magazine. It also includes a Windows NT driver machine, providing job management function and image management systems. *Contact Arri at 011 +49 89 3809-1038 or visit www.arri.com.*

For more information circle Reader Service #254

NVision Envy Routing Control System

The Envy routing control system will be able to control all Nvision routers, from the NV3064 up to the enVoy series of universal digital routing switches. It will also be able to control most currently installed routing switchers from other suppliers. Advanced features include intelligent routing, source locks and protects and an easy-to-use GUI for control. Up to 64 control panels and up to six routers can be connected to the Envy NT server. The system is scalable to allow the addition of more control panels and more routing switches by simply adding more serial ports or more servers. It will control up to 255 levels of routing at up to 2048 square. Envy is an Ethernet-based control system that uses existing PC and networking technology. Signal properties for each source, destination and physical tie lines are defined once in the configuration manager. When a switch is executed from a control location, Envy will analyze the properties and automatically select the proper path. Advanced features include RS-422 switch management, salvos and virtual layering. *Contact Nvision at (530) 265-1030.*

For more information circle Reader Service #255

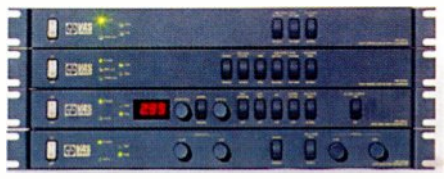
Fast Multimedia 601

Six-o-one is a new all-in-one solution for video editing from Fast Multimedia. 601 will be the first product in its class to offer "Print to DVD", allowing users to generate a fully DVD compatible MPEG-2 video data stream via a Fast-Studio software option. In the MPEG-2 variant used by Fast, editing is frame accurate. The program also supports data rates of up to 50Mb/s and also offers variable compression for both offline and online work. It offers users two realtime video streams in full quality and an additional realtime track for graphics and titles plus eight audio channels. A professional CG program is also included. *Contact Fast Multimedia at (425) 354-7002 or visit www.fastmultimedia.com.*

For more information circle Reader Service #256

VAS Group HDTV Product Line

The VAS Group has introduced the 20 Series HDTV product line. The 20 Series includes two Y Pb Pr/RGB transcoders, a safe area generator and a blanking generator. All 20 Series models accept analog HDTV 1080i and 720p standards and the field rate is also selectable for 59.94 or 60 Hz. The HD-21trc transcodes between



HDTV, Y Pb Pr and RGB and also has sync conversion capability and a built-in HDTV test bar generator for both 720p and 1080i. The HD-20sa is an HDTV safe area generator that inserts safe area markers into the video and offers four popular presets, manual control of markers via vertical and horizontal control dials and a three digit aspect ratio display. And the HD-20bg is a HDTV blanking generator that has manual vertical and horizontal control dials providing complete control of blanking. *Contact VAS Group at (818) 843-4831.*

For more information circle Reader Service #257

Maxell Professional Digital Audio Media

Maxell has introduced new DAT cassettes that use ceramic armor metal particles that deliver more than 2600 Gauss of magnetic energy, which, together with highly uniform dispersion and precision surface polishing, produce higher RF output and lower modulation noise. Maxell also introduced the DRS-1130, designed to fully exploit the performance of the eight-channel DTRS professional studio system. The tape uses high-output magnetic particles combined with an advanced polishing process for a smoother tape surface, high RF output and long operating life. The tape has a carrier-to-noise ratio of 54 dB and very low dropout and bit-error rates. *Contact Maxell at (201) 794-5922 or visit www.maxell.com.*

For more information circle Reader Service #258

Telect Umbilical Cable Harness Audio Patch Panels

Telect's new family of umbilical cable harness audio patch panels are designed to help users who need remote access to the front and back of their patch bays. The panels can handle both analog and digital in the same panel. They feature high-quality jacks and cabling components and a lifetime warranty. Users can maximize application space and gain convenient rear access with the panels, making them ideal for mobile truck environments, post-production studios with large racks of equipment and anywhere else remote access is needed. The panels are designed so that the traditional front and rear of the panel are individual units connected by a cable harness. The cable allows the user to place the front and rear of the panel on top of one another or in different locations to gain access to both sides of the unit for easier wiring. *Contact Telect at (800) 551-4567 or visit www.telect.com.*

For more information circle Reader Service #259

Cool-Lux U-3 Tri-Light

The new, enhanced U-3 Tri-Light has three MR-11 lamps and is now made with a new custom, high-impact, aircraft-quality aluminum casing and has a new one piece construction front gel frame holder. It weighs only 10 ounces and measures

2.5x3x3-3/4 inches. Each lamp is 35W for a total of 105W, and other specifications include a heavy-duty, 16-guage flexible quality, coiled cord with a four-pin XLR connector, individual switches for each lamp with an LED indicator and a master switch to control preset lamp indications. Price is $295 including lamps, gels and daylight filter holder. *Contact Cool-Lux at (818) 865-1616 or visit www.cool-lux.com.*

For more information circle Reader Service #260

Videonics Effetto Upgrade

Effetto 1.1 software is an upgrade for Effetto Pronto digital video effects and compositing system for the Macintosh. Effetto 1.1 brings an assortment of new features to the system. Users can now import Photoshop layers, motion-tracking files from Puffin's Commotion, and a majority of the standard After Effects plug-ins, such as those from DigiEffects and ICEfx systems from ICE. Users can also "publish" files to Effetto, allowing files created in other programs, such as Photoshop or Commotion, to be updated in Effetto as soon as any changes are made to the original. In addition, the character generator module can now handle Japanese, Chinese, Korean and other foreign languages that require "double-byte" support. Playback and rendering speed is also

Product Review

improved, from two to five times as fast, with the addition of RAM and disk caching capabilities. *Contact Videonics at (408) 866-8300 or visit www.videonics.com.*

For more information circle Reader Service #261

Storage Concepts High Definition Digital Storage

The HDDS is a high-definition digital storage system available from Storage Concepts. It is compatible with SGI's Octane, Origin 200 and Onyx 2 running IRIX and can support two high-speed XIO interfaces simultaneously. Depending upon the application, ranging from high-resolution telecine transfers to HDTV broadcasts, the HDDS can support sustained data rates of up to 248 MB/s, which is equivalent to a 1080i/30fps resolution of 1080x1920, 10-bit RGB signal. *Contact Storage Concepts at (949) 852-8511 or visit www.storageconcepts.com.*

For more information circle Reader Service #262

Frezzi Energy Systems Full-Spectrum Sun Gun

The Full-Spectrum Sun Gun from Frezzi Energy Systems is a 50 Watt HMI light that delivers the equivalent light output of a 200 watt tungsten quartz daylight-corrected output. It can be mounted on-camera, stand-mounted or hand-held and has a bulb lifetime of 4,000 hours and is 400%

more efficient than a quartz light. The Mini-Arc operates from any 13.2 or 14.4 volt battery or power supply with a power consumption of 65 watts. It is available with a choice of standard and special connectors and accessories include barn door with filter holder and a flip-up/down 3200 degree K correction filter which converts it to a tungsten balanced indoor light, providing the HMI advantage of low power consumption and high light output. *Contact Frezzi Energy Systems at (973) 427-1160 or visit www.Frezzi.com.*

For more information circle Reader Service #263

MetaWave MX/SC Control System

The MX/SC control system is designed for the MX routing system family of video and audio routing switchers. It includes a range of control panels suitable for small and large routing applications up to 1024x1024. The panels are easily customized for particular applications and feature user-definable button mapping, field legendable backlit pushbuttons, programmable LCD buttons and easy reconfiguration from a single PC. A wide range of control panels is available, including programmable, X-Y, single and multiple destination with breakaways. The new 16x2 control panel is totally reconfigurable, provides the ability to monitor status and features sharp, easy-to-read LCD displays. *Contact Metawave at 011-01635-299-000.*

For more information circle Reader Service #264

Tektronix PQA200 Version 3.0 Software

Tektronix is now offering Version 3.0 software for the PQA200 Picture Quality Analysis System. With the new software users can now use their own video for test sequences, in addition to the supplied library of material. It also allows users to record keystrokes and mouse clicks in order to automate repetitive measurement sequences. Sub-regional analysis, which allows users to analyze smaller areas of the picture and a lesser number of video fields is also available. Finally, the latest software introduces an SVGA display control for adjusting the contrast and brightness levels. As a result, customers can reduce the brightness and contrast on Picture Quality Rating and peak Signal-to-Noise Ratio maps to visually isolate important defect areas. *Contact Tektronix (800) TEK-WIDE or visit www.tek.com/measurement.*

For more information circle Reader Service #265

Pinnacle XtremePak

Pinnacle Systems has introduced the XtremePak, a new cost-effective software option for its DVExtreme DVE system. New features found in the XtremePak include:

- 3D Light Sources (interactive 3D light sources that are adjustable for intensity, color and allow positioning of intersecting planes
- Multiple wipes per DVE channel (providing nine types of wipe patterns per DVE channel with variable soft edge, colored borders and inverts
- Deep Defocus (adding defocus capability on an input by input basis)
- Deko Character Generator (a version of the Deko CG offering the creation of pages of text which can be rolled through the DVExtreme DVE)
- Pinnacle Paint Program (an industry standard 32-bit paint program for creation of graphics and wipe patterns within the DVExtreme. *Contact Pinnacle Systems at (650) 526-1600 or visit www.pinnaclesys.com*

For more information circle Reader Service #266

LeCroy Oscilloscopes

LeCroy has expanded its line of analog oscilloscopes with the introduction of the LA302 and LA303 models, featuring 100 MHz and 200 MHz bandwidths. Both oscilloscopes have a special display capability that makes it easier to measure relative frequency content of signals mixed together or the occurrence of low rep-rate events on repetitive signals. The analog display not only effectively shows these scaling and persistence effects, but also has an ultrafast display update that enables the user to see how the waveforms behave in realtime. The LA303 has a bandwidth of 200 MHz while the LA302 operates up to 100 MHz. The third channel on both scopes has a limited set of amplifier sensitivity levels and both oscilloscopes have a maximum sensitivity of 2 mV/dibv and maximum sweep speeds of 1 ns/div. Standard triggering includes TV system measurement based on NTSC and PAL/SECAM although HDTV triggering is standard on the LA303 and available as an option on the LA302. *Contact LeCroy at (800) 453-2769 or visit www.lecroy.com.*

For more information circle Reader Service #267

Barco DSNG Encoder/ Modulator

Barco is now offering the RE4221 DVB compliant DSNG encoder/modulator featuring 4:2:2/4:2:0 encoding, QPSK/8PSK/16QAM modulation and digital and analog video as well as audio interfaces, all in a 2 RU chassis with front panel control. It is designed specifically for digital satellite news gathering and

point-to-point contribution applications. It's a single channel encoder with a built-in modulator that allows for efficient vehicle space usage. Front-panel control, macro contact inputs and pre-stored configurations allow for quick set-up and reconfiguration of the encoder on-site. Multiplexing capabilities allow the unit to be used in multiple program transport stream applications by cascading of a second or more encoders. This allows for functional expansion while taking advantage of the 96 Mbit/s aggregate transport stream bandwidth available in the RE 4221 for satellite communications. It also has a low delay allowing for live interviews from distant locations. *Contact Barco at (770) 590-3629 or visit www.barco.com.*

For more information circle Reader Service #268

COMING ATTRACTIONS

JANUARY 1999

Special Report
DTV 1999: STATE OF THE INDUSTRY

Production
ENG CAMERAS

POST Production
STILL STORES

Operations
PLUG-IN BOARD SYSTEMS

Audio
LAVALIER MICROPHONES

Transmission
SOLID-STATE TRANSMITTERS

BONUS DISTRIBUTION

Digital Hollywood in Las Vegas CES, January 6 - 9, 1999

SPACE CLOSING 12/9
MATERIAL CLOSING 12/11

FEBRUARY 1999

Special Report
NAB BUYERS REPORT

Production
PRODUCTION SWITCHERS

Operations
ROUTING SWITCHERS

Audio
AUDIO MONITORS

Transmission
NAB TRANSMISSION PREVIEW

SPACE CLOSING 1/8
MATERIAL CLOSING 1/11

Zeros and Ones

Commentary from the Editors of Digital Television

End of the beginning but only the beginning of the end

CBS's Joe Flaherty was speaking in global terms when he told our "Dawn of Digital" celebration that the baton was ready to be passed from the technical to the creative and business communities in broadcasting and cable. Yes, it's more than time for those other disciplines to become involved, but those who concentrate on the technical side have far more to do. Yes, more than 40 stations now populate the digital airwaves, but that leaves almost 1,600 yet to go. Yes, more and more cable systems are being equipped for digital, but that leaves 60 million homes in analog. Yes, a few hundred households proudly possess a digital set, but another 100 million await. There's work enough left for all of us.

That said, the beginning is indeed behind us. As the Chinese say, a journey of a thousand miles begins with a single step. The steps in this journey lead back to the late 1960's, when the Japanese began in earnest to expand television to high definition. They accelerated in this country in the 1980's, when our government set its sights on that holy grail. Things advanced to a trot when the Wiley commission and the Grand Alliance broke the code for both digital and HDTV and the FCC granted the second channel. Today's pace of the digital advance is far from a gallop, but it's not too much to hope for a lope.

The motive of our Nov. 16 celebration in Washington was to make sure that as the digital tree was falling in the forest, someone would hear. The report, to our ears, was loud and clear.

Stay the referee

At the 11th hour, the Consumer Electronics Manufacturers Association and the National Cable Television Association reached and announced an agreement on Firewire—that elusive connection that one day will lead to interoperability among the various media and the display devices in America's homes. By some accounts, there was in the agreement less than met the eye. Conspicuous by its absence was a copyright protection mechanism without which Hollywood—shorthand for all program sources—will not loose its product among digital program purveyors.

The National Association of Broadcasters and the Association for Maximum Service Television promptly called on FCC Chairman William E. Kennard to bring the contending media parties on the commission carpet for a forced rapprochement.

Kennard had rejected a similar call by our sister publication, Broadcasting & Cable, and will probably stiff-arm this one as well. We are as anxious as the next person for the media to effect a level playing field for the consumer, but we still have faith that the momentum of the marketplace—and free enterprise—will close the gap on its own. And faster.

Advertisers' Index

The Advertisers' Index is provided as a reader service. Although every attempt has been made to make this index as complete as possible, the accuracy of all listings cannot be guaranteed.

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More Information Circle 107

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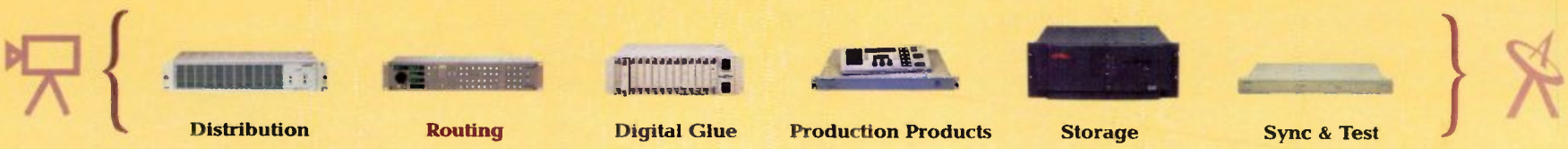

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More Information Circle 116