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Technology For The Digital Age

Cahners

JUNE/JULY 1998
Volume 1, Issue 4

COOL STUFF

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anon's J21ax7.8B telephoto zoom lens repre-nts a major leap in lens technology by offer-g the optical performance of Canon's 20ax om lens and placing it in a lens that is a size omparable to the standard 15x zoom lens. The

ns incorporates Canon's X-Element in a new tical designed concept called the Power ptical System. The Ifxs technology refracts ght in more directions than previously possi-e, and reduces a wider range of chromatic berrations while compensating for aberra-ns that occur in other lens elements. Fea-ures include a 21X zoom ratio, a 7.8mm wide gle, and 0.8 M.O.D.

For more information circle Reader Service #322

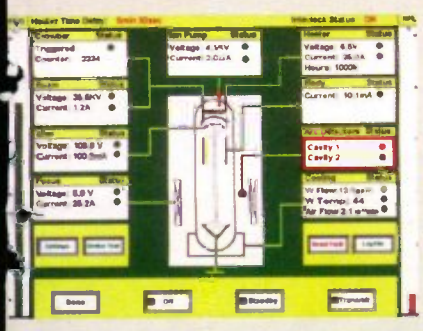
Where's The Fiber?

ynctrix is offering the FiberHydrant, a product at gives instant access to ATM networks. ith a Fiberhydrant on either side of an ATM etwork, users can establish high-bandwidth nteractive connections with the simplicity of a hone call. The system takes advantage of witched Virtual Circuits (SVCs), formerly vailable only to companies that had access to edicated point-to-point connections or Per-anent Virtual Circuits (PVCs).

For more information circle Reader Service #323

A Touchy Subject

arcan's Landmark DTV transmitter has a uchscreen control panel, providing the user omplete control over the entire transmitter ith the touch of a finger. A fiber optic LAN akes up the control infrastructure. Pictured



ere is the "IOT Status" screen, providing all the voltage and current operating conditions of the IOT. The status of the arc detectors and cooling system, and an independent set of LCD bar graph meters for FWD and RFL are also included.

For more information circle Reader Service #324

Here Come Those HDTV Sets; Confusion to Follow

Multitude of choices makes buying decision anything but black and white

Consumer television set manufacturers have begun rolling out their DTV and HDTV products in recent weeks, and it looks like the consumer is in for as confusing and complicated a transition to digital as broadcasters are.

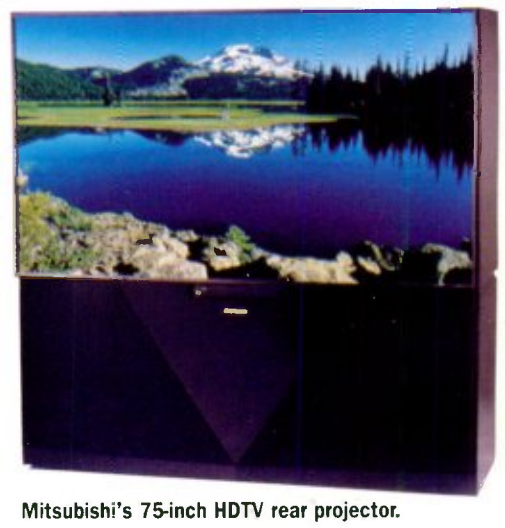
And almost as expensive.

Panasonic, Mitsubishi, Toshiba, and RCA have all introduced consumer sets and projectors offering different sizes, capabilities, and price points (see sidebar, page 77). But the looming confusing over set-top boxes, the difference between DTV and HDTV, and other issues are going to require a lot of education on the part of both broadcasters and retailers.

Nate Apfelbaum, Panasonic TV division assistant general manager, says, "We'll give straightforward information as we know it because the most important thing customers need to know is that there is regular television [NTSC], standard definition digital television and high definition digital television."

The Consumer Electronics Manufacturers Association (CEMA) sees the importance of the education process, and it has created a Retailer Education Road Show that began on June 23 in Washington, DC. Even for retailers, the learning curve will be steep.

Here are just a few of the issues that look to trip up consumers and retailers this fall.



Mitsubishi's 75-inch HDTV rear projector.

1) DTV versus HDTV

In the world of DTV receivers there will be the have (HD-compatible) and the have nots (DTV-compatible). So "Challenge Number One" is to make sure the consumer understands that DTV does not mean HDTV but HDTV means DTV and then some.

Mitsubishi is the only manufacturer offering only native display 1080i HDTV sets, and there's a reason for that. "We don't want anyone to wonder whether they were getting something half baked or whether they were getting the real thing," says Bob Perry, spokesman for Mitsubishi.

All manufacturers are offering DTV sets with native 1080i display, but the less expensive (and often smaller) models are really only capable of SVGA display. This means they can take in the 18 formats, but they are displayed at a resolution of

(continues on page 77)

Philly Rings In HDTV Era

The market to watch with four stations set to offer HDTV

By Ken Kerschbaumer

If you really want to get the full HDTV viewing experience you might want to schedule a trip to Philadelphia during the month of November.

With four stations volunteering to begin HDTV broadcasts on November 1, the Philadelphia market will offer the largest amount of viewing options of any market in the country. KYW, WCAU, WPVI, and WTXF will all be on the air with digital programming, and the engineering community is already looking forward to the opportunity to make history.

"It'll be a good test market for the nation because people here in Philadelphia are pretty typical," explains WTXF (Fox) Vice President of Engineering Diane Krach. "So with all of us going up at the same time we're going to be able to see consumer's response."

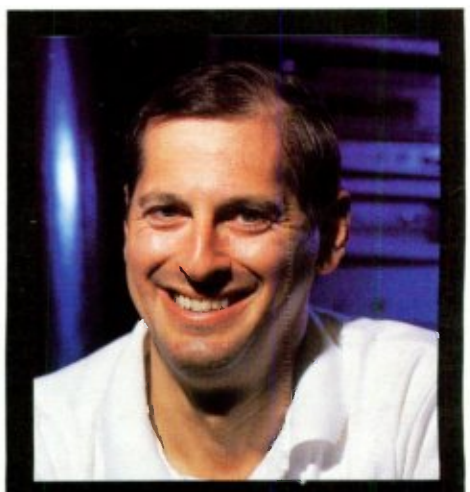
Sim Kolliner, director, Operations and Engineering, for WCAU Philadelphia (NBC), can't wait until November 1, the day WCAU begins HDTV broadcasts.

"I'm very excited about being able to finally provide the viewing public with fantastic, high-quality digital images and sound," he offers. "Over the years the industry has spent billions of dollars on capital to provide the absolute best possible signal to go out to someone's black-and-white TV set with a two-inch speaker, and we're getting past that now."

Three of the stations have had good experiences when it comes to getting construction permits from the FCC, but WTXF, as of June 8, was still waiting for its CP to be issued.

"We can't order anything until they issue a construction permit," says Krach. "And if

(continues on page 78)



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PANASONIC INTRODUCES

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News

HOT TECH

PSIP Helps Viewers Navigate DTV

PSIP standard to make new channel universe less confusing

By Ken Kerschbaumer

When you ask a general manager what a station's most important asset is after people, odds are he or she will say their station's call letters and identity.

For those stations that have spent years building that identity, the move to DTV broadcasts is more than just an expensive investment—it's a threat to their identity. After all, how will the viewer remember that two channels on the dial are the same broadcaster?

More importantly, how will a multichannel universe not degenerate into a mass of consumer confusion?

Enter PSIP, also known as "Program and System Information Protocol For Terrestrial Broadcast and Cable," or ATSC Standard A/65. "The point of PSIP is that broadcasters can put their digital stuff next to the analog stuff," explains Mark Eyer, Sony Electronics Digital Network Solutions of America principal staff engineer and a member of the ad/hoc group that drew up the standard. "The TV can figure out what channel numbers to use as opposed to just RF channel numbers, but beyond that it can also give channel names and program guides."

Art Allison, NAB senior engineer and leader of the ad-hoc group that drafted the standard, says simply: "PSIP is a must.

(continues on page 78)

WHEELING AND DEALING

Lucent+Matsushita
Lucent Technologies' Microelectronics Group has developed a new reference design with Matsushita Electronic Components that will enable personal computers to receive DTV signals. Microsoft and Compaq are currently testing the design, which is for a PC tuner card.

DiviCom+JVC
DiviCom and JVC are collaborating on the development of multi-standard HDTV encoding systems. Currently called the MediaView MV40-HD, the project will leverage DiviCom's skill in building video compression systems and JVC's expertise in digital recording.

Sierra Design Labs+Storage Concepts
Sierra Design Labs and Storage Concepts have formed a strategic alliance aimed at broadening the application of RAID-3 storage technology in the video and film industry.

Acrodyne+Immad+ECVS
Acrodyne has formed the Acrodyne Digital Integration (ADi), a joint marketing initiative with Immad+ECVS, one of the nation's largest audio/video and RF systems integrators.

Snell & Wilcox Receives Queen's Award For Technology

The Prince of Wales recently visited Snell & Wilcox' headquarters at Durford Mill, Petersfield, Hampshire, to present the company with the Queen's Award for Technology on behalf of Queen Elizabeth II.

The award was given for the technical and innovative achievement in the production of the Alchemist Ph.C (Phase Correlation) motion-compensated standards converter. Pictured here with Prince Charles is Professor David Youlton, Chairman and CEO of Snell & Wilcox, along with the Alchemist Ph.C development team.

Ph.C identifies motion in television pictures and tracks its speed and trajectory accurately in real time in order to predict its future direction. Its application maximizes the efficiency of machines such as slow motion processors, standards converters, telecine machines, and compression encoders.

HOT SALES

WXYZ-TV Detroit recently awarded equipment contracts to **Tektronix and NDS** for HDTV-related equipment. The ABC affiliate signed on with NDS Systems for a fully redundant ATSC-compliant HDTV encoding system. The NDS Series encoding system meets the profiles required by Table 3 of the ATSC specifications, including 480p, 720p, and 1080i. The design incorporates a bank of six standard definition encoders, which compress and multiplex the digital feed into one chosen ATSC/HDTV format signal.

WXYZ-TV also purchased several HDTV products from Tektronix, including the Tektronix HD Performer, 7000 series router, an M-2100 master control system, and an OmniBus facility management system.

The PBS Network Origination Center has chosen **Louth Automation** to provide multi-channel automation, using Louth's new Windows NT-based ADC-100 broadcast automation system. The system will be operated by eight Windows-based TO5 transmission operator workstations and a number of LCP-20 hardware control panels. Controlled devices include 46 Panasonic and Sony VTRs, three Odetics cart machines, eight Hewlett-Packard Media Stream servers, 11 Leitch LogoMotion logo inserters, nine Philips Saturn MC switchers, and three Philips Venus routers.

Florida's News Channel, Tallahassee, Fla., selected **Panasonic's** DVCPRO format. The purchase includes multiple DVCPRO camcorders, laptop editing systems, and editing VTRs and recorder/players to be assigned to bureaus throughout the state, as well as to the master control facility in Tallahassee. Also to be used in the facility will be ASC's VR300 16-channel server system under control of the NewsMaker StarDrive computer system. Other recent DVCPRO sales include WCTV-TV Tallahassee, Fla., and WYMT-TV Hazard, Kent.

Pro-Bel America, Chyron's routing and automation subsidiary, has received a $5 million routing order from DirecTV. The order is for a large serial digital video routing matrix to be placed in DirecTV's Los Angeles Broadcast Center. The order is the single largest order ever for Pro-Bel.

Four Media Company has purchased three **Cintel** C-Reality telecines with HUE, along with three URSA Diamond telecines.

CBS has purchased **NVision's** enVoy router for HD-SDI routing and distribution. Scheduled for installation in September, the initial package includes the enVoy series 128x128 router frame and the 4000 series 1.5 Gigabit fiber optic transmission equipment. The router will provide CBS with room for expansion as well as the ability to add extra SDI layers within the same switch.

Inside The ATSC

DTV Standards: A Work In Progress

Next up for ATSC T3/S8—Defining DTV conditional access

By Matthew Goldman

Although the Federal Communications Commission has mandated the Advanced Television Systems Committee's standard for Digital Television (known as A/53) some misunderstandings persist in the broadcast world.

Many broadcasters, equipment manufacturers and industry observers believe that the standard is completely finished, when the reality is that there is still much work to be done. There are many areas where enhancements or additions beyond A/53 are needed to support new business opportunities; furthermore, refinements to the current standards are constantly occurring.

Several standards-setting organizations are very active in developing new DTV standards. Most notable are the ATSC, the Electronics Industry Alliance—particularly the Consumer Electronics Manufacturers Association (EIA/CEMA)—and the Society of Motion Picture and Television Engineers (SMPTE).

Each has a primary focus area: ATSC concentrates on broadcasting/emissions issues, EIA/CEMA focuses on consumer receiver issues, and SMPTE on broadcaster studio/facility issues. In many cases, these organizations cooperate or share participants with one another as well as with other active standards-setting organizations, such as the Society of Cable Telecommunications Engineers and the Moving Picture Experts Group, under the International Standards Organization. No slight is intended towards other standards-setting bodies not mentioned; it merely indicates how much effort still goes into DTV's advancement.

This article's focus is on some of the ATSC's recent efforts to enhance DTV's implementation.

How The ATSC Operates

ATSC operates with several active groups under two overseeing organizations: the Technology Group on Distribution (T3) and the Implementation Subcommittee (IS). T3's mandate is to develop and recommend voluntary, international technical standards for the distribution of television programs to the public using advanced television technology.

Seven active specialist groups exist under T3: T3/S6 Video, T3/S8 Transport, T3/S11 Compliance, T3/S13 Data Broadcasting, T3/S14 Satellite Transmission, T3/S16 Interactive Services, and T3/S17 DTV Application Specific Environment.

IS was created in 1996 to look at the complete picture of production through point of entry into the home. The Implementation Subcommittee does not create standards; its purpose is to evaluate technical requirements, operational impacts, preferred operating methods, time frames and cost impacts. IS identifies potential requirements for standards, and may make recommendations to T3, SMPTE or other organizations. IS may also write recommended practices. Five active subgroups exist under IS: IS/S2 Distribution and Program Integration; IS/S3 Station Issues; IS/S4 Cable, MMDS, DBS, Consumer and Other; Data

Continues on page 12

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More Information Circle 425

DTV Profile

Point Man for the Consumer

Gary Shapiro is president of the Consumer Electronics Manufacturers Association, and as such is the interface between those who transmit DTV programming and those who receive it in the American home. He, and his industry, face an enormous challenge in the transition to digital—the largest electronic transition in history. There could not be a greater partisan for the new generation of television, as is evident in this interview with Digital Television's Don West.

We've talked to the engineers and we've talked to the programmers, but the big question about HDTV and digital is how the consumer is going to react. What do you anticipate will happen in November or December of this year, if that's when you come forward?

Shapiro □ There is a pent up demand for HDTV among consumers, especially those that are videophiles and upper-income Americans. That demand will not be satisfied in 1998 by the relatively few TV sets that will be offered. There will be a positive reaction, but there will also be bumps in the road. This is the most radical transformation of technology we've ever experienced in our lifetime. It is like going from the horse and buggy to the automobile. None of us have all the answers.

The first generation products will be great, but those that follow will be twice or three times as great—and will cost less. Our biggest concern is an initial negative reaction by those who expect that the first million TV sets should sell for something comparable to today's TV sets and work perfectly.

DTV ■ **I worry whether the consumer will say: "The Emperor has no clothes. Is this all there is to HDTV?"**

Shapiro □ I have no concern that consumers will be disappointed in HDTV. Not only will we capture those Americans who believe that picture is important, but we'll get the additional benefit of the wider screen, seeing the movies in their native viewing ratio. Plus you will get what we think is an even more important difference in the quality of the sound, which will be so much better than any existing TV set. Our research shows that you can have a great picture and good sound and it's only a good experience, but you can have a good picture and great sound and it will be a great experience.

DTV ■ **Is that sound dependent upon digital, or could you have it in analog?**

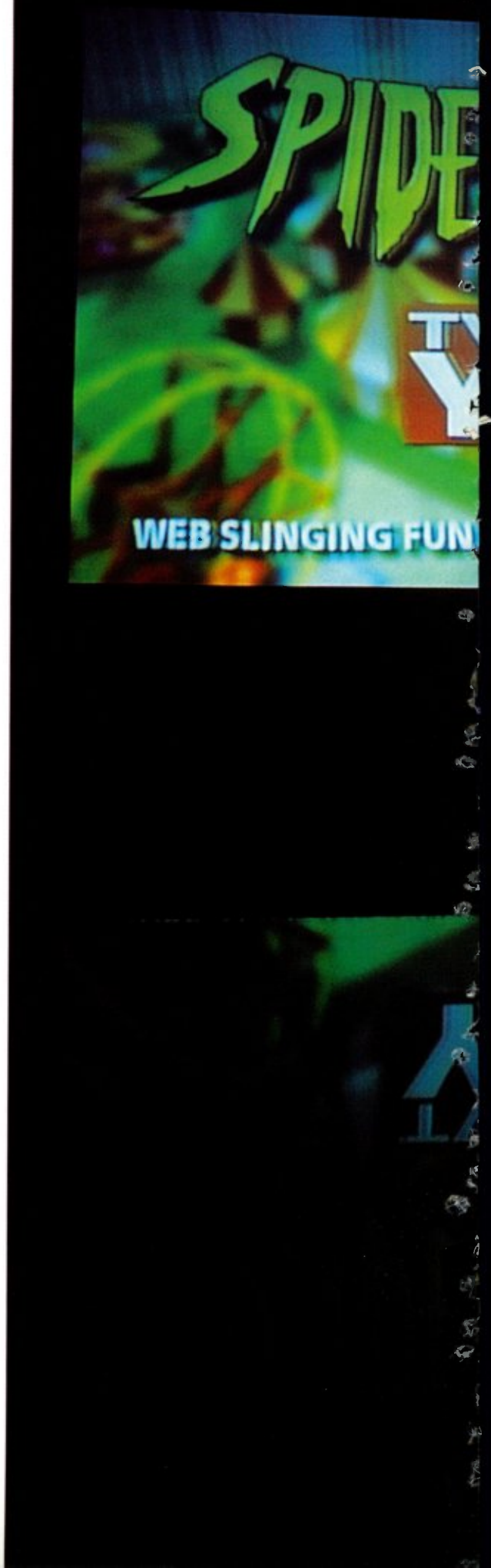
Shapiro □ By definition, the great sound is digital. We started out with just stereo sound, and moved to CD quality, which is digital sound. Then we moved to the Dolby experience, and now we're at digital Dolby, which is part of the HDTV standard, which is also called AC-3. But in consumer parlance, it will be called digital Dolby. Which means that you are surrounded by four speakers, plus a fifth speaker—center channel speaker—for the dialogue. Plus you have essentially a sixth speaker for the deep bass. And together, that will be called part of the home theater experience.

That's in almost 20 million American homes now. Americans are investing literally tens of thousands of dollars in their home theaters. The only missing component is the digital video. You have digital broadcast satellite which is, by definition, digital. You have digital sound, which comes through that. It's only in the last three feet when you take that little digital box from the satellite to the digital box, and convert the signal to analog to get into the TV set.

But the point is that you have DBS getting ready for HDTV, and its high quality. You have cable going digital, in spite of its mixed messages and mixed enthusiasm for HDTV. You have broadcasters who are the same. Many are very enthusiastic, and some are reluctant or neutral.

And then you also have home video, where we're starting to see announcements of the digital VCR. Or seeing digital video products on prerecorded media being introduced.

And of course, you have a fifth competition essentially for consumer's time, a fifth medium, if you will. And that's computers, if you consider video games and everything else like that, where you have either a prerecorded mix of information and in some cases even full-motion



video. That may be additional competition for that discretionary viewing dollar.

So this isn't the world of going to color, or stereo, where you have very little competition from other media. This is a world of five-way competition for the consumer eyeball, or viewing dollar, or advertising revenue, or whatever you want to call it. It's pure competition out there. And the best quality signal, and the best programming, is going to win.

DTV ■ **I'd like to go back to infrastructure considerations. How are we going to make this complicated animal work? And how do we get it to look less like something designed by a committee, and more like something on which everyone can agree?**

And how are we going to get started? Are we going to get started at 480i? 480p? 720p? 1080i? Does it matter, from your point of view?

Shapiro □ First of all, we do have the best standard in the world. Thank God for the Grand Alliance. Dick Wiley is my hero in this whole thing. I think he did a great job. The United States has developed, because of this best-mind process and all of the different industries getting together—because of our really striving for the best—something that I'm personally very proud of, and our country should be proud of. The fact that it does allow some choice in the standard is not a weakness. It's a strength. Because eventually, the best aspects of that, the ones that Americans choose to view and watch and use, will be the ones accepted.

As to whether it's 720 or 480 or 1080i, I agree with Tom McCullough of Circuit City. We should really start with the best possible, and then see if Americans and others are content with something not as good as the best, and let the free market decide that, but we should start with the best. Because the law of electronics is that there will be an immediate and tremendous deflation in prices. So what may be expensive today is very cheap a year from now. Every TV set will receive every standard, so we've already gotten over the hurdle of consumers having to make very difficult choices.

DTV ■ **But those sets won't display every standard.**

Shapiro □ That's true, and that's the choice they'll have to make: "Do I want the best possible display, or do I want something which is really good?" And for many Americans really good will be enough. But for a very significant group of Americans, they will want the best. There will be a cost differential.

What's so beautiful about this situation is that every week it's going to change. Every week there will be a new announcement by a CBS or a PBS or a cable provider of some type saying, this is the type of signal. There will be a new announcement of a digital VCR, where you can have your own library of movies in 1080, or 720, or even 480.

Our research has shown that Americans can see the difference, and they do want the best. Our research does show that the wider aspect ratio is very important to the HDTV experience, and that surround sound, when properly sold, makes a huge difference.

So we have optimism that 1080 or 720 are going to be preferred, but we also understand there will be a market for the 400 series of standards. And for some Americans, that will be fine, just the way we continue to sell black and white televisions today, and we'll continue to sell analog TV sets for awhile. So, too, there will be a market for 480.

The most difficult, perplexing question that we really have trouble getting our hands around is the question of a demand for converter boxes, and that's because we have seen no research that shows Americans really like converter boxes in their house. They don't like to add something onto their TV set.

DTV ■ **How important is multiplexing to the digital domain?**

Shapiro □ I have always maintained, even when I was on the board at the Advanced Television Test Center, that multiplexing was a non-issue, and should not be stressed for public policy reasons. It would upset legislators and commission members. It was not how HDTV was envisioned, and as anyone who now has DBS knows, having lots and lots of channels really doesn't do much.

Choice is important to a consumer in the purchase decision, but when it comes right down to it, very few people watch more than five or six channels, and I don't understand the multiplexing business paradigm from a broadcaster point of view. You have to pay the syndication fees for every multiplex signal, and I don't know how you justify the payment of those fees. The only way you can justify them is to either (a) get additional advertising or (b) have someone pay for a subscription. There's a fixed universe for advertising. I don't see that growing for multiplexing. And I can't imagine someone paying a subscription to get a broadcast signal. That's contrary to the free, over-the-air broadcast concept. It means broadcasters are trying to go after the cable model, and I don't think they have the capability to do that.

So I personally have always felt that multiplexing was the flavor of the month. It's right up there where interactive TV was a few years ago. It's up there where convergence is now. There's always a technological flavor of the month, and I think those flavors come and go.

It's like the TV-PC, PC-TV. That was very hot a year or two ago. I just person-

ally don't understand it. People buy a product for a reason, a very clear reason. And using it for other reasons doesn't usually happen.

DTV ■ **I think we left out one best mind when this system was devised: the cable industry, which is now in position to throw a block to this entire digital development.**

Shapiro □ I share your concern, but not your premise. We did not leave cable out; it was included every step of the way. Cable's viewpoints were heard and respected.

DTV ■ **But in the final analysis, they abstained.**

Shapiro □ That's true. They abstained at the end, and they also chose a different modulation format, intentionally, to make it more difficult, as opposed to Europe which has the same DBS standard. That was a business decision on their part. They recognized that what they offer over broadcasters, their competitive advantage, was, number one, a higher-quality signal; two, more choice. So, all of a sudden, they saw their competitive advantage being thrown out the window by digital television. They realized that broadcasters were smart and strategic in terms of how they approached HDTV all the way.

I think the way the broadcasters have figured out HDTV, and what they got out of this 10-year effort, has been brilliant, and very strategic, and in the broadcasters' interest. Cable also has been strategic. It has thrown up one roadblock after another. It started with the abstention on the vote, with the request that the FCC not set a standard so that there would be confusion in the marketplace, despite the fact they themselves had agreed all along the way that a standard was appropriate. It's moved over to their selection of a different modulation scheme, for no real apparent reason. It's gone now into their resistance of the clear mandate of the law and the must carry debate. It's carried forth to TCI's public pronouncements of a very confusing nature, designed in part to confuse consumers and scare people off of the best quality of HDTV.

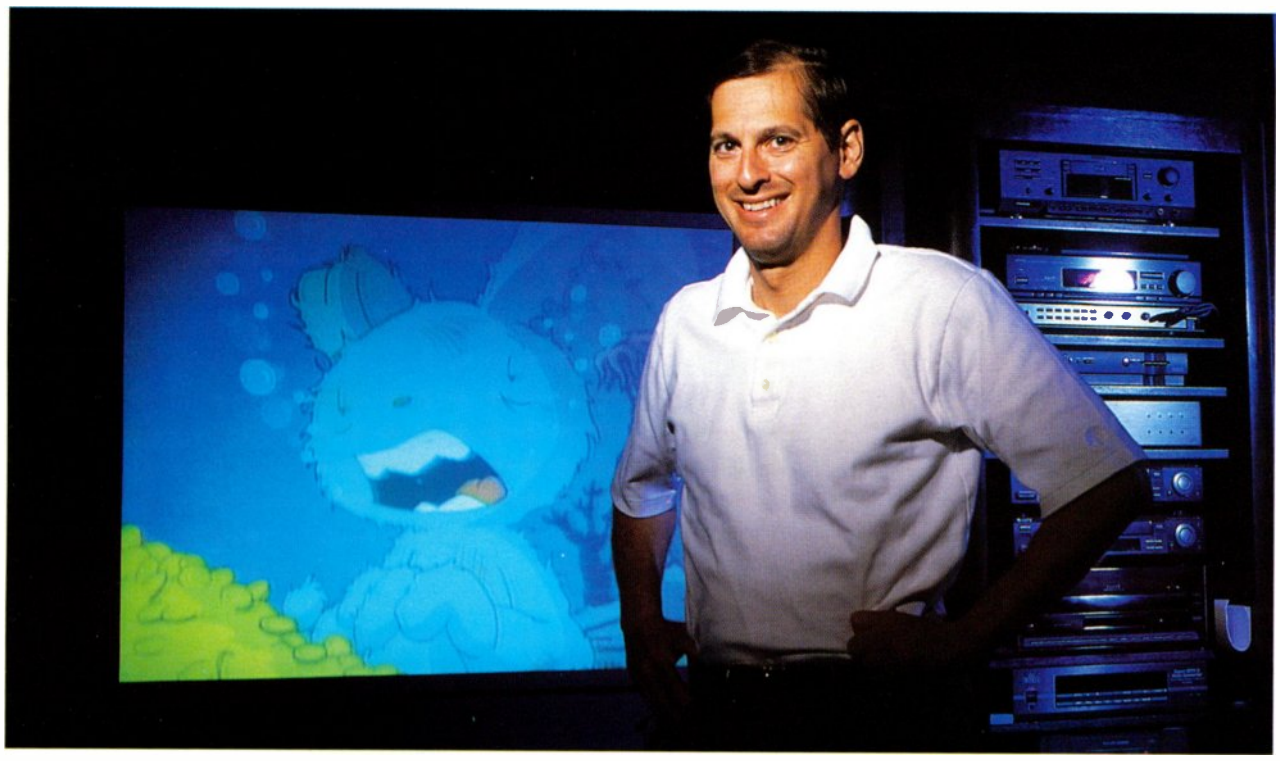
So I disagree that cable was left aside in the process. They were a vital part of the process, but they decided to dispute the process for their own strategic business interests.

DTV ■ **I was just saying that they were never full participants. They were reluctant participants at best, and now you have a system that doesn't incorporate cable. You're going to throw HDTV out to the winds, and it's going to run into a roadblock of 70% of the television homes that won't carry it.**

Shapiro □ That's true. When the process started, I think cable penetration was 30% or 40%, and it's gone up rapidly. On the other hand, if I'm a cable company, I'm looking out there, and I'm saying my best customers are buying HDTV sets. And they may be cancelling HBO and cable, and going to HBO on DBS. And they're going to start watching broadcasters rather than going through my cable service. And my advertisers, like Procter and Gamble, who are extraordinarily interested in HDTV, are starting to insist that I carry an HDTV signal. I think the marketplace, at some point, will pressure cable companies to get onto the HDTV bandwagon.

DTV ■ **But will that be 10 or 15 years from now? I mean, it seems to me that to jump start this new medium everybody's got to be on board. Ideally. The broadcasters have to be on board, and not with three different formats, but with one. And cable has to be on board, and DBS has to be on board. There has to be one HDTV pipe into American homes.**

Shapiro □ The format debate notwithstanding, I think that's greatly overblown in importance, even for broadcasters. Because there's all sorts of equipment out there on the market, and being developed, which allows transformation of the format at a relatively inexpensive cost by the time it gets into the consumer homes.



But cable is an important player, and that's why, when the law is as clear as it is on must carry, and broadcasters have their financial contribution that they must make by law, and equipment makers have made and continue to make their financial contribution to get our country launched in HDTV, we think it's appropriate—and very important—that cable meet its obligations under the law, and carry the signal.

DTV ■ **Are you at all worried about any of these testing results about which Sinclair Broadcasting seems to be making a big deal? They're saying: "Well, you're not going to be able to get as good a picture with an indoor antenna. The whole system is not going to work." What's your take on all that?**

Shapiro □ Sinclair has not been a vital part of this process. My understanding is they're not a member of the National Association of Broadcasters, not a member of the model station, not a member of MSTV. And everything that everybody knew all along, Sinclair has just discovered.

Number one, it is a law of physics that an indoor antenna does not work as well as an outdoor antenna. It obviously depends upon the building environment, the house. If you're in the middle of an apartment building, for example, and you have to go through five layers of concrete to get an indoor antenna signal, it's not going to work that way.

We've always known that. That's why outdoor antennas were invented and sold. Otherwise, everyone would just use those little rabbit ears, in the days of suburban houses with lots of windows. Now we've gone to different structures in the last 40 years, and indoor antennas just are not as good as outdoor antennas, although they're getting better.

Outdoor antennas are a big part of the answer, and we have developed a program of standardization for antennas so consumers will understand the different type of antennas they need. We've gone to a very sophisticated program where we're going to be mapping out every major city in the country as to where you live, so you can go into a retail store, and you can figure out what type of antenna you actually need, depending on whether there are buildings blocking your reception, how far you are from the broadcast, the HDTV signal. We've worked with the NAB on an antenna promotion campaign. We're focusing consumers' attention on buying antennas now, because we are concerned about the monopolistic cable choke hold.

Now, in some places, indoor antennas work quite well.

DTV ■ **How big are the screens going to be on the initial roll out?**

Shapiro □ Very, very big. You're talking about 35 to 5[illegible] inches.

DTV ■ **Will the 35 be direct view or a projection model?**

Shapiro □ They will be projection. I don't recall any direct view announcements to date.

DTV ■ **I have two interests. How big will the screens be, and how small will they be?**

Shapiro □ HDTV models will probably go as low as 30 inches in the first year. It's difficult to justify an HDTV consumer product less than 25 inches. But in time there will be just as great a variety as there is today. Except on the high end, where there will be more. You'll be seeing a phenomenal amount of displays in HDTV at the next Consumer Electronics Show in January.

HDTV clearly has its full glory in the larger models. But the challenge from the TV set manufacturer point of view is that you either have a huge tube, in which case you have to have big depth, or you have to have projection, and only so many rooms can handle projection. So that gives an opportunity for the Texas Instruments DLP (digital light processing) concept, for liquid crystal or for plasma, which is truly phenomenal. The work in those areas is proceeding furiously, and every day we're hearing about breakthroughs. In fact, last week, one of the breakthroughs actually was, believe it or not, in the cathode ray tube.

So the point is, HDTV is spurring a huge amount of investment and research in display technology. Eventually, the chips that allow you to receive HDTV can be very inexpensive. And so you're talking about attacking the cost of the display, which is 50% of the cost of a TV set. One of the ways TV sets are priced now, in analog, is about $10 a square inch. It's about $100 an inch in digital. You know, that's my nightmare, that everyone looks at these first sets and the first prices, and the story then is, "HDTV is for the richest people only."

DTV ■ **Why don't they have loss leaders, on the premise of selling 500,000 sets in the first year but not trying to break even on the first 10,000. Keep the 10,000 low to sell the 500,000.**

Shapiro □ The question is, can you get 10,000 in the first year of manufacturing? Once they figure out that they can do 500,000 a year, once they learn from the first few thousand sets and they get the manufacturing efficiency going, they will be going through that type of calculation. But every individual manufacturer is making its own pricing decisions, and they are very aggressive, and

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Everything you need to upgrade your transmission line network to digital technology

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RF SHIELDED CONNECTORS

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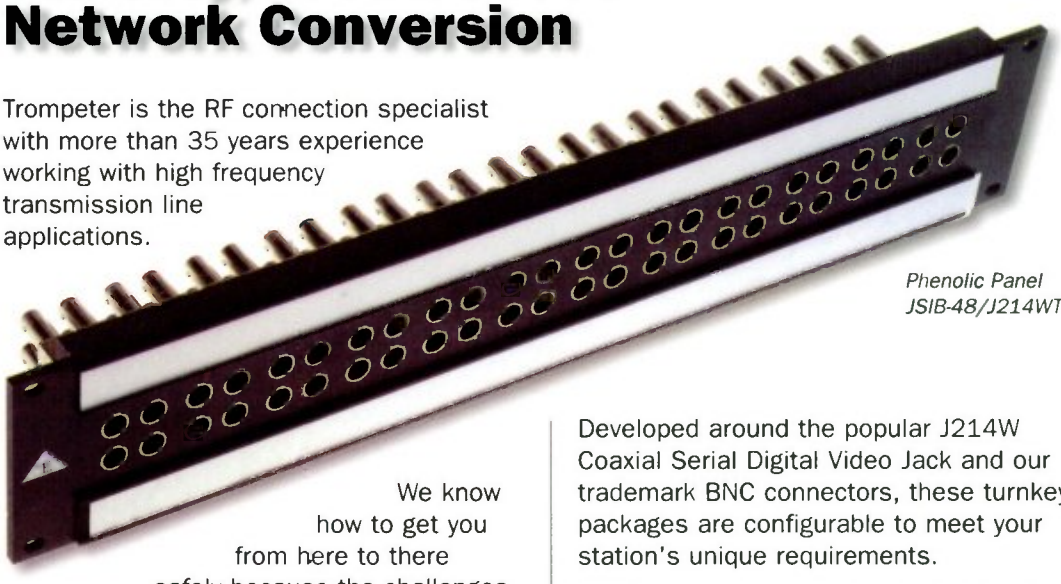
Fully Loaded Panel Packages for Easy, Trouble-Free Network Conversion

Trompeter is the RF connection specialist with more than 35 years experience working with high frequency transmission line applications.



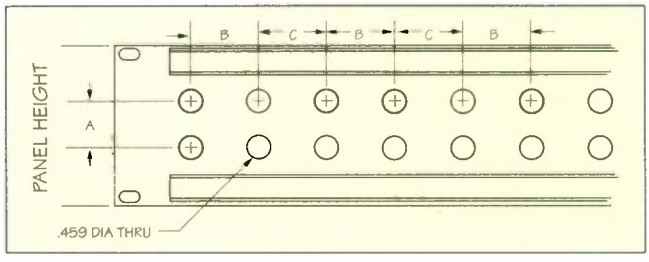
Phenolic Panel
JSIB-48/J214WT75

We know how to get you from here to there safely because the challenges of digital transmission are standard assignment for us.

Now, answering the broadcast industry's call for easy-to-buy, easy-to-use digital conversion solutions, Trompeter has developed a line of fully loaded video panels.

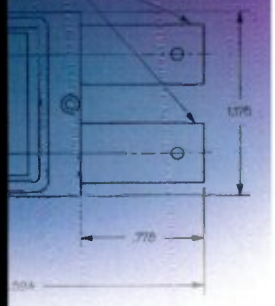
Developed around the popular J214W Coaxial Serial Digital Video Jack and our trademark BNC connectors, these turnkey packages are configurable to meet your station's unique requirements.

Panel packages come in standard 19" widths, in various heights, and jack spacing to accommodate your network. They are available in insulated black phenolic or standard gray. Each of these panel packages is loaded with either J214W or J214WT (self-terminated version) patch jacks.



Generic
Panel Spacing

FIGURE C



Black Phenolic Insulated Panels

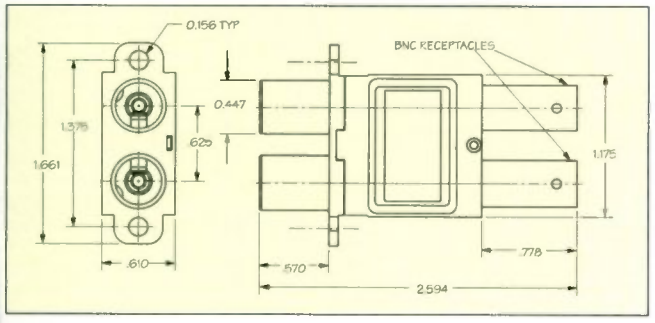
NUMBER OF PATCH LOCATIONS	PANEL HT.	JACK SPACING A	B	C	FIG.	UNTERMINATED PART #	PRICE/QTY. 1	2	5	TERMINATED PART #	PRICE/QTY. 1	2	5
48	3.50"	.625"	.625"	.625"	C	JSIB-48A/J214W	$623.39	$602.51	$581.39	JSIB48A/J214WT75	$668.75	$645.95	$623.15
48	3.50"	.625"	.625"	.750"	C	JSIB-48/J214W	$623.39	$602.51	$581.39	JSIB48/J214WT75	$668.75	$645.95	$623.15
48	1.75"	.625"	.625"	.750"	C	JSIB-48S/J214W	$620.86	$599.98	$578.86	JSIB48S/J214WT75	$666.22	$643.42	$620.62
52	3.50"	.625"	.625"	.625"	C	JSIB-52/J214W	$648.24	$625.36	$602.74	JSIB52/J214WT75	$695.30	$670.60	$645.90
52	1.75"	.625"	.625"	.625"	C	JSIB-52S/J214W	$645.78	$622.90	$600.28	JSIB52S/J214WT75	$692.84	$668.14	$643.44

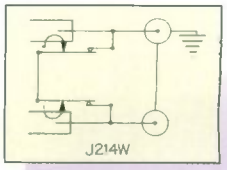
Standard Gray Insulated Panels

NUMBER OF PATCH LOCATIONS	PANEL HT.	JACK LOCATIONS A	B	C	FIG.	UNTERMINATED PART #	PRICE/QTY. 1	2	5	TERMINATED PART #	PRICE/QTY. 1	2	5
48	3.50"	.625"	.625"	.625"	C	JSI-48A/J214W	$665.77	$644.89	$623.79	JSI48A/J214WT75	$711.13	$688.33	$665.55
48	3.50"	.625"	.625"	.750"	C	JSI-48/J214W	$665.77	$644.89	$623.79	JSI48/J214WT75	$711.13	$688.33	$665.55
48	1.75"	.625"	.625"	.625"	C	JSI-48S/J214W	$665.77	$644.89	$623.79	JSI48S/J214WT75	$711.13	$688.33	$665.55
52	3.50"	.625"	.625"	.625"	C	JSI-52/J214W	$1320.92	$1275.68	$1184.68	JSI52/J214WT75	$1419.21	$1369.80	$1271.00
52	1.75"	.625"	.625"	.625"	C	JSI-52S/J214W	$1320.92	$1275.68	$1184.68	JSI52S/J214WT75	$1419.21	$1369.80	$1271.00

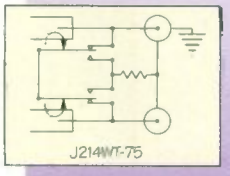
J214W and J214WT Serial Digital Patch Jack

The heart of Trompeter's digital panel packages is the J214W dual coax normal through patch jack. The J214W series delivers bandwidth from DC to 1.5 GHz with a typical return loss of >30db through 750 MHz and >25dB through 1.5 GHz. This low profile package fits comfortably into a 28-position panel and affords easy, one person rear mounting. Rated at 30,000 min. mating cycles, quality design, material and workmanship make this a product that you can depend on.





J214W
Inserting a plug into either side breaks the normal through.



J214WT (Self-terminating)
Insertion of a plug will automatically terminate the unused portion of the jack with a resistive load.

75 Ohm BNC Connectors

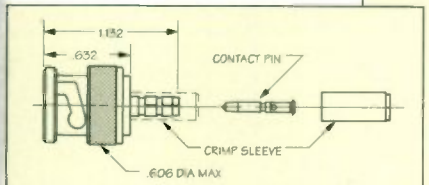
Trompeter's BNC connectors are designed to perform at 2 GHz and beyond. Made of the best quality materials, these tool-crimp connectors are built to last under the torque and strain of cable weight, high temperature and multiple matings. Models are available for all popular cable types.

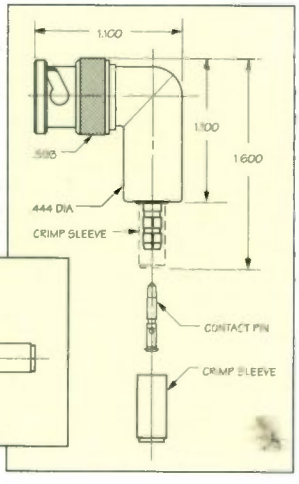
90° BNC PLUG

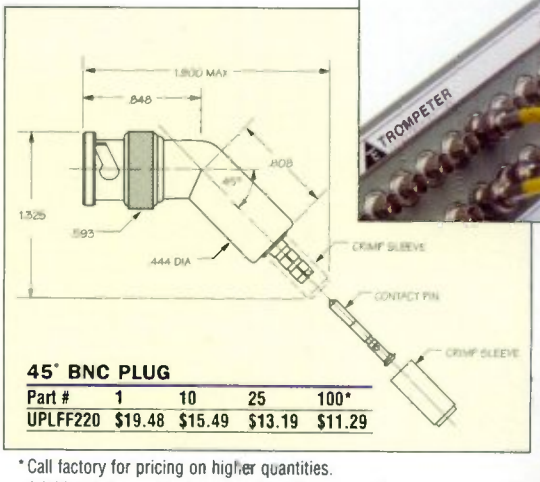
Part #	1	10	25	100*
UPLR220	$19.48	$15.49	$13.19	$11.29

STRAIGHT BNC PLUG

Part #	1	10	25	100*
UPL220	$4.48	$3.75	$3.31	$2.99

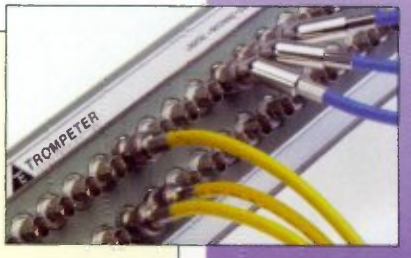






45° BNC PLUG

Part #	1	10	25	100*
UPLFF220	$19.48	$15.49	$13.19	$11.29



*Call factory for pricing on higher quantities.
Additional discounting based on bundling your order.

Cables

Manufacturer	Model	Connector Type Straight	Connector Type 45°	Connector Type 90°	Crimp Die Used With CT4 or CTL Tool
Belden	1505A	UPL220-014	UPLFF220-014	UPLR220-014	CD3-2
Belden	1694A	UPL220-020	UPLFF220-020	UPLR220-020	CD3-3
Belden	1855A	UPL220-009	UPLFF220-009	UPLR220-009	CD3-1
Trompeter	TCC-75-2 (RG-59 type)	UPL220-013A	UPLFF220-013A	UPLR220-013A	CD3-2
Montrose	CBL2354	UPL220-020	UPLFF220-020	UPLR220-020	CD3-3
GEPCO	VPM2000	UPL220-014	UPLFF220-014	UPLR220-014	CD3-2

Other cable types and custom dies are available, please consult the factory.

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Everything You Need...Available Today!

In addition to our new loaded video panels, Trompeter has a complete line of accessory and support products. Please contact the company directly with special needs or questions. Our application engineers will be happy to help you. Most products are available in five days or less shipped direct from the factory.

Patch Cords:

Length	Part #	1	10	25	100
24"	PCW-24-75	$25.07	$20.21	$18.15	$16.58
36"	PCW-36-75	$25.33	$20.47	$18.41	$16.48
48"	PCW-48-75	$25.59	$20.72	$18.66	$17.10

A full line of 75 Ω patch cords in standard stock lengths and colors is available on a quick turn basis for your new digital network. The company presently has over 500,000 different configurations using a broad range of RF connectors and cable types for camera, RGB, S-Video, Audio and many other applications.

Loaded Distribution Panels (Co-location/Meet-me bays):

Standard 19" gray aluminum panels loaded with Trompeter's UBJ28 insulated bulkhead jacks. These are available with 32, 48 or 52 jack locations and various hole spacing choices.

Audio Patch Products:

Audio panels come in two designs, 96 Bantam Jackfields and 48 Longframe Jackfields. These jackfields feature rapid punch series with full enclosure and an easy-tie pivoting cable bar. Looping plugs and patch cords for audio applications are also available.

Jacks, Plugs and Adapters:

Trompeter has a full line of complimentary products that include Mini-WECo patch jacks, video monitor probes, looping plugs, termination plugs, single patch jacks, and many types of adapters. BNC plugs are available in convenient bulk packs.

Triax Patching Products:

For patching triax camera cable, we offer triax cable plugs, patch jacks, looping plugs and patch cords. Our panels accommodate both coax and triax products to allow for multiple panels with both coax and triax cabling.

Tools:

We carry all the tools that you will need to do a first rate installation of your new digital equipment; powered and manual cable strippers, tool crimp assembly tools and connector removal tools.

Test Equipment:

To test for the proper assembly of BNC's and Mini-WECo plugs, Trompeter offers the perfect handheld BNC tester.

Training:

On-site connector installation training is available.

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hey'll do anything they can to be profitable.

As a trade association, we obviously stay out of pric-g decisions. But on the other hand we have the histori-al information. We understand that there is a product life ycle in terms of introductions. For example, the first CR was priced at five or six thousand dollars. And it as only for broadcasters to use. And then when the con-mer applications came along, it was still extraordinari-expensive. The first CD player was over a thousand ollars. You can buy a CD player for under $100 now. I emember when I bought one of the first calculators out here—it was a few hundred dollars as a gift for my ather. Now you get them as premiums. Cellular phones re another example. I remember $850 for my first. You ouldn't buy one that cost that much now—unless, of ourse, the government purchased it.

TV ■ Does it matter whether or not all 10 of these first oadcast markets are up and running by November 1? Ve've been reporting that probably Chicago and Detroit von't be.

hapiro □ No. This is a long process. It is a marathon, and he sprint is 1998. And that's just the first hundred yards f the marathon. And you can't judge a marathon by who's ahead after the first hundred yards, and what hap-ens there. Even if it's a slow start for everyone, includ-g TV set manufacturers. It doesn't mean anything in the ong term.

Glitches will occur. Some broadcasters may not be ble to go on right away. Some things may go wrong. TV et manufacturers who made announcements may not be ible to deliver. On the other hand, some TV set manufac-rers, because of a strategy, may make announcements nd go to market quicker, or not even announce and just o right to market. These manufacturers are extraordinar-y competitive with each other. And they probably have nings up their sleeve of which I can only guess.

TV ■ Will you have any sets priced as low as $3,000?

Shapiro □ Probably within a year to 18 months, I would ot be surprised if several sets were in that price range. his isn't like the automobile or other products where here are always price increases. This is an industry that as announced price decreases every year in history. here has never been a price increase announced that nyone has a historical record of—at least one that's tuck. Prices have gone down. A color TV set in the 960s cost exactly what HDTV is being announced at ow, and a color TV set today not only can be bought for ar less but it's 10 times as good.

Where are we going with all of this? Well, 50 or 100 ears from now, the entire environment will be your TV et. You'll be surrounded on every wall and the ceiling nd the floor. It will be your experience. That's what e're all going toward: the most realistic experience.

Let's start back. Other than to get news and informa-ion, why do people watch TV? They do it for the expe-ience. And what makes a movie or a TV show very ood? You have to buy into the believability of it. The elievability, where you lose yourself in the experience, is much easier on a larger TV set with better sound than it is with a little airplane-size TV far away. A compelling story makes up for a lot, but the experience is an equal partner in whether you can buy the whole concept. There's actually a phrase for it: the willing suspension of disbelief.

DTV ■ **Could we go back to the cable dilemma for a moment. Do you have a formula or a suggestion as to what the cable industry ought to do to be a player in this game?**

Shapiro □ The delay strategy should go out the window, and they should say, "We have a responsibility here under law. Let's work together to try to figure out the best way. What are the parameters? Is it realistic for us to have to carry everything all the time? If there's multiplexing, is there everything, and do we do it immediately? Obviously not. So there's a lot of discussion which has to occur as to what's reasonable, and what the law allows.

DTV ■ **It requires a set-top box for cable to deal with this, right?**

Shapiro □ Not necessarily. We are working with the NCTA on digital cable-ready attributes. And we think we've agreed on the whole basic definition, in terms of what characteristics the TV set must have to be digital cable ready. And theoretically, it is possible to have a digital TV set with a direct link-up from a digital cable system, with only the security feature being a separate little pouch. That's the goal.

DTV ■ **Without a set-top box?**

Shapiro □ Yes. And we've had some good faith negotiations for many years with that goal. We've been trying to get them to focus on digital cable ready for six or seven years, and they've been, you know, wanting to focus on

"This is a long process. It is a marathon, and the sprint is 1998. And that's just the first hundred yards of the marathon. And you can't judge a marathon by who's ahead after the first hundred yards, and what happens there."

analog, and just in the last year or so, we've started talking deeply about digital. We've made some major progress in several areas that way.

I think the government, by law, must get involved in it. I think Congress has determined it's a matter of public policy, that it's in our national interest to go to HDTV. They put a pretty huge burden on broadcasters. Equipment makers have invested several hundred million dollars. The cable industry has been part of the process, and has tried to throw monkey wrenches into it, and it's time that they stopped. They have an obligation to step forward under the law.

I think their strategy is to delay as long as possible, and then say, "Oh, but we've invested in these millions of digital boxes which don't work now." And I think that's an intentional policy, because I think they've made a decision that they can get more revenue by keeping the status quo, and they think they're going to get money off interactive television. You know: order your pizza through the TV type of thing. They'd rather use the digital cable box for other services rather than HDTV. They don't see incremental revenue for them from HDTV. I think they're wrong. I think when HBO, for example, announces a monthly fee that they can charge, you know, $20 a month for HBO-HDTV, and they can share that revenue, I think they'll see the benefit. But that's three or four years down the road.

DTV ■ **When we look back 10 years from now, what will our universe be like? Will be have succeeded with HDTV? Will there be a particular kind? Will cable be on board? Will we be happy campers? Or are we still going to be at war over this thing? Or will the Philistines have shot us down?**

Shapiro □ In 10 to 15 years we will look back the way my children now look back at the turntable, or the way we look back now at black and white television. In 10 to 15 years, if we turn the channel and it's not HDTV, we'll skip it.

While we're in the midst of dramatic change, it never seems dramatic, because we're experiencing it. But the reality is dramatic change. And we will end up at the highest format, either at 1080i or 720p, or perhaps at 1080p. And in 20 or 30 or 50 years, even 1080p won't be enough. This is not the end here. It's a major historical leap, but it's just a leap before we make the next leap.

DTV ■ **You've got 150 million to 200 million analog sets out there today. How long do you think it will take to replace them?**

Shapiro □ Our formal estimate projects by the great transition year, 2006, there will be about 30% percent of digital households.

DTV ■ **Do we give the analog spectrum back at that point?**

Shapiro □ It's never been our position we will. We've always said that's unrealistic.

DTV ■ **Then do you see a dual world, with analog and digital coexisting?**

Shapiro □ Yes. We see an analog and digital world coexisting, just as we see a black and white and color world existing today. We sold a million black and white TV sets last year. There is a market demand for lower cost products: there's no question about that. We don't see black and white TV sets filling garbage dumps. We don't even see color TV sets filling garbage dumps. What we see is their moving to different rooms in the house.

DTV ■ **What about convergence?**

Shapiro □ I think that's another debate that's more of historical significance than real significance. It's down to two companies now, I think: Compaq and Microsoft. Apple's kind of fallen out of this. Intel's gone with the whole approach. Even Compaq, which announced the TV-PC, has gotten out of the market for the most part.

I think that what happened was a couple of years ago the computer people perceived that the penetration of computers didn't come close to TV set penetration and they wanted to close that gap—35 million against a hundred million. And some of their aggressive members mistakenly tried to press it as competitive—when they're two different products, two different audiences, and two different purposes.

DTV ■ **Back to our "looking back on things" point of view. When will the mists begin to rise?**

Shapiro □ The mist will rise in 1999. We'll start seeing competition in TV sets. There will be a lot if different models, a lot of different types of TVs. Broadcasters will be coming on every day, and every day there will be news about this.

The initial sales of TV sets in November-December will be very scary and sparse. The broadcasters coming out will be sparse, but it will take a snowball effect.

We have to get through the next year, year-and-a-half, even two years. There will be a lot of prophets saying that the sky is falling. They'll be on all sides. They'll come from Congress. They'll come from certain consumers. They'll come from all sorts of consumers across the spectrum of America, who will say, "Why are we doing this?" There will be a whole bunch of self-doubt and second guessing, and I think we have to be prepared for it. But we have to keep our eye on the long term.

This transition is not going to be beautiful. It's going to be a transition that's going to be very, very bumpy.

So we just have to go into this with our eyes open. □

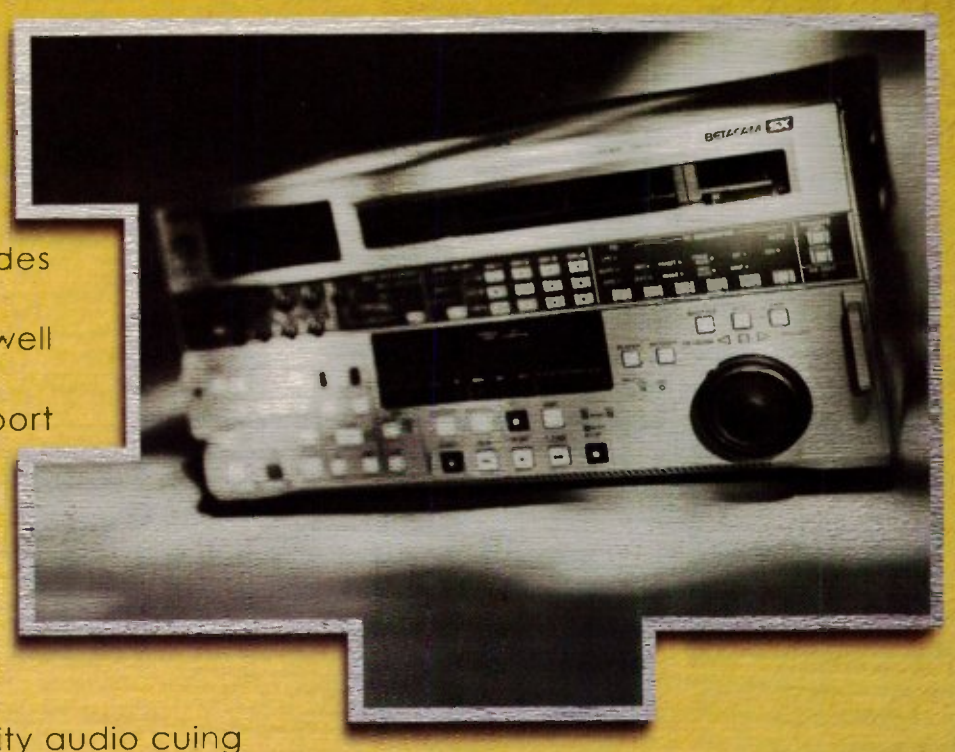
Everything is here. The complete Betacam SX® system. The only digital ENG solution that employs the MPEG-2 compression standard from acquisition, through production, to delivery. The choice is clear. Especially when you consider all the operational BETACAM SX advantages of Betacam SX: high quality 4:2:2 digital component video, four audio channels, a low 18 Mb/s video data rate, and analog Betacam® playback capability. But there's more to the story.

New for 1998 is the DNW-A75 VTR. Adding to our extensive line of SX Hybrid Recorders and Players, the A75 offers frame-accurate video and audio insert editing on Betacam SX tape.

All the elements of a great news story.

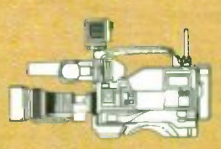
It includes Preread technology, compressed digital output in either SDTI or MPEG ES formats, and the analog Betacam playback features of the legendary BVW-65. All for a list price of $27,000.

The Betacam SX acquisition products include a dockable recorder and a full-line of one-piece camcorders. Sony's camcorders are known for their ruggedness and reliability. Betacam SX equipment continues this tradition in packages that are smaller and lighter in weight than analog Betacam camcorders. The line-up includes products supporting both 4:3 and true 16:9 aspects with IT or FIT imaging. New CCDs and DSP processing have significantly extended low light shooting capabilities, improved overall picture quality, and added important new operational aids, including set-up cards and the Good Shot Marker™ system.



In the news business, timing is everything. Sony delivers a variety of editing solutions to meet your business demands. The Betacam SX line includes portable editors and efficient nonlinear systems, as well as more traditional linear editing products. All support the SX Good Shot Marker system, streamlining the decision-making process from acquisition to editing. The SX portable editors weigh under 30 lbs, yet include powerful features like DMC and studio-quality audio cuing capabilities. The Betacam SX nonlinear editors provide many time-saving features, including faster than real-time transfer from tape to disk. All of the SX editing sytems allow easy integration of analog Betacam material into your work.

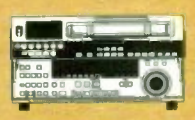
Acquisition



Camcorders

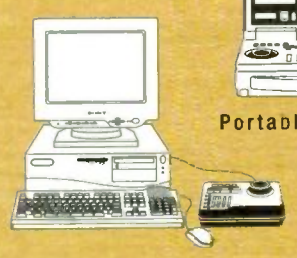
Dockable Recorder

Production



Linear Editors

Hybrid Recorders



Nonlinear Editors

Portable Editors

Delivery

Flexicart

Servers

Recorders/Players

dtv READY

Sony also offers a wide range of newsroom servers, including the NewsCache™ system. This affordable server system takes advantage of MPEG-2 4:2:2 P@ML compression technology to deliver high quality news playback with efficient disk storage. NewsCache integrates with many popular newsroom computer systems and can grow with your news operation.

When everything works together, news travels fast. That's the idea behind the Betacam SX format. From acquisition to transmission, the complete line of Betacam SX equipment is news-ready, road-worthy, and here now.

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News

DTV STANDARDS

Continued from page 4

Implementation working group (DIWG); and the Top-Down System Analysis group.

A standards-setting organization may produce three types of documents. A "standard" defines basic specifications or criteria which are necessary for effective interoperability or interconnection of devices, as applicable. This may include definitions of protocols, interfaces, and required operating parameters. A "Recommended Practice" states specifications or criteria which are not necessary for effective interoperability, but are believed to be advisable. It may specify a preferred methodology for implementation or operation. An "Engineering Guide" is a tutorial or explanation which describes the use of Standards or Recommended Practices. It may also be an engineering concensus on a particular industry issue.

This issue will concentrate on the activities of T3/S8 Transport.

The latest standard to start making headlines was A/65, Program and System Information Protocol for Terrestrial Broadcast and Cable (PSIP), completed in December 1997 (for more on A/65 see Hot Tech on page 4).

T3/S8 has been working closely with the Society of Cable Television Engineers (SCTE) Digital Video Subcommittee to create a unified protocol for both terrestrial broadcast and cable DTV. The SCTE has also approved the PSIP standard, but there are concerns regarding migrating from existing implementations which must be addressed before true interoperability can be obtained.

The goal of the T3/S8-SCTE collaboration is to formally standardize under the American National Standards Institute, benefiting broadcasters, consumers, and equipment manufacturers by achieving an interoperable solution for program and system information. The industry also would best be served if direct-to-home satellite systems using MPEG-2 Transport standardized on PSIP, with compatible extensions as needed. The harmonization should also extend to the International Telecommunications Union's Study Group 9's effort to define a universal system information protocol. Because programs will be increasingly shared among various delivery mechanisms as DTV becomes more ubiquitous, interoperability would benefit everyone.

T3/S8 has been working with EIA committee R-4.3 to support content advisory ratings and DTV's closed captioning service known as EIA-708. EIA-708 extends the FCC-mandated NTSC closed captioning protocol (EIA-608) to apply to DTV. The caption service and content advisory descriptors define the method by which captions and content advisories are transported—not their contents. These descriptors are part of PSIP and are tied into EIA-708.

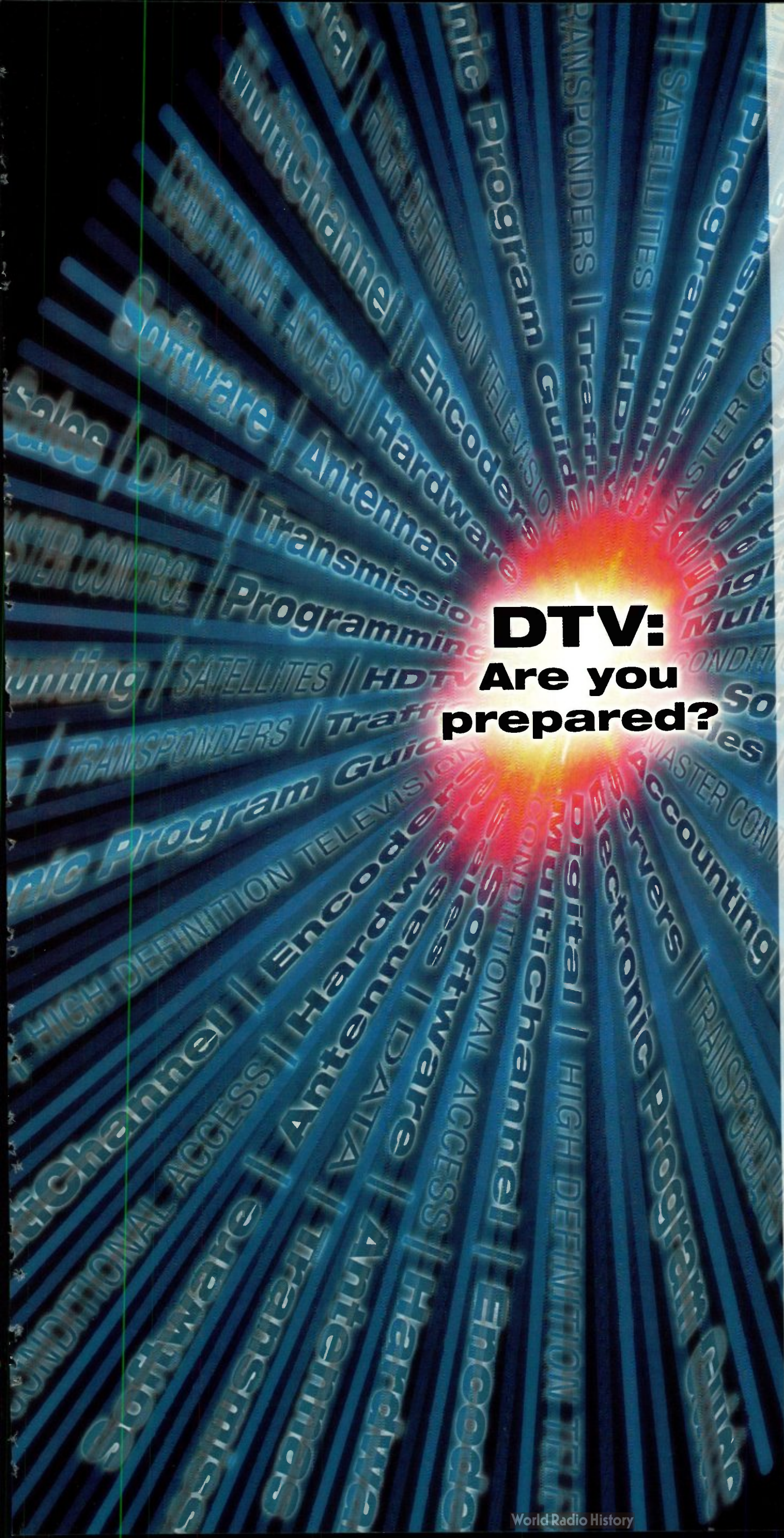
Terrestrial DTV Conditional Access

T3/S8 is also currently defining a standard for terrestrial DTV conditional access. FCC rulings require that at least one DTV channel be carried as a free service, but the potential of having multiple DTV channels within a current 6MHz "analog" channel raises the possibility that many other types of services will be offered, some of which may be by subscription. Two examples would be multi-channel standard definition TV and data broadcasting services.

In contrast to direct-to-home satellite and cable DTV, several unique requirements are placed on terrestrial DTV. Typically, a single operator controls the delivery/emission of all digital channels on DTH and cable systems, enabling use of common access rights and control messages to be delivered and shared among the channels.

With terrestrial DTV, the frequency spectrum received consists of programming from many operators who may not be willing to broadcast entitlement information from another broadcaster. Issues such as use of a single, replaceable scrambling algorithm in the form of a plug-in smart card or similar device become practical limitations on consumer device deployment. □

This is the first in a series of columns that will track the developments at the ATSC and the introduction of new standards. Matthew Goldman is director of engineering for advanced technology at DiviCom Inc., in Milpitas, Calif. He was project editor for MPEG-2 part 6: Digital Storage Media Command and Control, which includes the data broadcasting protocol used by the ATSC, Digital Video Broadcasting, and the Digital Audio-Visual Council standards organizations. Currently he is active in the ATSC and SMPTE.



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- ❑ programming
- ☑ a plan
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- ❑ transmitter
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Digital ENG Formats

Manufacturers Ready

Look for 100 Mbps systems to be introduced next year

By Bob Paulson

When digital ENG formats, specifically Panasonic's DVCPRO, Sony's Betacam SX, and JVC's Digital-S, began showing up on equipment purchasing orders about three years ago the purchasing decision became more difficult than it was in the days of analog.

In the analog days, the cameras and VCRs were NTSC in/out two-piece systems, and users could mix and match their vendors within a system after considering feature tradeoffs versus price. And it didn't matter what analog component video signal form flowed across the SMPTE standard interface connector. The video on the cassette played out of any SMPTE Type (A through "N"?) standard tape deck as SMPTE 170M NTSC.

But for all of digital's advantages, the use of different interface connectors and pinouts to connect camcorder camera outputs to tape deck inputs has removed the ability to mix and match much of the equipment. Digital cameras output 601 serial digital video at 270 Mb/s, per SMPTE 259M. Compression to transcode that signal into the DVCPRO, Betacam SX or Digital S compressed video schemes is all done within the tape deck's DSP subsystem.

The popularity of the digital ENG formats is undeniable. Sony, Panasonic, JVC, and other manufacturers offering related products have regularly announced digital format sales in the millions. Networks, 24-hour news stations, and station groups have all bought into the new formats with serious investments pointing to years of future use.

But how will the digital ENG formats hold up in their transition to DTV transmission given the compression issues involved? Understanding MPEG and DV-based compression is a first step to understanding where the formats are headed.

MPEG Compression

"Compression" is the process of removing bits from a bit stream whose rate is arithmetically the product of a specified sampling rate (occurrences per second) and a specified number of bits per sample (sample resolution).

To date, the amount of compression selected for any given application is a balance between criteria for "acceptable" image or sound quality, and "acceptable" costs for that processing, transmission or storage. Costs for signal transmission over common carrier distribution networks tariffed at 1998 rates have had perhaps the strongest influence on television program producers' determination of "acceptable" picture and sound quality.

But will those 1998 "acceptable" levels change if rate regulation ends and competition for viewers' dollars increases?

MPEG-based compression is being widely heralded as the inevitable single global standard for motion video signal compression. Its specifications and capabilities were selected to be optimum for point-to-point, fixed bit rate transmission of groups of mixed video and audio signals, each produced by varying compression ratios. MPEG system design is "asymmetrical," with the majority of the total costs and complexity of compression and decompression assigned to the encoder.

MPEG documents meticulously specify the decoder as a low-cost, simple and small standard device located in all MPEG receivers. Feature and capability innovation by manufacturers is allowable and encouraged in the encoder (compressor) design, limited only by the condition that the signal must be decodable by any manufacturer's decoder. Compressed video signals in the individual program streams are created as varying bit rate "Groups of Pictures" (GOPs) of I (Intra), P (Predictive) and B (Bi-directional) frames, replacing precisely framed, uncompressed video. Digital buffers smooth out the variations to enable decoding.

MPEG compression engines are now available for use in all the stages of television production, post production, real-time distribution, and delivery (by electromagnetic "emission" from an antenna, or physical transportation of replicated storage media).

Panasonic's Phil Livingston describes MPEG as having a "wonderful tool kit. It allows designers to create individually distinctive encoders at targeted decoded picture quality levels and prices. That means two things. The decoded picture can be as good as the encoder made it. Or it will look only as good as the decoder can make it."

Unfortunately, some worldwide standards setting bodies reportedly are now concluding that there probably can never be a single MPEG standard, adaptable to compress signals as needed throughout the television/multimedia signal acquisition, processing, mastering, storage, distribution, and delivery chain.

Panasonic is currently developing DVCPRO100.

DV-Based Compression

"DV-based" compression was the second scheme to be developed, by many of the same select group of mathematicians, in a consortium of professional and consumer equipment manufacturers. Explains Livingston, "The fundamental concept of DV compression was different from the start. It's 'frame based.' The specifications and capabilities arbitrarily preserve traditional motion picture frame boundaries, which is required to enable recording the bit stream on helical scan video tape recorders."

Livingston adds that DV compression guarantees interoperability and tape interchange from shooting to post because compression can be cascaded with little noticeable generation loss. Why? Because all DV-based compression starts with a grouping of each frame's array of pixels into 8x8 pixel blocks before DCT (Discrete Cosine Transform) compression begins.

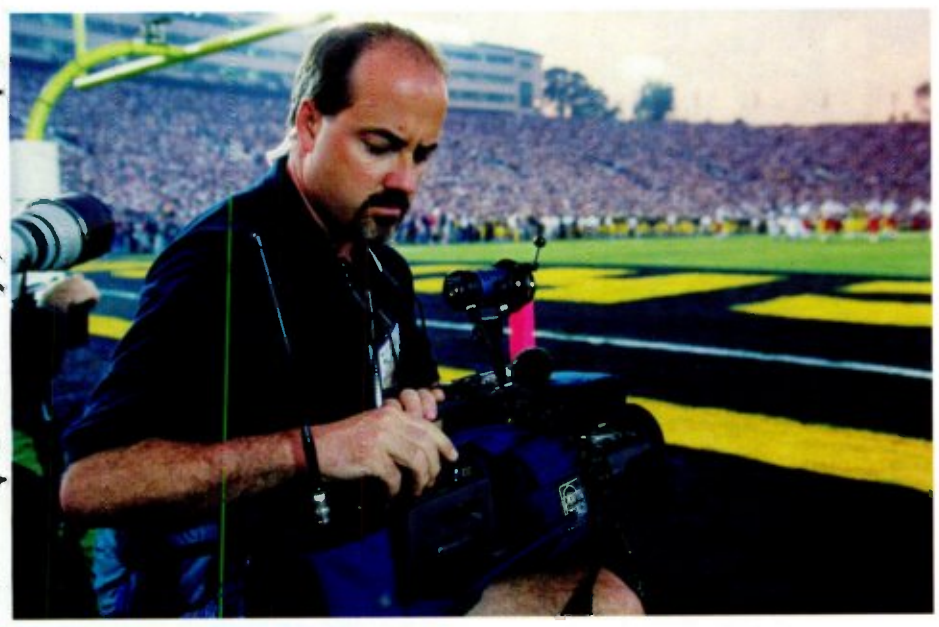
"That process must begin at exactly the same pixel in every tandem compression operation to enable artifact-free tandem digital processing," offers Livingston.

In MPEG bit streams, there are no frame-rate indications of frame boundaries within a GOP, and no precise identification of the first pixel in each frame's active picture area. Seventy percent of detectable picture degradation is caused by sampling grid misalignments at successive encoding stages. Only by using encoders and decoders of the same manufacturer can the problem be suppressed.

DV-based compression has the planned virtue of a "feed-forward" messaging scheme associated with DCT compression. Each 64-pixel macroblock is represented by a series of coefficients. In a "busy" frame (full of detailed images), the result could be a string of coefficients greater than the number of pixels the frame contains. Encoder messages describing how the compression was achieved are used by the decoder to select the right rules for decoding.

This is possible because the system design is "symmetrical." The identical chip sets used in one arrangement sequence for encoding are used in the opposite arrangement for decoding. Each frame is compressed into a 125 kB data space for transmission. This constant bit rate (CBR) regularity not only enables video tape recording, but also makes SFX

Products for HDTV



KHQ Spokane, Wash., used DVCPRO for its coverage of the Rose Bowl.

KITV Honolulu is using JVC's Digital-S throughout the islands.

and TX signal processing (especially of "p" (Progressive-scanned) video much more robust.

End-to-End Compression System Design

Video compression system output bit rate targets of 25, 50 and 100 Mb/s are achieved by a mix and match design process. Variables in the compression scheme options are compression ratio, Luminance, and Chroma sampling schemes and rates, frame repetition rates, interlace versus progressive scan, and raster pixel densities and geometry.

Attempting to shoot in the field with one compression system's equipment, edit in the truck with another, and post at the studio with the third still remains an impossibility. It would require dubbing from tape to incompatible tape at 270 Mb/s baseband, increasing artifacts from tandem codecs to perceptible and objectionable levels. The only relief might be afforded by using video processing equipment which can reconstitute that format to baseband, store work in process on disk, and feed the MPEG encoder, in the selected format.

However, even this total control of system functioning isn't enough. Satellite and long-haul, fiber-based common carriers' employ a wide variety of compression techniques to import analog and digital television signals into their high-speed digital multiplexed transmission systems

Remember — the MPEG-2 encoder needs a 270 Mb/s or 1.485 Gb/s digital component video input. Resolution and colorimetry of the receiver's displayed picture will be "just like the original" if the signal passed uncompressed through the acquisition and posting processes. Shooting and posting in one compression format should yield a softer picture with no perceived artifacts but possibly less than camera original colorimetry.

Processing through different compression scheme acquisition and posting equipment appears to be like playing poker—you can trade in the old scheme for a new one, but you can't be sure that the new scheme will be better.

The Formats

The first format we'll look at is JVC's Digital-S. When Digital-S was first introduced it was criticized by some camps for its use of a half-inch tape format, while DVCPRO and BetacamSX both have narrower tapes, saving real estate.

But Dave Walton, JVC marketing manager, says part of the reason for going with the half-inch format was to make it backwards compatible with S-VHS archived material.

Walton's advice for those looking into new equipment is simple: "Always use the best equipment, 4:2:2 sampling and the lowest possible compression ratio in every digital video processing or transmission subsystem."

JVC's three custom LSI-based compression chips provide a "robust" 50 Mb/s output stream, specially produced by a "not-off-the-shelf" algorithm.

JVC's compression starts with DCT (Discreet Cosine Transform) 8x8 pixel grouping, the approach common to both MPEG and DV compression schemes (and the M-JPEG intra-frame compression schemes which are the legacy formats found in workstation editing schemes still being manufactured). Compression is done in several stages, with a goal of maintaining compression in the "lossless" range.

"Huffman coding" is adapted to react to varying levels of detail present throughout the picture, which results in lower overall compression ratios in each frame. Such high-detail frames are "compression breakers" in other compression engines.

An example is a head shot with a highly detailed background not important to the shot. In playback the detailed areas will be "blocky," distracting the viewer from the message.

With half-inch tape, each frame is recorded in 10 helical tracks of two video segments each. This guarantees interchanged playback, even under tape deck conditions ranging from new to well worn from 4,000 to 5,000 hours use in dusty environments with partially clogged heads. The deck is economically priced, and downtime for maintenance and maintenance costs are low. Metal particle (MP) tape is the correct choice for professional applications.

JVC hasn't finalized plans for moving into HDTV field acquisition systems, but work on a system that outputs at 100 Mb/s is underway and expected to be at NAB99. The need for keeping compression of 1080/30i and 720/60p HDTV and 480/60p SDTV signals in the range of lossy-but-acceptable range mandates 100 Mb/s as the output rate. Pictures outputted at 480/30p can still use 50 Mb/s.

DVCPRO

Panasonic concentrated from the beginning on evolving the DVCPRO format family of products from the specification developed by the DV Camcorder Consortium. DVCPRO's tape width is therefore 1/4-inch (also loosely referred to as "the 6 mm format").

The first DVCPRO family member is now referred to as DVCPRO 25, which is based on 4:1:1 video sampling of SDTV 4:3 pictures. The second DVCPRO family member, DVCPRO 50, debuted at NAB98 using 4:2:2 sampling of SDTV.

At NAB99 DVCPRO 100 is expected to use 4:2:2 sampling to compress HDTV 1080i or 720p images to 100 Mb/s.

DVCPRO compression divides each image into 50 areas, and each are compressed. The constantly changing compression rules applied to each area are forwarded to the decoder along with the compressed bit stream, enabling it to be efficient in selecting decoding rules. Snell & Wilcox's MOLE technology allows the decoder to apply the knowledge of how the first compressor did its job to be mimicked in the second compressor.

The DVCPRO compression scheme is said to be robust enough to survive transportation through tandem links of digital satellite and terrestrial circuits which use unrelated MPEG, DS-3, OC-1 and ATM compression schemes and bit rates.

Livingston also emphasizes that the technical feasibility and reliability needed to interchangeably record and play back signals at 25, 50 and 100 Mb/s was thoroughly researched before the family evolution plan was announced.

"We achieved 50 Mb/s by paralleling the 25 Mb/s subsystems. We also test the 25 Mb/s systems ability to capture and process 25 Mb/s playbacks transmitted at four times play speed. When we determined that this feature worked, we knew we could transmit HDTV compressed to the same 100 Mb/s bit rate."

Panasonic's plans for meeting customer needs for compressed HDTV systems

Continues on page 16

Digital ENG Formats

Continued from page 15

include a field-based compressor tailored to accommodate the 3/2 pulldown requirement in film-to-tape transfers. Frame-bound compression can't deal with the mixed-field frames. To deal effectively with other yet-undefined problems in the development of end-to-end compressed HDTV systems, Panasonic is now working with many vendors in a spirit of "coopetition."

Betacam SX

Sony joined the MPEG compression system development team in 1988. In 1993 Sony engineers decided that the MPEG compression tools being developed were not ideally suited for television production and postproduction use. Betacam SX then became Sony's primary SD domain product development focus. In the intervening years, however, as Betacam SX was in development.

Sony's DNW-A220 Betacam SX editing system

Developing a field acquisition product family around MPEG compression technology was appealing, "Because MPEG is flexible, and can do many tricks, but a more powerful algorithm was needed," explains Sony's Hugo Gaggioni. "The long GOP length acceptable for signal transmission had to be reduced to be compatible with frame bound editing. At MPEG's Singapore meeting in December 1994, Sony requested MPEG to formalize a 4:2:2 profile which allowed compressed signal transmission at up to 50 Mb/s, but which was compliant with MPEG's existing compression tricks and syntax."

Another concern addressed by Sony was MPEG's definition of a 480x720 pixel raster as Main Profile (MP). Internationally, the line density is 486, and in the U.S. 483. It was also highly desirable that the VIRS test signal in the VBI be processed through the compression engine. Closed captioning (CC) also in the VBI could survive processing through a good processor. MPEG's specified 525 and 625 rasters' line counts of 480 and 576 were increased to 512 and 608, respectively. DV-based compression was restricted to 480 and 576 lines maximum. Further, the compression system had to incorporate the latest schemes for motion compression, replacing the late 1980s ETSI 34 and 45 Mb/s schemes specified in ITU 273.

In January 1996 the 4:2:2 Profile@Main Level extension of MPEG-2 was approved as an international amendment to the ISO 13828 MPEG-2 standard. Betacam SX makes use of the MPEG-2 4:2:2P@ML for its compression system. In addition, it employs four channels of studio quality audio which differentiates it from other formats, such as DV-based systems.

The compression system in Betacam SX operates at a video compressed rate of approximately 18 Mbps. This allows the use of existing satellite, microwave, and terrestrial DS-3 links to back-haul two channels simultaneously or one single channel at twice realtime speeds.

Sony views MPEG-2 4:2:2P@ML as the "new NTSC," a "lingua franca" technology specifying a unified compression layer and syntax elements that are robust enough to be used by the broadcast industry at large. A two-frame "IB" GOP and 4:2:2 compression is a very efficient solution that more than satisfies the bit-rate constraints of field acquisition while still satisfying the requirements of frame-bound editing for production applications. At 18 Mbps, this two-frame GOP structure produces picture quality comparable to M-JPEG at compression rates of 35-40 Mbps. Sony also believes that the robustness of Betacam SX's compression scheme is attested to by its multi-generation capability.

In moving to HD, Sony has developed a new system for field acquisition and production applications: HDCAM. It processes 1080i signals according to SMPTE 274M; all interfaces handle 1920x1080 pixels at 10 bits per pixel for a total serial bit rate approaching 1.5 Gpbs. The active payload of the signal, however, is approximately 996 Mbps. A bit rate reduction scheme of about 7:1 is used to fit the compressed data to the 140 Mbps allocated for the video components in the system. It is this selection of bit-rates and overall system optimization that has resulted in the HDCAM HDW-700.

This 7:1 bit rate reduction is accomplished by a combination of "clever filtering and subsampling" and a sophisticated intra-field/frame adaptive compression algorithm. This scheme preserves not only most of the signal energy produced by contemporary cameras (in excess of 24 MHz of bandwidth) but also permits optimizing the compression portion, resulting in a very high-quality picture of high performance in multi-generation work.

Sony, as well as other companies, are working towards the development of the so-called "mezzanine level" for compressed HD signals for production and post-production applications. This work will produce interesting new products in the very near future, like DVCPRO100 and a 100 Mbps version of Digital-S, systems that will join HDCAM to address the important needs of cost-efficient field and studio production for the upcoming HDTV broadcast infrastructure. □

The ENG Spectrum Crunch

A Potential Digital TV

There's barely enough space to handle today's needs, let alone tomorrow's

By Chris McConnell

Digital TV may be hitting the airwaves this fall, but high-definition looks at the latest celebrity dashing into a limo or homeowners assessing flood damage will have to wait.

The problem is much more fundamental than the lack of affordable HDTV ENG gear. The problem is a lack of electronic newsgathering spectrum, as broadcasters find barely enough spectrum to handle current demand, let alone the needs of a potential secondary TV news service. And if it's an HDTV news service the needs will be even greater.

So all that talk of offering a 24-hour local news channel on a multicast channel may have to wait a bit.

"The bands are extremely congested," says Lynn Claudy, the National Association of Broadcasters' senior vice president of science and technology.

Claudy and others point to the increased demand on channels in the 2 GHz band. As Fox and cable channels have increased their involvement in gathering firsthand news footage, the number of news crews looking to use the microwave ENG links has grown.

"That's added a few more trucks per market," says Kelly Williams, NAB's director of engineering.

The problem is an old one. As far back as 1993 the Commerce Department compiled a study predicting an annual growth rate of 15% for the broadcast "auxiliary service" band at 2 GHz. When helicopters were hovering over O.J. Simpson's Bronco during the 1994 low-speed chase, demand on the ENG channels was so heavy that adjacent channel interference caused some of the pictures to break up.

And while the line to use the ENG bands is getting longer, the supply of available spectrum is getting shorter. New services such as mobile satellite communications have their own spectrum problems, and the result is that a chunk of the 2 GHz ENG spectrum (25 MHz out of 120 MHz in the band) is being sent to the mobile satellite business.

Last year the FCC tried to compensate broadcasters for the loss by assigning them a new, 20 MHz slice of ENG spectrum. But Congress nixed the plan in the 1997 Balanced Budget Act. The law requires regulators to auction the "new" spectrum they had intended to give broadcasters.

On top of that, it also requires the FCC to auction another 15 MHz of spectrum between 1990 and 2110 MHz. As a result, broadcasters could be forced to squeeze ENG operations that once occupied a 120 MHz piece of spectrum into a 70 MHz band.

No Room At The Inn

So where is the spectrum for a new secondary news service?

"There is none," says NAB's Williams, who adds that any news crew wanting to beam an HDTV feed back to their station would need wider channels than those currently designated for ENG, even if sufficient spectrum existed.

Williams voices some hope the FCC will reconsider its 1997 decision to give the mobile satellite industry the 15 MHz chunk of spectrum. Industry engineers cite the fact that the U.S. allocation for the global mobile telephone service does not completely match the international spectrum allocation for the service.

That allocation, made at the 1992 World Administrative Radio Conference, extends only to 2010 MHz rather than to the U.S. designation at 2025 MHz. Successive U.S. attempts to add the extra 15 MHz to the global allocation have not yet succeeded, although the mobile satellite operators now have an international green light to begin operations in the year 2000.

Despite the difference be

tween the U.S. and international MSS

Roadblock To News Services

allocations, Williams and others concede the chances of such a reversal at the FCC are remote.

"There are not many good options," adds NAB's Claudy, who points to the prospect of finding additional ENG channels somewhere else along the electromagnetic spectrum frontier. But he and others add that staking a new ENG claim would require news crews to obtain new equipment even if the additional spectrum could be found.

Broadcasters have tried locating additional ENG spectrum before. When the federal government turned over 50 MHz of spectrum for private sector use in 1994, NAB and the Association for Maximum Service Television (MSTV) made a pitch at the FCC for grabbing 25 MHz of frequencies in the 4 GHz band.

And even then their argument cited the eventual need to deliver a high-definition news feed.

"The spectrum required to facilitate dual ATV/NTSC broadcast operations will rapidly exceed the capacity of already overburdened auxiliary spectrum," MSTV told the commission.

The broadcasters, however, were competing with other businesses looking to provide a range of communications and were unable to win exclusive use of the spectrum. Engineers question whether the frequencies at 4 GHz would work well for a digital ENG service even if the bands were given to broadcasters.

Other Questions

Broadcast engineers even question how well digital broadcasts will work in the 2 GHz bands broadcasters now use for newsgathering.

NAB's Claudy points to the problem of range. News crews are able to beam analog news feeds across great distances today. Claudy and others worry the digital feeds might not hold up as well over the same distances.

"That's where new information is needed," he says. Claudy adds the industry soon will get a look at some digital ENG gear from manufacturers.

He adds that, in the meantime, broadcasters will have to wait and see what the FCC does with the existing 2 GHz band.

While pushing the regulators not to take away another 15 MHz of the newsgathering frequencies, the NAB also is focusing on issues such as how the remaining channels would be organized if the band is reduced to 70 MHz. Another issue is how broadcasters will be compensated if they have to modify or replace their current ENG equipment.

"There is no clear path as to where this is going," Claudy says.

Survey Says

To help make its case for keeping as many channels as possible and for getting compensated for any loss of spectrum, MSTV and the NAB have been surveying stations on their use of 2 GHz field equipment. The organizations plan to use the surveys to tell regulators how much 2 GHz ENG equipment is now in use.

Responses to the surveys were due in late February, although the groups are still assembling the survey results.

Stations have been handing in their surveys as they struggle to answer a long list of questions about the new service they will begin offering next year.

With some stations slated to begin offering high-definition television as early as November, NAB's Williams concedes that dealing with the problems of collecting HDTV news feeds probably ranks second on the digital to-do list at most stations. Ranking first are questions concerning tower space, transmission equipment and the ability of stations to meet the DTV construction deadlines set by the FCC last year.

But Claudy insists the ENG problem is still important, and that some stations may be looking to provide news footage in true high-definition.

"They're all scratching for market share," Claudy says.

What If?

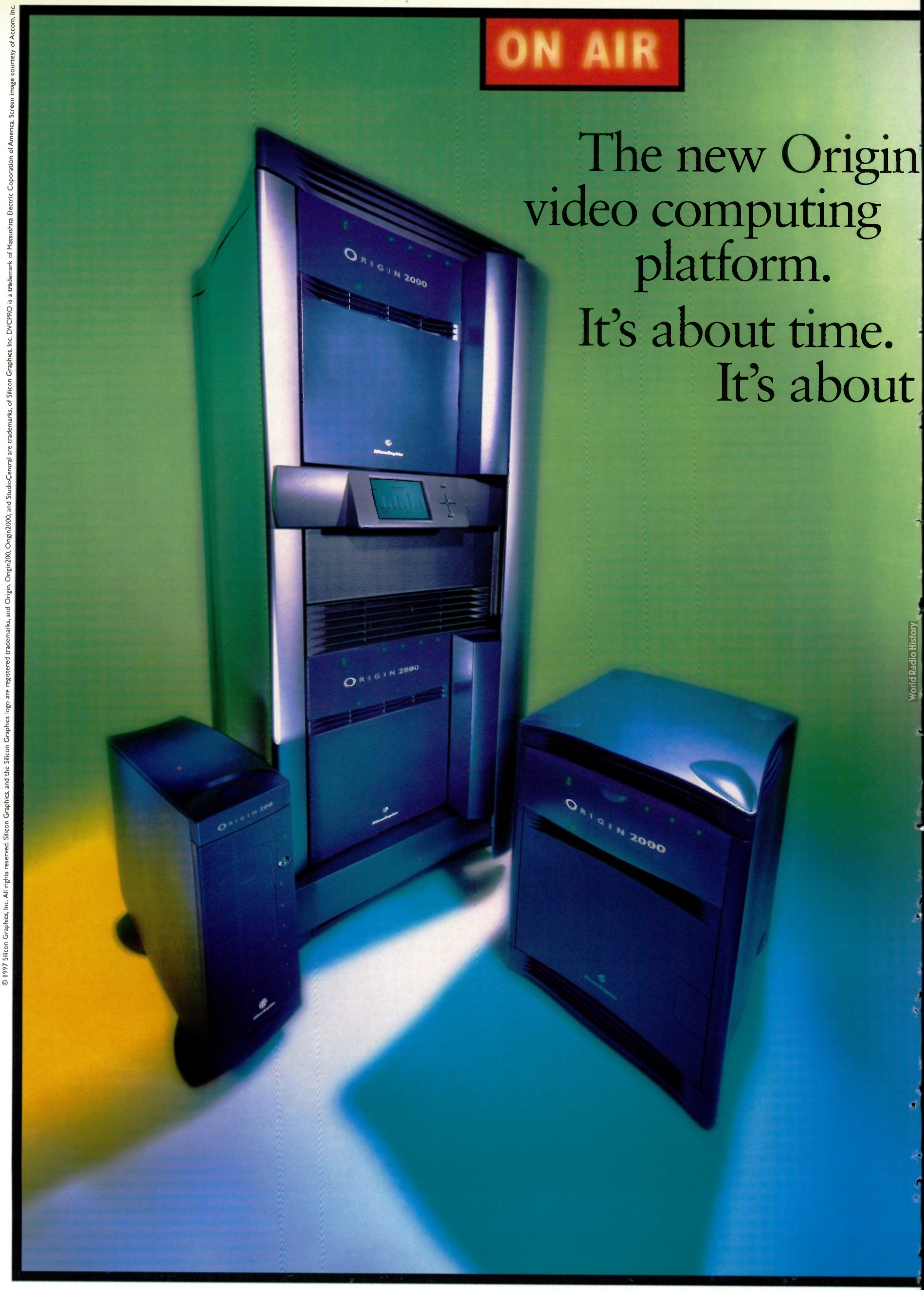
Should broadcasters be left with a shrunken ENG band, they will have two options, according to Claudy.

One will be to simply go on sending the same analog transmissions that they send now. Stations could still incorporate the analog footage into any high-definition news broadcast they offer, but the material would lack the look of a true high-definition news feed.

Another alternative is to simply switch to a digital ENG service on the same channels news crews now use for their analog service. This, however, would require industry-wide coordination and also would require broadcasters to answer the lingering questions about their ability to send digital news feeds on the bands at 2 GHz.

And even if the digital links work well, broadcasters may only be able to send digital versions of "standard-definition" news feeds rather than high-definition footage.

"That would require more spectrum," Claudy says of electronic newsgathering in high-definition. □



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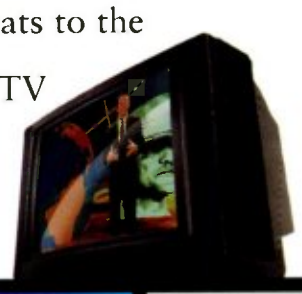

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More Information Circle 431

The Digital ENG Formats

What's New In Cameras And Camcorders

Betacam SX

Sony

Sony's top format for broadcast-quality digital ENG work is Betacam SX. The Betacam SX lineup includes the

DNW-7 and DNW-90 camcorders. The **DNW-7** is equipped with 2/3-inch 400K Power HAD IT CCDs and incorporates 10-bit/28MHz full digital signal processing in the camera section.

The **DNW-90** is equipped with 2/3-inch 520K Power HAD FIT CCDs and incorporates 10-bit/36MHz full digital signal processing in the camera section. Features are the same as those on the DNW-7.

Both units feature variable speed electronic shutter, comprehensive menu control, precision audio level adjustment, setup card for uniform camcorder settings, color playback without an external adapter as well as viewfinder playback on location, and Turbo Gain.

For more information contact Sony at (800) 686-SONY or visit www.sony.com

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Thomson

With the use of the TTV 4005 Betacam SX recorder, Thomson's **1657D** 12-bit camera series can be converted to a camcorder. According to Thomson, the 12-bit camera offers improvements in dynamic range, color accuracy in overexposed areas, and noise-free blacks versus 10-bit camera systems.

Users have a choice of two sensors—IT or FIT, and the sensors can be scanned in two modes—field integration mode or frame integration mode (an extended vertical resolution mode where vertical resolution reaches 530 TV lines. The camera is also switchable between 16:9 and 4:3.

For more information contact Thomson at (800) 882-1824 or visit www.thomsonbroadcast.com

■ For more information circle Reader Service #326

DIGITAL-S

JVC's **DY-90** Digital-S camcorder is a three-chip Digital-S field camcorder constructed to offer 4:2:2 digital signal processing, four channels of audio, and 2/3-inch 768x986 pixel CCDs. The camcorder weighs just 15.4 pounds fully loaded with typical lens, viewfinder, battery and tape, and has sensitivity of f11

at 2,000 lux. The DY-90 also has Full Auto Shooting Mode (FAS) with continuous automatic white balance that allows automatic shooting from 4 to 24,000 lux. It also has a signal-to-noise ratio of 62dB, 14-bit digital signal processing, and four-bit 48 kHz PCM audio channels yielding more than 80 dB of dynamic range.

For more information contact JVC at (800) 582-5825 or visit www.jvcpro.com.

■ For more information circle Reader Service #327

DVCAM

Sony

Sony's DVCAM lineup may not be designed specifically for broadcast news applications, but it has found some believers who are looking for equipment to round out their news operations at a lesser cost.

The DVCAM lineup includes the **DSR-130** digital camcorder, a combination of the **DXC-D30** and the **DSR-1** Digital Recorder. It is made of magnesium and incorporates DSP technology based on the TruEye process and uses Power HAD CCDs. It also offers the ClipLink function, providing automatic loading of shot data onto the DVCAM cassette tape. The data is then conveyed

to the final editing system, making editing more streamlined.

Also available is the **DSR-200**, allowing recording up to 184 minutes with the PDV-184 ME (DVCAM Standard Cassette), and it also can play back standard size consumer DV cassettes.

The unit is lightweight (7 lbs. 15 oz. without a tape and battery) and offers the optical Steady Shot function to compensate for camcorder or operator movement. It also has timecode and a DV interface based on the IEEE 1394 standard for digital signal transmission.

The latest in Sony's DVCAM lineup is the **DSR-300** Digital Camcorder. It incorporates Sony's latest DSP (Digital Signal Processing) technology based on the TruEye process. It also makes use of half-inch Power HAD CCDs and is capable of the ClipLink function (with optional accessory board).

For more information contact Sony at (800) 686-SONY or visit www.sony.com

■ For more information circle Reader Service #328

DVCPRO

Hitachi

Hitachi's **Z-V1A** DVCPRO camcorder is designed for ENG applications and features 2/3-inch CCDs, resolution of 850 TV lines, a signal-to-noise ratio of 63dB, and a sensitivity of f8 at 2,000 lux. The camera is equipped with a removable memory card which stores set-up information as well as a redesigned larger viewfinder that allows the operator to hold the camera at a distance from the operator's eye, beneficial for extreme low or high-level shots. In addition, the camera has Hitachi's unique six vector color corrector, allowing users to alter individual colors without changing the overall black-and-

white color balance.

For more information contact Hitachi at (516) 921-7200 or visit www.hdal.com

■ For more information circle Reader Service #329

Ikegami

Ikegami's DVCPRO lineup features the **HL-V77** with three 2/3-inch 520,000 pixel FIT CCDs, the **HL-V77W** with the same FITs plus 16:9 and 4:3 switchability, and the **HL-V73** with three 2/3-inch 400,000-pixel IT CCDs.

All three models offer 16-bit digital signal processing ICs with 10-bit A-to-D conversion and features like Skin, Slim, and Diagonal Detail. Signal-to-noise ratio is 62 dB and sensitivity is f8.0 at 2,000 lux. Horizontal resolution is 850 TV lines for the HL-V77, 750 for the HL-V73 and 600 (in 16:9) and 700 (in 4:3) for the HL-V77W.

For more information contact Ikegami at (201) 368-9171 or visit www.ikegami.com

■ For more information circle Reader Service #330

Panasonic

Panasonic's latest addition to its DVCPRO lineup is the **AJ-D810** DVCPRO camcorder, with three 2/3-inch CCD. It features 63 minutes record time, 10-bit digital signal processing, a signal-to-noise ratio of 62dB, minimum illumination of 0.2 lux, consumes less than 24 watts of power, and weighs

under 14 pounds, fully operational.

Also available is the **AJ-D210** DVCPRO camcorder with three 1/3-inch CCDs. The AJ-D210 is the successor to the AJ-D200, but offers improvements in audio quality with the inclusion of manual audio level controls. It also offers an optional IEEE 1394 DVCPRO interface for downloading digital video and audio for desktop multimedia applications. It has a horizontal resolution of 500 lines, SMPTE timecode generator/reader, minimum illumination of 5 lux, and sensitivity of 2,000 lux at f5.6.

For more information contact Panasonic at (800) 528-8601 or visit www.panasonic.com/PBDS.

■ For more information circle Reader Service #331

DVCPRO50

Panasonic

Panasonic's DVCPRO50 lineup recently took on three new additions, the **AJ-PD950** studio editing VTR (with built-in progressive recording capabilities), the **AJ-PD900W** 16:9/4:3 camcorder (a progressive camcorder that also records in 480i DVCPRO50 and DVCPRO, and the **AJ-D90** DVCPRO50 dockable VTR.

The three new models join the AJ-D950 studio editing VTR and the AJ-D900W 16:9/4:3 camcorder.

Both the AJ-D900W and the AJ-PD900W camcorders have three 2/3-inch M-FIT CCDs, 10-bit digital processing, a signal-to-noise ratio of 63dB, and minimum illumination of 1.6 lux. Controls include PCMCIA camera setup storage card, 1.5-inch viewfinder, built-in color bar generator, filter wheels, and digital menu setups. A 26-pin VTR interface is optional.

The **AJ-D950** and **AJ-PD950** dual-standard studio VTRs offer compatibility between the 25 Mb/s 4:1:1 and 50 Mb/s 4:2:2 DVCPRO signal structures and are switchable between NTSC and PAL. Both VTRs offer RS-422, RS-232C, parallel remote control, and an SDI interface. They are each four rack units in size.

The **AJ-D90 VTR** will dock directly

or by adapter to most popular cameras. It uses the DVCPRO medium cassette, with a maximum record time of 60 minutes in DVCPRO, 30 minutes in DVCPRO50.

Also available is the **AW-F575** 1/2-inch HS-FIT three CCD camera, dockable to the AJ-D90 VTR. The camera has three high sensitivity 1/2-inch 400,000 pixel FIT CCDs that produce 850 lines of horizontal resolution, sensitivity of f8 at 2,000 lux, and a minimum illumination of 0.5 lux.

For more information contact Panasonic at (800) 528-8601 or visit www.panasonic.com/PBDS.

■ **For more information circle Reader Service #332**

Philips Digital Video Systems

Philips is offering two products for the DVCPRO50 format. First up is the **LDK 150** Digital Camcorder Plus, featuring unique audio processing, 4:2:2 digital recording, 24-bit internal digital processing, and more than 30 minutes of record time per cassette. Additional features include 4:3/16:9 switchability with DPM sensors; 50Mbit/25Mbit switchable operation; 12-bit A/D for high-resolution pictures; inexpensive smart card with four scene files and two operator files; new software upgrades via serial link and PC; and dual-skin contour circuits with automatic skin tone selection.

Also available is the **DCR 950** Studio Editing VTR, offering improved picture quality with 4:2:2 digital recording and four-channel audio. Features include dual-standard 525/625 operation with all-digital I/Os, standard analog NTSC I/O, four channels PCM digital audio, 3.3:1 compression, and up to 90 minutes recording time.

For more information contact Philips Digital Video Systems at (801) 972-8000 or visit www.news.philips.com.

■ **For more information circle Reader Service #333**

Digital Betacam

Digital Betacam may be a little too expensive for daily ENG operations, but in case you're interested...

The **DVW-700** is a Digital Betacam camcorder equipped with 4:3 Hyper HAD 1000 FIT CCD sensors, incorporating digital signal processing in the camera section and Digital Betacam recording format in the VTR section. Features include full digital operation, variable high-power Lithium-ion battery, refined ergonomic design, and 16:9/4:3 switchable digital Betacam recording.

Also available is the **DVW-700WS**, a Digital Betacam 16:9/4:3 switchable camcorder which uses a Hyper HAD 1000 FIT 16:9 widescreen CCD sensor. It achieves full digital video acquisition in both 16:9 widescreen and 4:3 picture formats with the Digital Betacam recording format. It offers the same features as the DVW-700.

For more information contact Sony at (800) 686-SONY or visit www.sony.com

■ **For more information circle Reader Service #334**

HDTV FIELD CAMERA ROUNDUP

Hitachi

Hitachi's SK-3000P provides simultaneous HDTV and NTSC outputs and automatic 16:9/4:3 signal conversion. The camera head features digital signal processing, 2,000,000 pixel CCDs, and operates in a 16:9 HDTV format. The camera offers 1,200 TV lines of resolution, and f8.0 at 2,000 lux sensitivity. The field rate is switchable from 60 Hz to 59.94 Hz.

A single VLSI developed and manufactured by Hitachi offers up to 30-bit internal processing accuracy, and uses 0.35 micron technology to provide 1.8 million gates, allowing increased functionality over previous VLSI designs.

For more information contact Hitachi at (516) 921-7200 or www.hdal.com

■ **For more information circle Reader Service #335**

Ikegami

Ikegami currently offers two EFP HDTV cameras, the HDL-79D camera featuring digital processing with a new generation ASIC, and the HDL-79N, offering analog processing with digital delay circuit. The HDL-79D is the flagship camera, with all the video processing digitized with 10-bit A/D conversion and up to 16 bits of internal processing (quantization).

Both models offer 2/3-inch, 2,200,000-pixel FIT CCD image sensors, and the use of down and up-converters provides video, genlock, and RET for both HDTV and NTSC formats. Another feature is component serial digital transmission, enabling fiber-optic transmission of up to 3,000 meters, utilizing a hybrid fiber/copper camera cable. A newly developed seven-inch color viewfinder is available as an option.

For more information contact Ikegami at (201) 368-9171 or visit www.ikegami.com

■ **For more information circle Reader Service #336**

JVC

JVC's KH-100U has been around for a while, but it remains the only camera on the market offering 1080i. It's part of JVC's HDTV/W-VHS product line, and weighs in at less than 8.2 pounds without lens. It has a sensitivity of f7.0 at 2,000 lux, low power consumption of 30 watts, and one million pixels per CCD.

For more information contact JVC at

(201) 794-3900 or visit www.jvcpro.com

■ **For more information circle Reader Service #337**

Panasonic

Panasonic's first camera entry into HDTV field production is the AK-HC830 1080i camera. Part of the AK-HC800 Series (it's companion is the AK-HC880 studio camera), it features three 2/3-inch, two million pixel FIT CCD images to deliver more than 1,000 lines of resolution.

The camera offers a sensitivity of f8.0 at 2,000 lux, a signal-to-noise ratio of 54 dB and a dynamic range of 600 percent. The camera also has a serial digital fiber optic cable link to transfer HD video from the camera head to the

CCU and advanced all-digital 16-bit 74 MHz processing. It offers parallel 1125-line HD with 525 interlace down-converted outputs with 16:9/4:3 aspect ratio conversion. The camera series includes a 1.9-inch B/W viewfinder, a 7-inch B/W viewfinder, a 7-inch color viewfinder, an optical adaptor, the CCU, remote operation panel, master setup unit, and build-up unit.

For more information contact Panasonic at (800) 528-8601 or visit www.panasonic.com/PBDS

■ **For more information circle Reader Service #338**

Philips

The LDK 2000 Series is Philips' True Frame progressive camera lineup. It's a multi-scan, high-resolution series offering True Frame progressive CCD scanning technology, improving vertical resolution by approximately 50%, according to Philips. It can instantly switch between the 480p and 480i standards, and also has DPM frame transfer technology and 24-bit internal digital processing. The 2000PS is the EFP 4:3/16:9 switchable version of the series.

■ **For more information circle Reader Service #339**

Sony

The HDC-750 camera is a companion portable digital HDVS camera to the HDC-700 camera. It can be used in a standalone portable configuration for highly mobile field acquisition, or can be configured for full-studio operation with the same CCU and control panels as the HDC-700 camera.

The HDC-700 is designed to bridge the transition period from 525-line NTSC to an all-digital HDTV/SDTV combination. It uses the same standard 2/3-inch lens interface as the present 525-line SDTV camera family (the BVP700/750/500/550 series), thus allowing lens interchange as part of a cost-effective migration path.

The viewfinders contain a considerable number of assists to handle both 16:9/4:3 program origination. The HDVS cameras tie into the same high-speed digital command and control system as their SDTV counterpart cameras—also a crucial aid to migrating to full HDTV operation.

It also has parallel HDTV and SDTV video outputs, provided in the HDC-750 camera control unit (HDCU-700). This unit provides for primary HDTV output and a separate high-quality 525-line SDTV down-conversion—both via SDI video output.

Also available is the HDW-700 digital widescreen HDTV camcorder, a full RGB two million-pixel CCD camera with 10-Bit 74.25MHz DSP processing of the RGB video. The HDW-700 features full-sampling 2/3-inch CCD 996 Mb/sec transfer rate (at an 8-bit bandwidth).

For more information contact Sony at (800) 686-SONY or visit www.sony.com

■ **For more information circle Reader Service #340**

HDTV EFP Cameras Show Early Promise

True 1080i, 720p sensors on the horizon

By Edmond M. Rosenthal

Once HDTV transmitters start firing up in November they'll also fire up the need for HDTV programming.

While HDTV field production may not be desired for a station's local programming, creating HDTV programming may be a viable business opportunity. After all, what local station wouldn't want to be the creator of a nationally broadcast program?

For many stations and local production companies, creating HDTV programming begins with having access to HDTV EFP cameras. And it looks like the camera manufacturers will offer access to 1080i, 480p, and maybe even 720p cameras, by year's end.

For now, those manufacturers offering cameras with 1080i capabilities, with the exception of JVC, are upconverting from 1035i, since Japanese camera CCD development also looked to meet the demands of the Japanese 1035i market.

Using the 1035i chips for 1080i work has left some manufacturers vulnerable to criticism from other manufacturers (because of the need for internal or external upconversion creating aliasing, etc.) but by 1999 all of the Japanese manufacturers are expected to have 1080i CCDs.

So the 1035i/1080i situation is really a minor and temporary part of the up-down syndrome. The other part of the up/down syndrome concerns the desire for manufacturers to offer cameras that are multi-standard.

Working On 1080i

For the time being, the principal camera activity for some manufacturers is a 1080i native format camera, the chosen format of CBS and NBC. With ABC and Fox having chosen a progressive direction, only Philips has taken determined steps toward servicing 720p needs from the ground up.

JVC Professional Products Co., with its KH-100 portable HDTV camera, already had a 1080i CCD developed for it. Through software interpolation, it was mixing the pixels together to form 1035 lines. But, as the 1080 standard came about, the camera was offered with this software bypassed.

The advantage of going directly to 1080i, according to Jerry Cohen, manager of product development and strategic marketing, is "better picture quality because you have a dedicated row of pixels for every scan line. Otherwise, your picture won't be as sharp and you'll probably be creating a bit of aliasing."

Sony, which has been marketing its HDC-750 with upconverted 1035i, expects to have a 1080i camera shortly. The camera will also offer the ability to work in 480p or 480i, with the use of plug-in boards.

Larry Thorpe, vice president, acquisition systems, Sony Business & Professional Product Group, says the 1080i sensor will be a good example of the work accomplished in minimizing noise in CCD sensors. While the signal-to-noise ratio of 54dB compares with the S-to-N ratio of 65 dB in recent Sony standard-definition cameras, the greater bandwidth of HD makes for more noise energy.

"The 54dB will look quieter," Thorpe declares, "and if you crank the gain of the high-definition camera up to 18dB and do the same to the standard-definition camera, both pictures will look noisy, but not very noisy, and the high-definition picture will look less noisy. The noise in our high-definition CCD is very fine-grained and less visible."

The camera will be equipped with electronic graticules to impose a 4:3 square on the picture for those shooting for dual aspect ratio, and that has created a concern by users that there will be a reduction in horizontal resolution for the 4:3 picture. But Thorpe contends, "There is so much horizontal resolution

Ikegami's HDL-79D camera

in our cameras today that this is a non-issue."

Bill Sturcke, product manager of digital cameras, for Panasonic Broadcast & Digital Systems Co., reports his company expects to have full-fledged 1080i cameras by the end of the third quarter or early in the fourth. He notes there can be slight problems in upconversion from 1035, such as aliasing effects.

Transfer Systems

Aside from this, he says, a critical difference between CCDs can be in their transfer systems. He notes Panasonic uses a single-channel transfer system, sampling at 74.25 MHz while the bandwidth of the HD system is 35 MHz. In sampling at more than twice the required bandwidth, the response is flat, he notes. This, he adds, provides a higher depth of modulation and less aliasing than with manufacturers using an alternative method such as sampling at 37 MHz and having a dual channel.

Like others, Hitachi Denshi America has a 1035i chip in its HD camera, the SK-3000P, and is waiting for a 1080i version. Tony Delp, camera product manager, notes Matsushita and Toshiba are expected to offer the chips before the end of the year. With the interchange of boards, Hitachi is offering the choice between 1080i, 720p, 480p and 480i.

For all the talk surround DTV and HDTV, Delp advises that the ability to offer quality 480i pictures not be overlooked.

"We're still tied to the NTSC world," Delp explains, "so the most critical thing is downconversion to 480 interlaced. We're going to see programs that are produced in both HDTV and standard TV, so it makes sense to have both outputs. Doing down-conversion at the shoot provides full bandwidth video, and it won't get any better than it is at the origination point. Since the camera system does the downconversion, the result is tighter control of the signal."

Heading To 720p

Philips has made it no secret that its work on progressive cameras is the primary concern.

"We're choosing 720p as our direction," says Dean C. Leeson, business development manager, Philips Digital Video Systems, "because progressive has advantages for a manufacturer of across-the-board technology."

Philips is currently working on a 720p camera, and at the past two NABs that technology was seen in a camera created by Polaroid that used technology licensed from Philips. That camera is studio-configured because of the wide 30MHz bandwidth it requires, but Leeson says he thinks there will also be a need for it for EFP work.

As for actual progressive product, Philips is offering its LDK-2000p, a 480p camera. Although this is a studio and triax camera, a field version is expected to be shown next fall. With upconversion the 480p signal can be sent out at 720p.

Although it has made the first move toward 720p, Philips is ultimately expected to have company in the marketplace. Ikegami, for one, expects to respond to the interest expressed by customers, especially ABC and its affiliates.

"We're working in that direction," reports Alan Keil, Ikegami vice president, director of engineering. "The 720p sensor that we have in mind in order to develop the camera is not yet developed, though." He notes the hoped-for sensor is being developed by Toshiba but adds that Ikegami is open to other providers as well.

While Ikegami has a 1035i portable that goes to 1080i with a converter unit, it's waiting for a 1080i CCD, expected in the third quarter, before marketing a DTV camera in the U.S. The 1080 CCD, Keil says, can be operated progressively and converted to 720 or 480. Once the 720 sensor is in hand, he adds, an alternative version in native 720p is expected.

Looking at the trade-offs, Keil notes that, when converting 720p to 1080i the dynamic horizontal resolution is not as good. When converting 1080i to 720p, he adds, the dynamic vertical resolution suffers. Nevertheless, he feels multiformat cameras will be important to those shooting for more than one network.

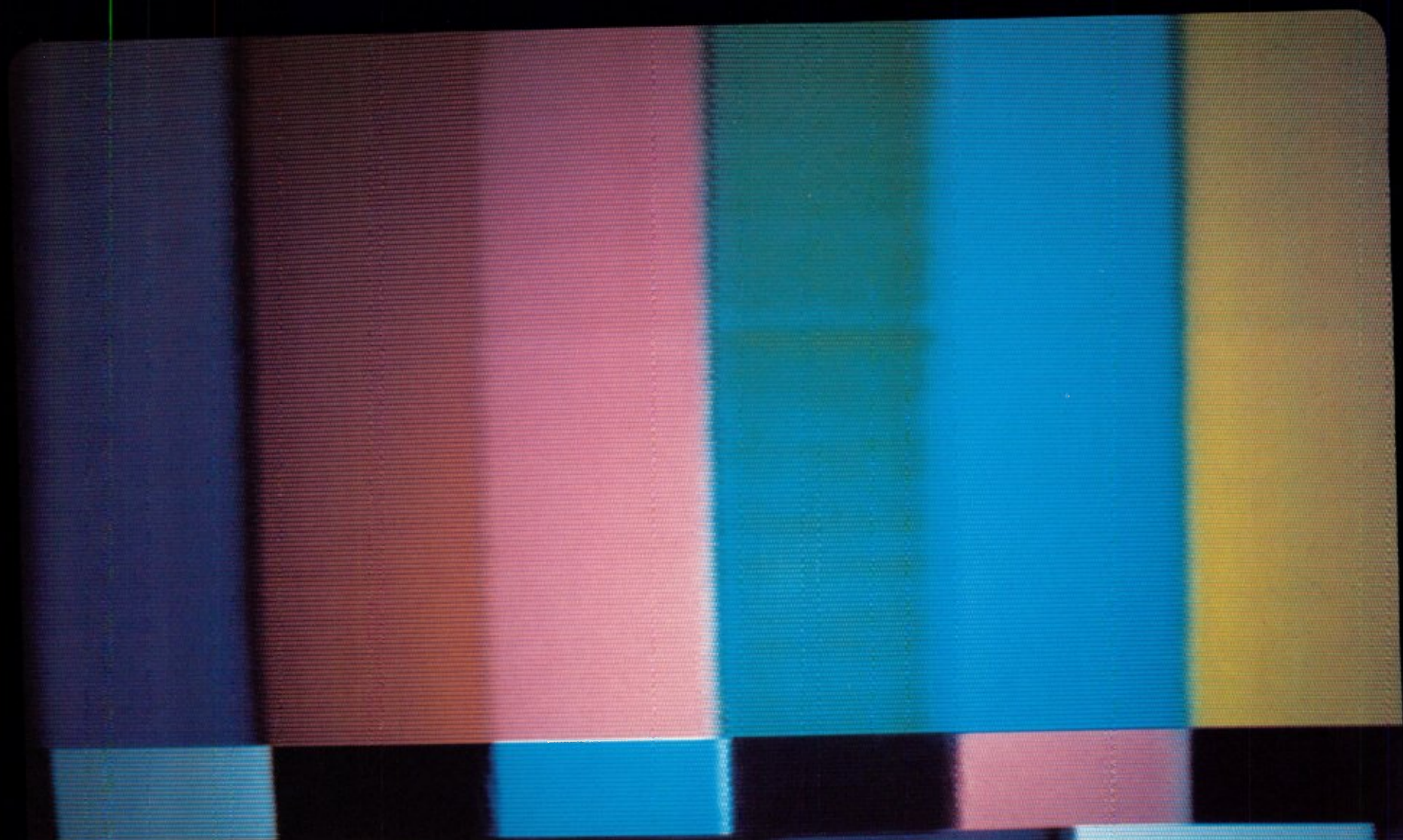
At the NAB exhibition, JVC showed a 480p camera in prototype form. Cohen takes the stand that upconverting from a camera like this to 720p is a much more economical approach than going to the expense of a 720p camera. He poses, "How much is that extra resolution worth?"

He adds, "As we get into the higher scan rates of HDTV, bandwidths go up and the amount of data is greater. The recording device may have to do more compression, causing artifacts that might be more damaging than in working in a lower scan rate in the first place."

Future improvements to HD cameras, he says, will come in CCD sensitivity, signal-to-noise ratio, dynamic range and reduction in vertical smear.

"HDTV stresses everything much more because the pixel density is greater," he holds. □

Corporate Profiles



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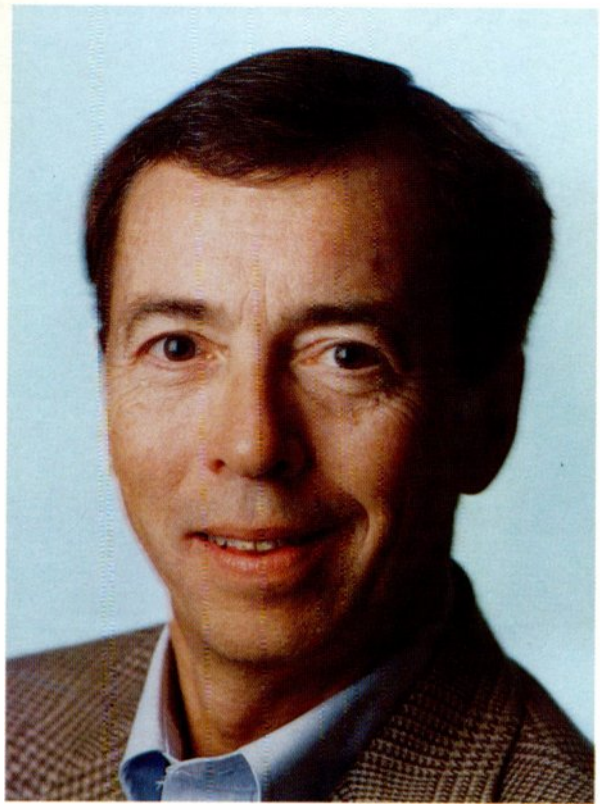

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Avid Newscutter
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Company Profile

Founded in 1987, Avid Technology, Inc. is an international, industry-leading provider of computer-based picture and sound tools used to create content for information and entertainment applications. Avid's products are used by customers worldwide ranging from communications professionals, film, television and interactive content producers to broadcast news organizations.

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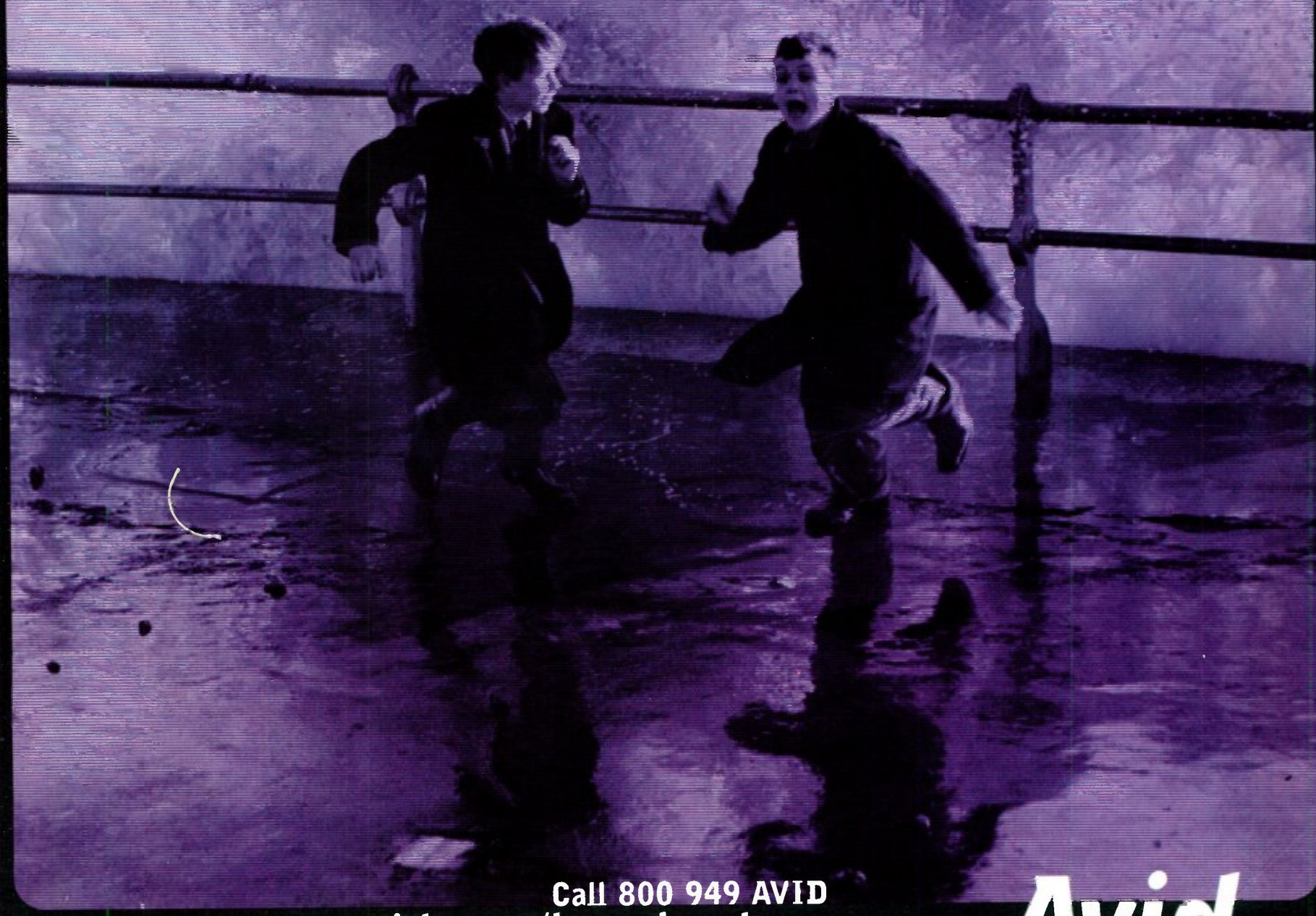

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COMPANY PROFILE

Serving the television industry for three decades, Chyron Corporation has been known as the premier manufacturer of television graphics equipment. Chyron systems can be found in almost every television facility in the world. As television makes the transition from analog to digital and HDTV technology, Chyron has also established itself as a leading innovator in the development of new products to meet the demands of digital television production and broadcast. Reinvesting its resources in digital research and development, Chyron, together with its subsidiary Pro-Bel, have introduced new capability and flexibility into graphics creation, asset management, routing and automation.

Graphics created on Chyron systems can be seen not only on the small screen, but the big screen as well. Chyron's Liberty paint and animation system produced special effects for major Hollywood blockbuster movies such as *Independence Day*, *Batman and Robin*, *Men in Black*, and the just-released *Godzilla*.

Pro-Bel's routing and automation systems provide the signal management infrastructure for broadcast companies such as CBS, NBC, ABC, Turner Entertainment, BBC, CNN, DIRECTV and PRIMESTAR.

COMPANY PHILOSOPHY

Chyron Corporation is dedicated to a leadership role in the development of digital and high definition television technology. Chyron and its subsidiary Pro-Bel, are committed to continually developing new applications, and upgrading existing hardware and software to keep pace with a rapidly evolving industry. Cutting-edge graphics and 3D animation systems formerly found only in large scale production facilities, are now available to a wide customer base at affordable prices. By providing a broad range of cost-effective high-end products and services, Chyron is easing the transition from analog technology to digital, providing resolution independent systems adaptable to almost any studio configuration. All Chyron and Pro-Bel products are backed by a highly skilled customer service team.

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- **Aprisa®** – Aprisa is a family of NT-based still store systems, providing playback with special effects and key, DDR capability, slow motion playback, playback of stills and clips with internal switching, multiple dynamic compositing and layering, and keyframe-based DVE.
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ROUTING AND AUTOMATION PRODUCTS

- **Pro-Bel TX 320** – Building on the success of the TX 220 digital master control switcher, the new TX 320 provides enhanced facilities, in a smaller, more cost effective package. Providing an ideal solution for single or multi-channel applications, the TX 320 handles up to eight levels of digital, analog, or embedded audio, with options for internal routing or full integration with external routers managed by the Pro-Bel System 3 controller.
- **Pro-Bel Routers** – Pro-Bel offers the widest range of routing and control systems available, from small Gemini monitoring routers to large scale digital XD routers. Pro-Bel's first HDTV routing system was just introduced at NAB '98. Pro-Bel routers are compatible with the powerful Pro-Bel System 2 and System 3 controllers, enabling integration of future HDTV routers into existing Pro-Bel routing systems.
- **MAPP** – This asset management system enables the user to browse video from archive stores, video servers or live outputs from a PC. Applications include previewing material for compliance checking, client review in post production, and indexing and viewing of material for promotion creation. Using standard Ethernet networking with frame accurate indexing, MAPP Video Browse is the most advanced desktop viewing system available.

FOR INFORMATION ON CHYRON PRODUCTS
PLEASE CONTACT:

Edward Grebow
President and CEO, Chyron Corporation

Ronald Witko
VP, North American Sales, Chyron Graphics Products

Richard Hajdu
VP, Chyron Corporation
General Manager, Pro-Bel America,
Pro-Bel Routing and Automation Products

CHYRON CORPORATION 5 Hub Drive Melville, New York 11747 TEL 516-845-2026 FAX 516-845-3867 http://www.chyron.com

Chyron has always been synonymous with quality output; our guiding principle has been to produce superior graphics systems that integrate seamlessly into the whole production operation. Put another way: Chyron graphic systems not only work well; they work well with everything else.

INFINITE FREEDOM™

A complete integrated, networkable production environment that combines CG, paint, animation, still store, DDRs and graphics servers into a total package that works with more kinds of software and hardware combinations than any other system. Gain unlimited creative freedom to converge, create, acquire, manage and playback.

WiNFiNiT!™

Working with Windows NT®/95®, Chyron workstations can be networked with your assets, across the Internet or through your facilities, all controlled by simple PC-based user interfaces.

iNFiNiT!® Series

The industry standard production tool for high-end graphics, CG, and broadcast animation to display news, election results, sports and stock market data, program notes and weather. Built by the leader in real-time, state-of-the-art performance and backed by decades of experience and proven support/ service.

CLYPS®

A new, full screen video clip capture and playback system for complex animations and movie files in real-time without using external devices. A single operator can control moving video and script with animation from any iNFiNiT! Series or Chyron Aprisa still management system.

TRANSFORM II™

Animates 2D objects in 3D space and builds multiple animations of characters, words or full screen graphics in real-time with simultaneous display. Key frame control is provided along with a timeline with field-based editing precision for linking of multiple effects.

DUET

Previewed at NAB '98, Duet is a new concept in an open, high performance media processing platform that provides a new benchmark in real-time 3D graphics and animation. The Duet architecture is scaleable to handle multiple display resolutions, including DTV formats. Available later this year for HD applications, come see how Duet can provide a variety of solutions by configuring different hardware and software.

CHYRON GRAPHICS

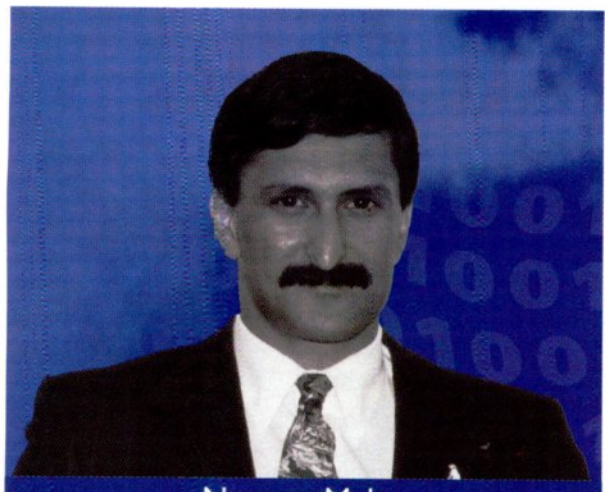
IT'S NOT JUST HOW WELL THEY WORK, BUT HOW WELL THEY WORK WITH EVERYTHING ELSE.

CHYRON®

PERFECTION OF IMAGE

5 HUB DRIVE, MELVILLE, NY 11747
516-845-2000 FAX 516-845-3895
WWW.CHYRON.COM

COMARK Communications, Inc.



Navroze Mehta
President & CEO, COMARK Communications

"Together, COMARK and CDS offer a broad range of products and services from consulting to complete turnkey design and implementation solutions."

COMARK
COMARK Communications, Inc.
104 Feeding Hills Road, Southwick, MA 01077
Tel: (413) 569-0116 Fax: (413) 569-0679

CDS
Comark Digital Services
601 North Fairfax Street, Alexandria, VA 22314
Tel: (703) 838-5655 Fax: (703) 838-1687

www.comarkcom.com

Company Profile

The future of broadcast is looking bright at COMARK. As pioneers of UHF and DTV broadcast technologies, COMARK is doing more than planning for the future, they're helping to create it.

For over a quarter of a century, COMARK has been a world leader in the manufacture of high power television equipment and systems. As part of their history of innovation, COMARK invented the industry's first IOT transmitter in 1986. Now the IOT transmitter is the standard technology for both analog and digital UHF high power TV, and COMARK has been the dominant supplier of IOT transmitters worldwide.

And the innovations continue. With the advent of Digital Television, CDS (Comark Digital Services) was created in 1997 as a new business unit. States Navroze Mehta, President & CEO of COMARK Communications, "The CDS mission is simply to provide innovative, cost-effective solutions for broadcasters in the implementation of DTV."

CDS is already providing stations with the technology and know-how to get "on-the-air" with tested technology and custom solutions for a variety of DTV applications.

COMARK and CDS are members of the Thomcast Group of companies, the world leader in terrestrial broadcast transmitters with equipment installed in more than 22,000 locations in 140 countries.

The Advantage™ DTV transmitter was created for broadcasters seeking a 100% digital solution for HDTV, multicasting and data.

Company Philosophy

COMARK is committed to engineering excellence. Innovation to meet broadcaster needs is a corporate objective. In 1990, COMARK proved this philosophy to be a reality when they were awarded an "Emmy for Engineering Excellence" for the development of the first IOT (Klystrode®) transmitter. From their COMARK (Southwick, MA) and CDS (Alexandria, VA) facilities, a team of researchers and engineers keeps the industry "one step ahead" by designing, manufacturing and implementing quality products and systems available to all of the broadcast industry.

At COMARK, quality doesn't stop with the product. Their customer service and quality control program leads the industry in thoroughness and integrity, ensuring customers unparalleled support to keep broadcasters "on-the-air", 24-hours a day, 7-days a week.

Products & Services

COMARK

- **"Advantage"** DTV Transmitter (IOT)
- **"IOX"** "Dual-Use" Transmitter (IOT)
- **"Optimum"** VHF SS Transmitter (MOSFET)
- **"Ultimate"** UHF SS Transmitter (LDMOS)
- Project & Site Management Services

CDS (Comark Digital Services)

- Consulting & Project Management Services
- Key subsystems including:
  - SDTV and HDTV encoding and multiplexing systems
  - Studio-to-transmitter links (STL)
- Engineering design & turnkey integration

CDS is supplying "complete digital systems" for DTV broadcasting today.

More Information Circle 405

Future Tested. Ready.

The digital age has arrived. At COMARK we're sending broadcasters a clear signal. *"We deliver as promised."* COMARK and Comark Digital Services (CDS) are delivering today the products and services that are required to make DTV a success for your tomorrow.

We have led the broadcast industry and its adoption of new technologies for over a quarter of a century. Developing new technologies means setting new standards that benefit your business.

CDS, THE DIGITAL EXPERIENCE FROM COMARK.

Offering a broad range of solutions:

- Consulting and planning services
- Innovative products
- Key sub-systems
- Transmission systems
- Turnkey design and implementation solutions

Whether you are a small market independent, a Top 10 network affiliate or a Public TV station, we will address your specific business planning needs, timetables, capital and operating budget considerations. When digital gets down to business, make COMARK and CDS your partners.

Emmy Award Winner for Engineering Excellence

Contact us today for complete information to meet your needs. Find out what we can deliver.

Future Tested. Ready.

COMARK

CES '98. *First "All Digital" 8-VSB modulator on-the-air*

NAB '98. *Live HDTV and "Multicasting"*

World Cup '98. *Intercontinental ATSC HDTV broadcast*

CDS

The Digital Experience *from COMARK*

COMARK Communications, Inc.: Tel: (413) 569-0116 Fax: (413) 569-0679
Comark Digital Services: Tel: (703) 838-5655 Fax: (703) 838-1687
www.comarkcom.com

DIRECT SATELLITE, INC.

3825 North Elston Ave. Chicago, IL 60618 ▪ Tel. (773) 539-6000 ▪ Fax (773) 583-0281 ▪ E-mail: SALES@DSI-ANA.COM

DSI
DIRECT SATELLITE INC.

Thomas Looney, *President-CEO*

- **Digital Broadcast Satellite (DBS) installation and services: DBS (DirecTV and USSB), MATV, private cable, and DirecPC**
- **Telephone systems installation & services: traditional voice services, video conferencing, and high-speed internet access and downloading.**
- **Security/fire installation & services: home security, video monitoring, and fire and safety prevention**
- **Traditional cable installation**
- **DBS systems for apartment buildings, condo associations, hospitals and schools**

"Judge a company by the company it keeps"

COMPANY OVERVIEW AND VISION

Direct Satellite, Inc. is currently a Direct Broadcast Satellite/Telecommunications Service Provider offering programming of entertainment channels delivered via satellite and maintained by qualified technicians on a 24 hour basis. The corporate office is located at: 3825 North Elston Avenue,Chicago, Illinois 60618. The legal form of business is an Illinois Corporation under FCC (Federal Communications Commission) regulation. Services that are offered include:

- Satellite Television Services
- Telephone Systems Installation and Services
- Fire and Security Installation and Services
- Fiber Optic Solutions
- Traditional Cable Installation

DSI will soon offer a comprehensive telecommunications package consisting of the above services, plus video teleconferencing and Internet access, all provided to the customer by one direct source: Direct Satellite, Inc.

The geographic areas served are primarily Chicago and the surrounding counties in the state of Illinois. However, expansion will continue into selected markets throughout the Midwest. The company is in the expansion stage of formation.

OPERATIONS STRATEGY

Under the Telecommunications Act of 1996, a company is able to combine enhanced services like cable, telephony and Internet access on one bill, from one provider, offering bundled discounts.

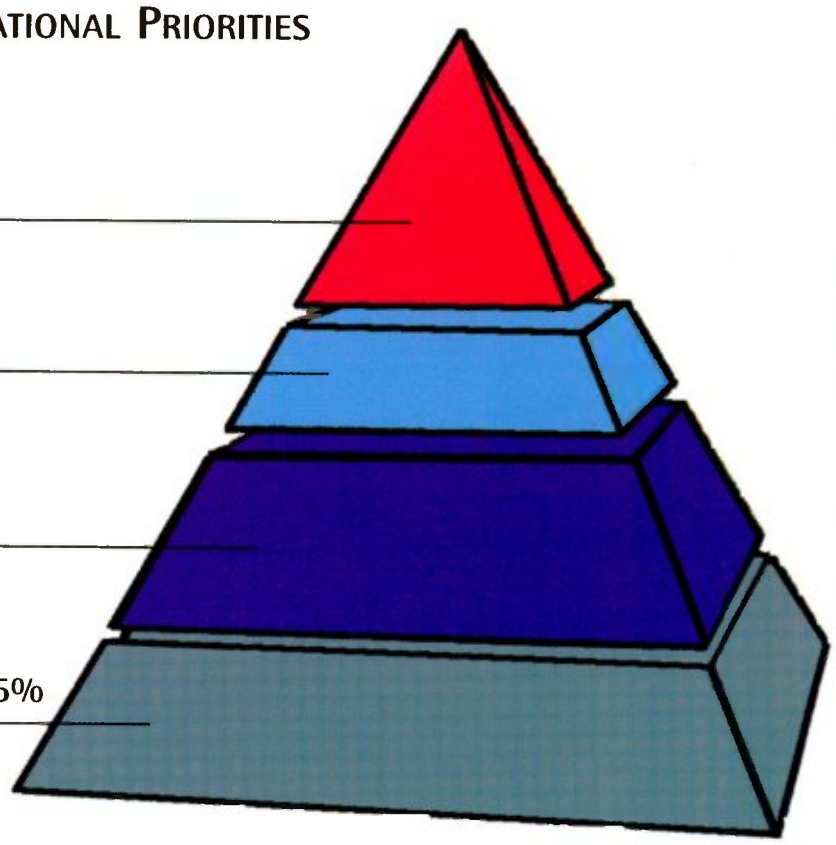
The core business of *Direct Satellite, Inc.* (DSI) has been the installation of cable since 1974. Over the last year, DSI has established all necessary supplies and support systems to launch its satellite campaign. The background and capabilities of the management team and the past successes of the company assure future growth and market leadership for new venture. Now, DSI is entering into providing competitive local satellite and cable service to residential multi-tenant and office complexes. One of the keynote advantages for DSI's entry into the marketplace is the relationship with DIRECTV.

This partnership enables DSI capital to be allocated toward the procurement of subscribers versus the development of infrastructure & distribution technologies. We envision the marketing and operational priorities for the company to be as follows: (see chart below)

MARKETING PLAN

Direct Satellite, Inc.'s basic marketing plan is to enhance, promote and support all satellite and telecommunications services & products with: value-added features, qualified & trained sales professionals, and superior technical & customer representatives. The unique, alternative features of DSI services & products will place the company in the forefront of currently available competitive offerings.

MARKETING AND OPERATIONAL PRIORITIES



More Information Circle 407

OPPORTUNITY + TIMING = $

There is nothing as powerful as an idea who's time has come!

TIMEING can make an opportunity a GREAT opportunity. This is the last opportunity for YOU to MAKE MONEY in the Digital Television Industry. The Telecommunications Act of 1996 makes it possible for the first time, for the "Little Guy" (you) to compete equally with the AT&T'S of the world. Did you miss out on the cellular opportunity? Well, this is better!...

Tired of being a "Little Guy"? Call (312) 670-9681 *(NOWS THE TIME!)*

HARRIS CORPORATION, BROADCAST DIVISION

4770 Duke Drive, Suite 200, Cincinnati, Ohio 45050-9010 • Tel: (513)459-3400 • Fax:(513)459-3890 • e mail:

Harris offers products, systems and services to help make your conversion to DTV as smooth and as cost-effective as possible.

Complete range of DTV products, systems and support services

Unmatched track record for field-proven DTV transmission equipment and systems

Experienced field sales team backed by full resources of Harris

DTV applications engineers and DTV RF conversion studies

50+ systems engineers and integrators with 600+ years' experience

Western hemisphere's most extensive transmitter manufacturing capability

24-hour technical service and parts; full-time training

HARRIS

More Information Circle 409

COMPANY PROFILE

Harris Corporation is North America's oldest and largest supplier of radio and television equipment, custom-integrated systems, and services. The company serves broadcasters in more than 150 countries.

The Broadcast Division was founded in 1922, and has pioneered more than 60 key technical innovations that have literally changed the way our world sees and hears itself. Since introducing the industry's first digital broadcast transmitter – a 10-kilowatt Medium Wave (AM) unit featuring digital amplitude modulation – in 1987, Harris has set the pace in broadcasting's conversion to digital technology.

In 1990, Harris provided the RF Test Bed that was used by the Advanced Television Test Center in Alexandria, Virginia to evaluate every advanced television system proposed for the United States. Other major Harris milestones in digital television transmission include:

- The first dual-channel NTSC/ATSC antenna (1993)
- The first commercial ATSC 8-VSB exciter (1995)
- The first commercial DTV transmitter (1995)
- A DTV transmitter for WRAL-HD, Raleigh, NC, the first DTV station on the air (July 23, 1996)
- DTV transmitters for six of the United States' seven experimental DTV stations (1996, 1997)
- DTV transmitters to support world-first DTV demonstrations at NAB; Montreux, Switzerland; Australia; People's Republic of China; Mexico, and Brazil (1997, 1998)
- First live high-definition broadcast of Major League Baseball (Sept. 16, 1997)
- The first second-generation ATSC 8-VSB exciter (1998)
- ATSC MPEG-2 encoding system (1998)
- Dual-channel STL (1998)
- Complete working DTV broadcast facility for the HARRIS/PBS DTV Express (1998)

Harris innovation extends to digital-ready and digital systems as well. Harris' team of more than 50 systems engineers and integrators has over 600 years' combined experience in virtually every aspect of systems planning, design, integration and installation. The company has more than a dozen digital and digital-ready facilities to its credit, from turnkey systems to upgrades. With relationships with major equipment manufacturers, Harris can help you select the components that meet your most exacting requirements. In addition to fixed production, transmission, and master control facilities, Harris offers a complete range of customizable ENG, SNG, satellite fly-away and mobile production systems. Harris also is a leading distributor of audio-for-video products.

Harris is currently building a 160,000 square foot facility that will house a digital R&D center and its Broadcast Division headquarters in the Cincinnati area.

COMPANY PHILOSOPHY

Harris is committed to providing a complete range of next-level products, customizable systems and value-adding services to help broadcasters make the conversion to digital television as smoothly and as cost-effectively as possible. To this end, Harris offers unmatched support services and training programs, including:

- A U.S. field sales force with nearly 300 years of combined experience in broadcast engineering, operations, management and sales.
- Complete DTV RF Conversion Studies, which analyze every part of a television station's RF air-chain from transmitter through tower. These studies provide a complete blueprint for the station's DTV conversion, as well as budgetary pricing and a time-frame.
- A DTV Applications Engineering Team to work with a station's consultants and in-house engineers to help develop the best conversion strategies.
- Around-the-clock service and parts support.
- Installation teams to augment broadcasters' in-house engineering staffs

In addition, Harris is the only manufacturer to sponsor a full-time Broadcast Technology Training Center. The Center, which is located in Quincy, Illinois, offers general training as well as Harris product training. New week-long classes include *Introduction to HDTV* and *TV Systems and Installation*.

MANUFACTURING CAPABILITY:

Harris is well-equipped to support the FCC's aggressive DTV roll-out schedule with the largest manufacturing capacity of any broadcast supplier in the Western Hemisphere. In addition to a 125,000 square-foot transmitter factory in Quincy, Illinois – one of the largest in the world! – Harris has factory in Cambridge, England and systems manufacturing capabilities in the Cincinnati area.

SERVICES OFFERED:

- Field Sales
- DTV Applications Engineering
- DTV RF Conversion Studies
- Installation
- 24-Hour Staffed Technical Service
- 24-Hour Parts
- Training
- Systems
- Facility Upgrades

PRODUCT CATEGORIES COVERED:

- Audio-for-Video Products
- ENG, SNG, Fly-away Satellite and Mobile Production Systems
- Satellite Uplink Systems
- DSE 1400 Digital SNG Exciter
- Transmission, Production and Master Control Systems
- FlexiCoder™ ATSC MPEG-2 Encoding System
- MultiLinkCD Dual-Channel STL
- CD 1A ATSC 8-VSB Exciter
- PlatinumCD Solid-State VHF DTV Transmitters
- DiamondCD Solid-State UHF DTV Transmitters
- SigmaCD 10T UHF DTV Transmitters
- Combined-Channel Antennas

Harris Broadcast's headquarters and R&D center under construction in Cincinnati, Ohio

Field Strength Extraordinaire.

As you prepare for DTV, your biggest challenge is to find the solutions that make the most sense for your station.

Harris would like to help.

You've come to know us as broadcasting's leading source for field-proven analog and digital solutions - from next-level products, customizable systems, and an unparalleled array of service and training programs.

But did you also know that you can access Harris solutions through our TV field sales team? With nearly 300 years of combined experience in broadcast engineering, operations, management and sales, our field team knows broadcasting.

Backed by the resources of Harris – including full-time DTV applications engineering; a large and experienced systems integration team, and a full force of service, installation and training experts – our field sales team is ready to help make your conversion to DTV as smooth, as hassle-free, and as cost-effective as possible.

Why not contact us today and put us to work for you?

HARRIS

A new world of broadcast solutions

More Information Circle 410

End-to-End Solutions - RF: ATSC MPEG-2 Encoding System - Dual-Channel STL - Analog and Digital VHF and UHF Transmitters - ATSC 8-VSB Exciter - Combining Systems - Multi-Channel Antennas - DTV RF Conversion Studies - Training - Field Service and Installation - 24-Hour Service and Parts **•Systems:** ENG - Fly-Away Satellite - Mobile Production - SNG - Satellite Uplink - Television Production, Transmission and Master Control - Turnkey Systems **•Audio-for-Video Products and Systems**

ADC Telecommunications

Broadcast Systems Division

102 Rahway Road
McMurray, PA 15317 USA
724-941-1500
724-941-4603 FAX

broadcast_info@adc.com
www.adc.com/broadcast

Profile

ADC Telecommunications Broadcast Systems Division (formerly ITS Corporation) is a global supplier of high quality television transmission systems. With over 16 years experience in solid state and tube type transmitters, exciters, power amplifiers, and system design and integration, ADC provides a wide variety of products and services for the broadcast RF plant. ADC, with annual sales of over $1 billion, has over 6,000 employees around the world and provides telecommunications solutions to service providers in telephony, data communications, and cable as well as the broadcast market. ADC is traded on the NASDAQ system under the symbol "ADCT."

Philosophy

ADC's strong commitment to high quality and customer satisfaction are primary foundations for the business. This philosophy, along with expertise in RF transmission and signal processing, has been the cornerstone of ITS which carries on today. Our goal is to provide the highest level of product performance, system design and integration, and customer service to ensure your satisfaction. Our products are designed and manufactured under a quality system that has been recommended for ISO-9001 certification.

Products

ADC's Broadcast Systems Division offers a full line of analog and digital transmitters, translators, and exciter retrofits, along with unique solutions for DTV conversion. Several new products were recently introduced to the marketplace, including the Visionary™ IOT UHF transmitter that is easily configured for either analog or digital broadcasting. The 840 10kW UHF transmitter, the DT20 DTV UHF exciter/modulator, and the 5032 8-VSB modulator are other recent introductions that provide a versatile range of solutions for broadcasters. With the transition to digital on every broadcaster's schedule, ADC has the solution to meet each stations specific DTV needs.

Services

Complete system design and integration along with 24-hour, seven days per week customer service and field support are hallmarks of ADC. By being the designer, engineer, and manufacturer — ADC can offer a complete limited warranty on all product lines.

More Information Circle 411

The transmitter the broadcast industry has been asking for is here.

Providing Solutions

The VISIONARY™ UHF IOT transmitter.

VISIONARY™ series transmitters combine ITS Corporation's extensive exciter/driver experience with proven IOT amplifier technology to provide a world class transmitter system. Easily configured for analog or digital broadcasting, the VISIONARY transmitter series is your high power UHF solution for today and tomorrow. Utmost performance and redundancy within a small footprint is the mark of this series. Power levels of 20kW-280kW analog or 12.5kW-100kW digital are available in air or water cooled configurations. Exceptional performance derives from highly stable and low noise carrier generation, precise digital filtering and quadrature vector modulation techniques, and highly linear feedforward amplifiers. The 44MHz IF is compatible with analog, making digital conversion very straightforward.

ITS Corporation's Broadcast group is now the Broadcast Systems Division of ADC Telecommunications. Same RF experts. Same quality solutions. And more....

ADC Telecommunications®

Broadcast Systems Division

102 Rahway Road
McMurray, PA 15317
USA

www.adc.com/broadcast
broadcast_info@adc.com
TEL 724-941-1500
FAX 724-941-4603

More Information Circle 412

JVC PROFESSIONAL PRODUCTS COMPANY

41 Slater Drive, Elmwood Park, NJ 07407 Tel:(800) JVC-5825 Fax: (973) 523-2077

JVC continues to shape the broadcast market with its innovative products, while providing technological leadership in digital video.

JVC is unparalled in its record of "firsts". In 1939, JVC developed Japan's first practical television. In 1976, JVC introduced VHS, which nearly single-handedly spawned an entire video industry. Twenty years later, in 1996, JVC launched DIGITAL-S, which offered broadcasters high-end 4:2:2 digital performance for the price of analog. Plus, DIGITAL-S was designed with HDTV extensions to offer high-end performance well into the digital television era.

JVC'S PHILOSOPHY

JVC PROFESSIONAL PRODUCTS COMPANY answers the call of digital television by relying on a simple ethic: "To offer our customers practical, productive and economical solutions with products that expand the boundaries of video technology." This philosophy has buoyed JVC in more than 70 years of serving both the evolving demands of sophisticated video professionals and ordinary needs of new users in the marketplace.

JVC'S EMPHASIS ON SERVICE

With the recent formulation of its Digital Broadcast Systems Group, JVC is well equipped to offer exceptional technical and service support to the television industry. This new group is focused on digital broadcast VTRs, cameras, non-linear editing systems, and broadcast monitors.

JVC IS DTV-READY

JVC markets an exceptional array of video equipment scaled for price and performance:

VTRs

JVC offers DIGITAL-S, a revolutionary digital format which provides high quality 4:2:2 component digital video, and an outstanding 50Mbps data rate, ideal for 480i and 480 P30 DTV recording. Producers shooting for 16:9 will appreciate the higher 4:2:2 chroma resolution and perceptually lossless compression afforded by DIGITAL-S. JVC has announced a 100 Mbps extension to its DIGITAL-S line, capable of high quality 720P or 1080i HDTV recording.

CAMERAS

JVC's leadership in DTV is only beginning with today's DIGITAL-S products. For acquisition, JVC offers a wide range of digital cameras, including the KY-D29W, the widescreen version of its popular KY-D29, featuring switchable 4:3 and 16:9 aspect ratios. Docked to the BR-D40 DIGITAL-S field recorder – fully capable of accepting the 16:9 images – this new combination gives videographers the ability to make extremely high quality 4:2:2 recordings in either aspect ratio, with the capability to edit this high-quality footage on any of the current DIGITAL-S models. JVC also offers two DIGITAL-S camcorders, both providing high-quality 4:2:2 recording.

HDTV TRANSMISSION

Besides its proven leadership in digital video recording and production, JVC is poised to market new products for digital transmission and the display of HDTV pictures. To facilitate the transmission of HDTV signals, JVC has entered into a strategic alliance with DiviCom Inc., a wholly owned subsidiary of C-Cube Microsystems Inc., to develop a high definition encoding/decoding system for the transmission of HDTV.

D-9

DIGITAL-S IS DESIGNED FOR BROADCAST

JVC's DIGITAL-S has been adopted by:

KITV-TV
WRAZ-TV
WJPR-TV
BBC-Bristol
KRXI-TV
KAME-TV
KAYU-TV
KFWD-TV
Fox News Channel
WEEK-TV
WPTY-TV
KFXK-TV
KNTS-TV
Fox Sports
KNWS-TV
KTBU-TV
KOKI-TV

And Many More...

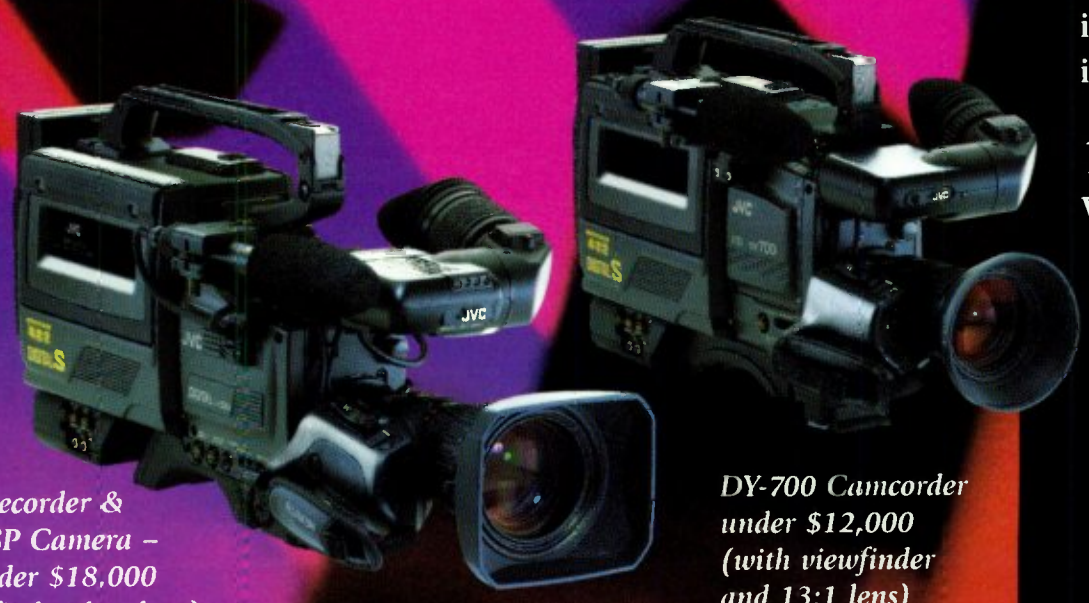
For more information about JVC or its products, call
1-800-JVC-5825
or visit JVC's Web site at
www.digital-s.com.

JVC PROFESSIONAL

More Information Circle 413

Every step in video production affects the next.

Your first is the most critical – start with 4:2:2!



BR-D40 Dockable Recorder & KY-D29 DSP Camera – package under $18,000 (with viewfinder, less lens)

DY-700 Camcorder under $12,000 (with viewfinder and 13:1 lens)

DIGITAL-S Acquisition

To get the most out of today's digital editing systems, you need to begin with the best raw footage possible. And that means shooting in 4:2:2. With DIGITAL-S, you get 4:2:2 color sampling with perceptually lossless compression. This produces an image that remains free of annoying artifacts that could build up through various steps in post production and digital distribution.

DIGITAL-S also offers superior chroma resolution, producing more well-defined colors, chroma keys and effects. In fact, all high-end systems, including the best non-linear editors, require 4:2:2 to achieve these benefits. The result is performance and quality that can stand up through each phase of digital video production. Shooting in a 4:1:1 DV format compromises your image, and you can't bring back the quality once it's lost.

COMPONENT DIGITAL 4:2:2

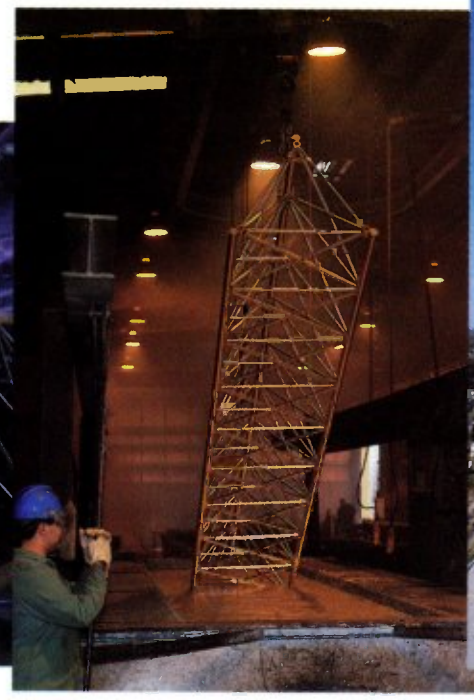
Take your first step into high performance. Make it DIGITAL-S. For more information call:

1-800-JVC-5825
www.jvcpro.com

JVC
PROFESSIONAL

More Information Circle 414

LOOK AT WHAT'S HAPPENING AT LeBLANC®



LOOK AT WHY.

LeBLANC is one of few companies in the world who have the experience and capabilities to design, manufacture, install and erect integrated broadcast communication systems. This is our business... and has been...for over 30 years.

Our new television group **LeBLANC Broadcast Inc., (LBI)** is a member of the LeBLANC Group. We are uniquely positioned to offer turnkey services ranging from tower construction to antenna installation and testing for analog and DTV systems. We form teams of highly trained professionals from our staff of 2400. They work directly with your staff and consulting engineers to nail down tight specifications and cost effective solutions.

LeBLANC's specialty is designing, constructing and installing towers up to 2000 feet. Starting with a thorough structural feasibility study of the existing tower...and working with our LARCAN teammates...we provide comprehensive DTV solutions to ensure your tower, transmitter, waveguide and antenna requirements are met...and to your complete satisfaction.

You are always concerned about quality and safety. So is LeBLANC. No other company has achieved the myriad of certifications in as many jurisdictions for our products and services as LeBLANC.

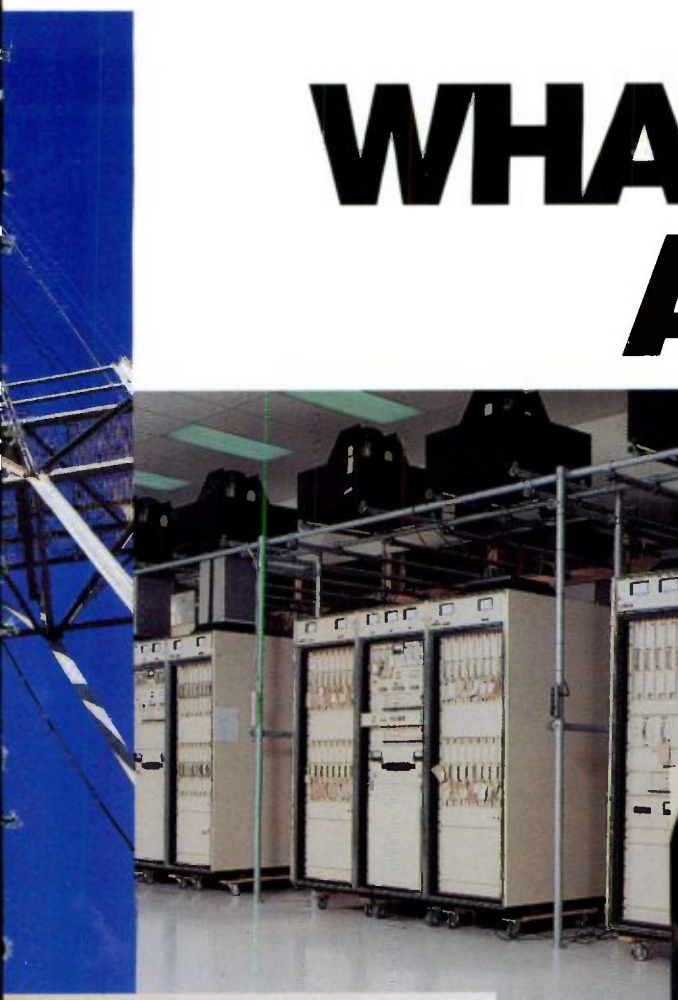
For all your tower solutions...
Look At **LeBLANC Broadcast Inc.**

LeBLANC BR

LARCAN

Corporate Offices: Dallas: Bob Groothand, President 972.664.1817
Special Projects: New York: Joe Nigro, Vice Pres. 973.790.4778

LOOK AT WHAT'S HAPPENING AT LARCAN



LOOK AT WHY.

LARCAN pioneered high-power solid-state VHF transmitter technology and is a recognized leader worldwide.

With the advent of Digital TV we contributed to its development and in 1993 LARCAN supplied the VHF solid-state transmitter for ACATS 'air' tests in Charlotte, North Carolina.

At NAB '97 our new LANDMARK Series DTV transmitter demonstrated the Zenith DTV 8-VSB exciter...live...an industry first.

In January 1997 we assisted KOMO-HD to transmit the first HDTV signal west of the Mississippi. In early 1998 we delivered a LANDMARK UHF digital transmitter to KOMO-HD.

These LARCAN pioneering successes translate into major LANDMARK features and benefits for your DTV Transition, and include...

• LARCAN/Zenith exciters ensure ATSC compliance. • Microprocessor control ensures complete system stability. • Touch screen controllers and fiber optic LAN control. • Solid-State LDMOS Class AB Broadband Driver ensures exceptional linearity. • LARCAN conservative power ratings in 8kW to 25kW IOT socket modules...up to 100kW. • Our Quality Assurance System has attained ISO 9001 registration.

For all your transmitter solutions...
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OADCAST INC.

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for September 11-15th?

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Amongst the 30,000 square metres of stand space you will find every major supplier of broadcast technology.

A full five stream, five day conference, tackles the technical, management, economic and craft-skill issues impacting on your business.

And our Widescreen Festival screens and rewards the best in widescreen TV production.

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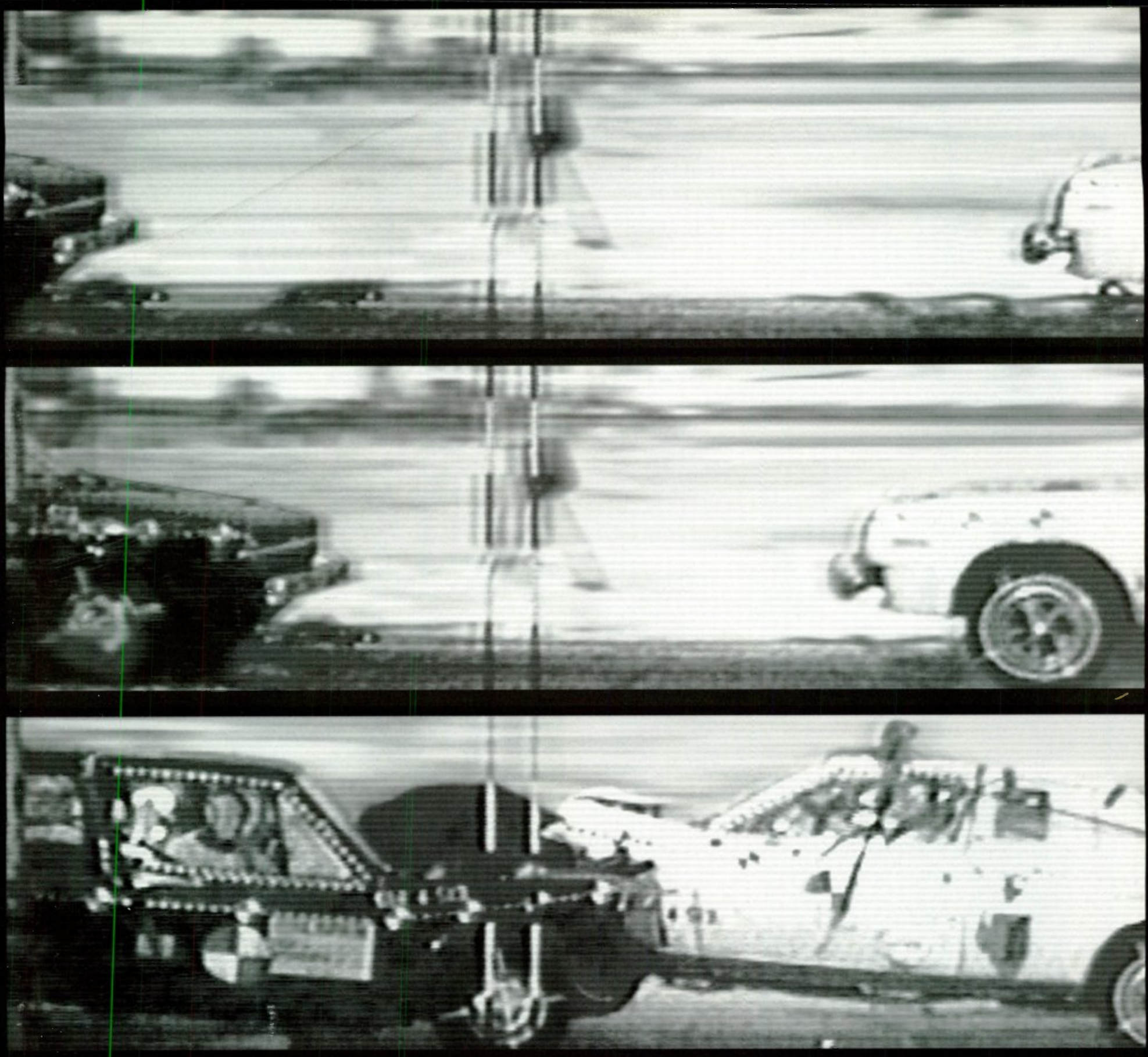

OK | LET'S TALK CONVERGENCE.

>> YOU'VE SEEN IT COMING FROM A DISTANCE — MAYBE EVEN TRIED TO AVOID IT, BUT THE WHOLE WORLD IS ABOUT TO CHANGE — ENTIRE INDUSTRIES REDIRECTED. AT LOUTH, WE CAN HELP YOU GAIN CONTROL. MULTI-CHANNEL DIGITAL BROADCASTING. GLOBAL NETWORKING, REALIZING NEW MARKET POTENTIAL — THIS IS WHAT WE DO. VISIT US AT WWW.LOUTH.COM FOR INFORMATION. IT'S TIME. AND YOU CAN CHOOSE THE RIGHT WAY TO MAKE AN IMPACT.

LOUTH
AUTOMATION
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More Information Circle 417

National Digital Television Center, Inc. (NDTC)

Denver • Hollywood • New York • Hong Kong

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.

For More Information Contact:

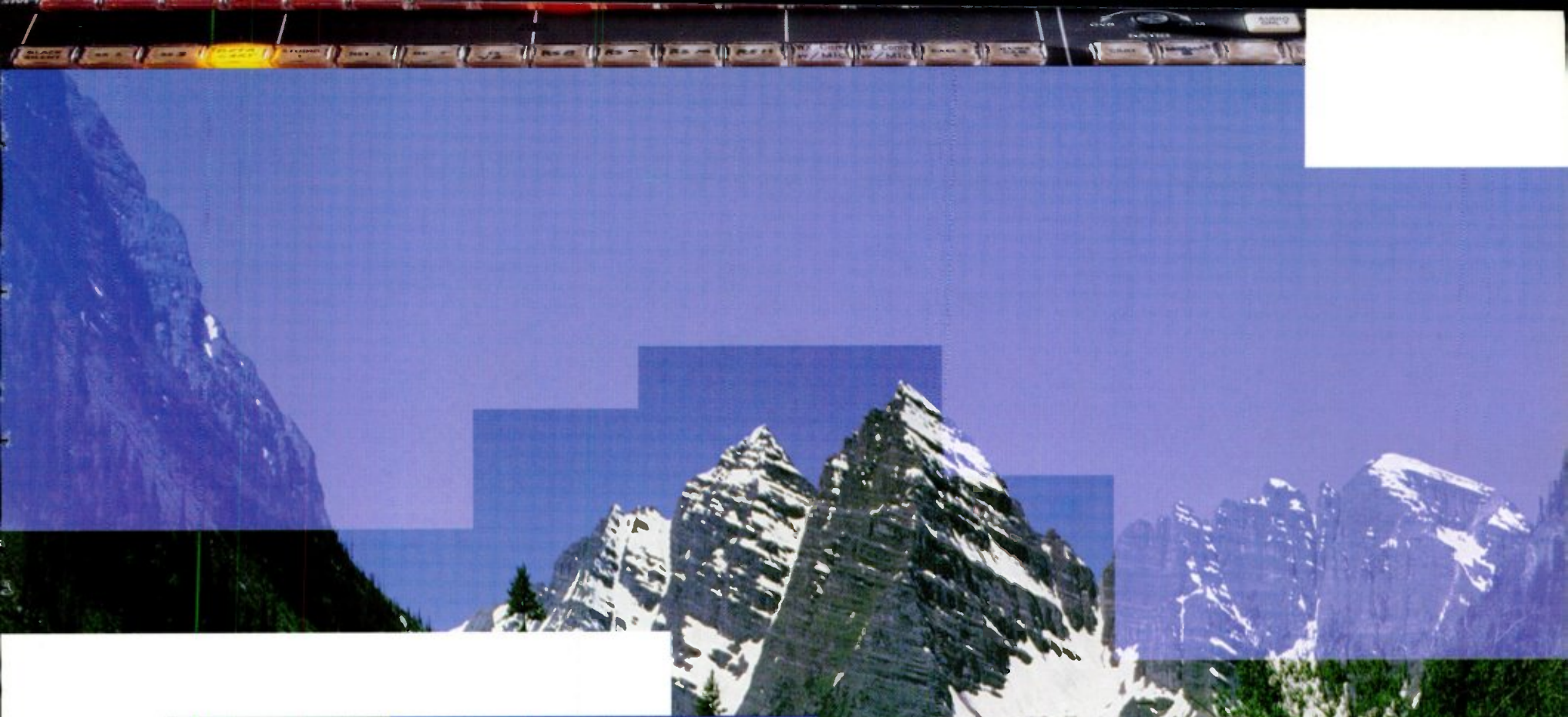
Kathy Standage
303.486.3809/303.486.3890 (fax)/standage.kathy@tci.com

More Information Circle 419

TCI®

NDTC National Digital Television Center

NDTC uplink site in Denver, CO



A Whole New Meaning for High-Level Production

Come to Colorado.

Where spectacular peaks are always within reach.

TCI's spectacular National Digital Television Center, in Denver, offers producers and directors the highest level of production capability available anywhere.

All new.

All state-of-the-art.

All under one roof.

NDTC/Denver is the place to consider for exceptional state of the art television production, in a truly exceptional state.

Find room to work.

- 6 state of the art studios
- 65,000 square feet of production space
- Shapes and sizes to fit any set requirement
- All cameras with full digital and set up panels

And rooms to work wonders in.

- Digital, Analog, and Avid non-linear edit suites
- Full service digital audio and music production available
- All digital control rooms

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,
or e-mail her at standage.kathy@tci.com

More Information Circle 420

TCI®
NDTC National Digital Television Center

DENVER • HOLLYWOOD • NEW YORK • HONG KON

NDS
WORLD LEADER • WORLD VISION

NDS Americas Inc. 3501 Jamboree Road Suite 200 Newport Beach, CA 92660 949.725.2554 www.ndsworld.com

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.

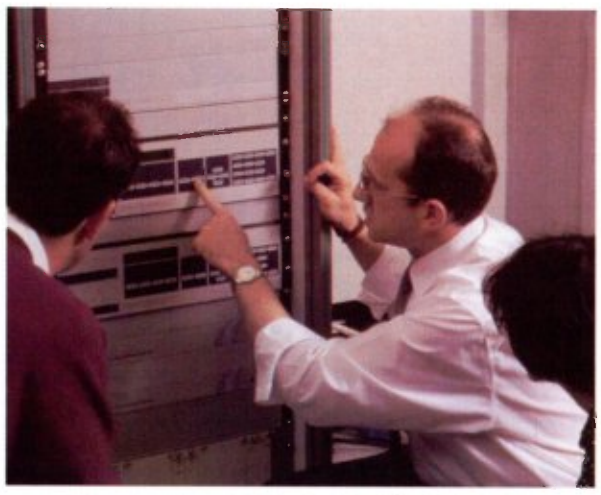
COMPANY PROFILE

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 421

NDS has the DTV solution for every resolution.

The debate about digital TV is raging on, but one thing is perfectly clear: whether you're planning to use 480p, 720p, or 1080i, there's only one company to turn to for your DTV solution — NDS.

With our extensive range of contribution, distribution and ATSC station products, you can count on NDS.

NDS is your one stop shop for high definition and standard definition encoding, multiplexing, modulation, MPEG splicing, ad insertion, conditional access and system control. Our decades of digital experience and proven leadership in the design, manufacture and integration of digital television products make us the right choice to help you win with DTV.

NDS has developed proven DTV solutions; and the products, systems and solutions we've created for ATSC will be the ones selected by leading broadcasters. Just like yourself.

Life may be full of resolutions, but there is only one company with the complete ATSC solution. See it for yourself. Call NDS Today.

NDS
WORLD LEADER • WORLD VISION

NDS Americas Inc.
3501 Jamboree Road Suite 200, Newport Beach, CA 92660
714.725.2554 www.ndsworld.com

More Information Circle 422

Panasonic Broadcast & Digital Systems Company

Delivering Next Generation Television and Video Today!

Company Profile

Panasonic Broadcast & Digital Systems Company (PBDSC) is a leading supplier of professional video and audio equipment for broadcast and post production applications. Panasonic provides products and systems for image acquisition, recording, production, storage, display and projection.

Winner of the most Emmy Awards for digital technologies, Panasonic was the first to use DSP technology in video cameras; the first to bring digital switchers to the U.S. market; the first to develop the 1/2" digital format, D-3; the first to produce the fully uncompressed digital component format, D-5; and now, the provider of the first truly affordable digital acquisition and recording system, the highly-popular DVCPRO.

Supplying Emmy award-winning technology to broadcasters is a long-standing tradition at Panasonic. The AJ-LT75 DVCPRO Laptop Editing System represents the equivalent of an entire field edit pack in a unit that can fit under an airplane seat. With the ability to playback both DVCPRO and DV-format videotapes, the AJ-LT75 takes the video production process anywhere, any time for battery-operated portable editing.

First in High Definition Digital Video

Panasonic is taking a realistic approach to the somewhat daunting prospect of HDTV and DTV by offering a range of basic production tools (i.e., VTRs, cameras, switchers, and monitors) to broadcasters. Panasonic's advanced digital television (ADTV) products will serve as fundamental production tools for TV stations beginning digital television production.

We are the first company to deliver a cost-effective digital HD VTR, the AJ-HD2000 D-5 HD VTR, designed for 1080I recording/playback, and will offer a full range of D-5 HD recording solutions, including the AJ-HD2700 1080I/720P switchable D-5 HD VTR, the portable AJ-HD2200 1080I VTR and the AJ-D580 D-5 VTR /AJ-HDP500 HD processor combination. In HD switching solutions, Panasonic offers the industry's first family of 1080I switchers -- the AV-HS3000 Series, dubbed the Millennium Series. This switcher family includes the compact AV-HS3100 and AV-HS3110 10-input switchers and the AV-HS3200 20-input switcher. In HD acquisition solutions, Panasonic is marketing the full-featured AK-HC800 Series 1080I cameras for studio and mobile field applications. Both the AK-HC880 studio camera and its companion, the AK-HC830 portable camera, deliver the full HD bandwidth of more than 1,000 TV lines. In DTV display solutions, Panasonic is offering two 16:9 wide screen monitors -- the AT-H3015W 30" master grade HD monitor and the DT-M3050W 30" multi-format monitor, which can display all ATSC image formats.

Everywhere You Go, the News is DVCPRO

Panasonic DVCPRO has emerged as the compact digital component acquisition and recording standard for newsgathering. More than 45,000 DVCPRO units have been delivered worldwide to international networks like the BBC, CBC, ITN and Televisa to the U.S. networks like CBS and NBC; dedicated news operations like NY-1 and WFXT/Fox Boston;. to broadcast groups like Sinclair Communications, Raycom Media, Hearst-Argyle, the Ackerley Group, Benedek Broadcasting, and many more.

In the midst of its far-reaching acceptance, Panasonic is delivering its fourth wave of DVCPRO products, which includes the extension of the format to DVCPRO 50 compatible 4:2:2 signal processing products for post-production, 480 Progressive Scanning DVCPRO products for DTV, and the availability of exciting nonlinear systems— the newsBYTE fast-transfer workstation with 4X built-in DVCPRO VTR and the fully-integrated DVedit DVCPRO native system.

With an 18-member product line-up, DVCPRO provides the full range of field acquisition and production equipment. The format includes provisions for broad future systems integration and expansion. The recently announced DVCPRO HD100 is a 100 Mb/s system that will allow DVCPRO to be utilized for cost-effective acquisition in the HDTV era.

Next Generation Service

In our unrelenting commitment to Next Generation Television and Video, Panasonic has established an integrated global service network dedicated to broadcast and production customers. As part of a broad range of service commitments, Panasonic has announced a worldwide warranty system, including provisions for back-up units at major media events; and the development of service and training support via the World Wide Web and other interactive media.

Panasonic
Broadcast & Digital Systems Company
One Panasonic Way, Secaucus, NJ 07094
201-392-6136 www.panasonic.com/PBDS

More Information Call 1-800-528-8601

How do you want your HD?

introducing the next generation of HD, the AJ-HD2000

Now Panasonic offers you more choices in how you want your High Definition. Offering full-bandwidth 10-bit or 8-bit HD recording, the Panasonic AJ-HD2000 offers an integral High Definition processor capable of 1080i and 1035i line standards. The compact, full-featured AJ-HD2000 offers full editing and slow motion features in HD, all on a standard D-5 1/2-inch cassette. An optional downconverter provides standard definition outputs (525p and 525i, digital component, digital and analog composite) from the High Definition VTR.

You can also choose the AJ-D580 D-5 VTR/AJ-HDP500 HD Processor combination if your application calls for the flexibility of both HD and D-5 digital recording at the highest standard definition performance level. This solution offers a feature-rich, dual-standard digital VTR capable of producing 525i or 1125i recordings. One box or two, it's up to you.

When it comes to HD, there really is only one choice. Panasonic offers the highest quality and most cost-effective solutions in HDTV production, on a transparent recording system that is available today!

Welcome to the next generation of High Definition Digital Video.

Bottom: AJ-D580 D5 1/2" Component Digital Studio VTR

Top: AJ-HDP500 Digital HD VTR Processor

D-5 HD

For more information call: **1-800-528-8601** (Upon request, enter product code 24)
Visit us on our website at www.panasonic.com/PBDS

Panasonic
Broadcast & Digital Systems Company

Defining the Future... Broadcasting & Cable Announces Digital Television

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FEBRUARY 1998

1998: DTV'S YEAR

After two decades and hundreds of millions in development, digital TV is finally a go

By the Editors of Digital Television

The television delivery systems of the 21st century has arrived. Two years early.

No one yet knows what shape digital televisions will ultimately take, but there's no longer doubt that it's here. The last piece of the puzzle was put in place at the Consumer Electronics Show in Las Vegas Jan. 8-12, when the leading edge of the consumer electronics industry—Sony, Zenith, Thomson, Panasonic and Philips—demonstrated prototype digital display devices. No matter that they were pricey: typically, $7,000 for a 30-inches-and-up projection model. More importantly, they represented the high-water mark in introducing the new TV fever; prices can only go down from there.

At the same time, the broadcasting industry is essentially on target in fielding its first 26 digital stations before Christmas 1998. Those advents are timed to the Christmas buying season, the consumer industry's largest. That will be the moment of truth in terms of the public's reaction to digital—and specifically to high-definition, the high end of the four to digital transmission.

A number of broadcasters are committed to high definition. Tom Rogers, president of NBC Cable and executive vice president of NBC, declared at the NATPE conference in New Orleans that HDTV will be the people's choice.

The cold-medium-out at the moment is cable, which has shown no enthusiasm for passing through broadcasters' HDTV transmissions. Indeed, the first digital boxes being deployed by that medium will accept no higher than 480P transmission, although the next-generation boxes will be able to pass through HDTV signals to digital televisions sets to decode and display. It's anticipated that the FCC will be asked to step in on this and other digital carriage problems.

HDTV swoops CES

That was the message at the Consumer Electronics Show as major manufacturers showed their prototype HDTV television sets. Most were huge rear-projection units measuring over 50", although some manufacturers also showed HDTV-capable 16:9 flat-panel displays and prototypes of smaller direct-view HDTV sets and DTV converter boxes for use with existing analog sets.

High-definition video was on display everywhere, including two live over-the-air broadcasts delivered by CBS station KLAS and PBS station KLVX. An in-house programming feed was also delivered over cable by HDTV production company REBO Group.

Broadcasters were very much in evi-

(continued on page 12)

Philips will introduce its 64-inch rear projection HDTV set at an entry-level price between $6,000 and $8000 in fourth quarter 1998.

WWL's Upgrade Focuses on Non-Linear Editing Equipment

By Rob Ettridge, Quantel

Being the best in your field is one thing, but staying competitive is what separates the best from the rest. A sound business plan, dedicated staff and the right technology are all important ingredients for success.

WWL, the CBS affiliate in New Orleans, Louisiana, seems to have the recipe just right.

For the past 20 years, Channel 4 has been considered one of the great broadcasting legacies in America. In the last ratings period ending in July 1997, it ranked as the number one CBS affiliate across all network affiliates nationwide in the 40 metered markets surveyed.

The station has always placed a high priority on station promotion. As a result, the promotion department has won more than a hundred awards throughout the years. Most recently it took home two coveted Promax International Gold Medallions for this past year's award-winning sports and community project promotional spots.

Executives at WWL praise their talented designers, directors, photographers and state-of-the-art editing system for keeping their station on top. As

(continued on page 26)

WWL's 60-second news image spot.

NEW TECHNOLOGY

Digital Video Recording, Networking

SPACE is a full-bandwidth, CCIR-601, eight or 10 bit digital video recorder that is designed for speed and reliability in storage, recording, and networking applications. The unit handles 525 and 625 formats, film rates and pull downs. It can be "strapped," allowing 4:4:4, 4:2:2:4, or up to 8:8:8:8 recording. SPACE also offers shock-mounted drives to optimize disk performance and improve MTBF. This feature also protects the internal connectors from vibration corrosion and provides sound dampening. **Pluto Technologies International, Inc.**, 2511 55th Street, Boulder, CO 80301.

More Information - Circle 101

Serial Video to Fiberoptic Links

The RF-3004 is a standard 19" sub-rack frame designed to complement the current Matthey 3000 series digital interconnect and distribution system from Matthey Electronics. Applications can be found in any broadcast, post-production or mobile environment where the transport of digital video is required over distances greater than that achieved with standard coax cable. **Television Equipment Associates, Inc.**, P.O. Box 499, South Salem, NY 10590-0499.

More Information - Circle 102

Transport Stream Generator

Digital Transport Systems' second generation Transport Stream Generator is designed to provide greater system flexibility. PCI bus-based architecture and WindowsNT® functionality. The Transport Stream Generator allows equipment designers and manufacturers to perform real-time capture and playback of MPEG-2/DVB Transport Streams for use as a test source. **Digital Transport Systems**, 11545 West Bernardo Court, Ste. 200, San Diego, CA 92127.

More Information - Circle 103

More Information Circle 107

DigitalTelevision is exclusively dedicated to reporting on the latest developments in digital technologies, strategies being employed by leading-edge companies and new product introductions.

The mission of DigitalTelevision is to keep you on the cutting edge of this rapidly changing environment in the broadcast, cable, and satellite industries... from acquisition through production to transmission.

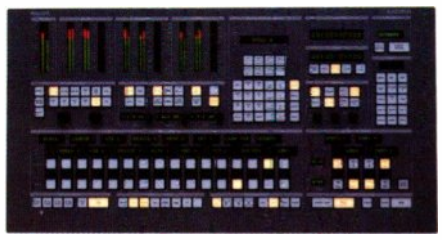
Broadcasting&Cable's
Digital Television™
Technology For The Digital Age

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,



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

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

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.

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.

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.

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

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

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

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.

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

Let's make things better.

More Information Circle 423

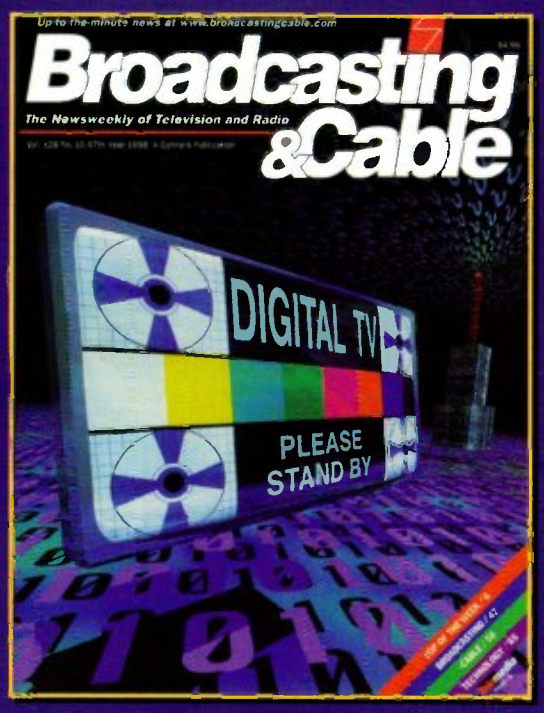
CLEAN UP YOUR IMAGE

SPECIAL REPORT:

DIGITAL TRANSMISSION

IN

Broadcasting &Cable



1,606 stations have been allocated DTV frequencies. Now, broadcasters are busy determining the best way to replace their old analog equipment with new digital technology. On July 20th, *Broadcasting & Cable* brings you a special report on digital transmission.

This in-depth report will focus on the latest digital transmission technology. Our circulation of 37,000 decision-makers means your message will reach a large audience interested in DTV transmission. So your message will come through loud and clear. Call your *Broadcasting & Cable* sales representative and reserve your space today.

ISSUE DATE: July 20

CLOSING DATE: July 10

ADVERTISING OFFICES:
EAST COAST: 212.337.7026
WEST COAST: 317.815.0882

QUANTEL LTD

No limits. No compromise.

Company profile

In 1973, the company now known as Quantel developed the first practical analog to digital converter for television applications. That innovation not only gave Quantel its name (QUANtized TELevision), it also started a process that has fundamentally changed both the look of television and the way it is produced.

Twenty-five years on, Quantel remains at the forefront of the digital television industry. Today the company designs and manufactures a range of innovative solutions that extends well beyond its traditional television markets into the high-end print and film domains. As a result, Quantel is the market leader in television graphics, effects and editing, as well as in creative imaging for print and high-end film effects compositing.

Developed and manufactured in the Newbury, UK headquarters at its extensive manufacturing plant and purpose-built Research and Development laboratories, Quantel products are marketed worldwide through 12 subsidiaries. The company is a member of Carlton Communications plc, one of the world's largest communications groups.

Company philosophy

Quantel helped pioneer the digital revolution in television. Our commitment is to continue to invest in the development of more effective and efficient ways of handling and manipulating images. Behind this commitment is the application of new thinking and new technologies but the aim is strictly practical; to help users achieve better results, faster and without constraints.

This solution-driven approach, while often challenging existing perceptions of standard operating procedure, will continue to result in highly effective, dedicated systems with intuitive user interfaces that set new benchmarks for productivity and creativity in the hands of their many talented users.

As the television industry moves into a new era, Quantel is introducing a number of key DTV-ready developments which balance real-world economics with the requirement to keep pace with HDTV needs as they unfold over the coming years.

Key personnel

Ken Ellis *Chief Executive Officer*
Quantel Inc, USA

Richard Taylor *Executive Chairman*
Quantel Ltd, UK

Jeff Meadows *Managing Director*
Quantel Ltd, UK

Product range

Television

Editbox Magnum
the ultimate on-line editor

Editbox Platinum
seriously affordable on-line

Henry
the world's leading effects editor

Hal
the video design suite

Paintbox F.A.T
the big, animating Paintbox

Paintbox Esprit
seriously affordable graphics

Pictureframe
the single user, multi-output graphics system

Picturebox 2
the multi-user, multi-output still store

Clipbox
the true random access video server

Cachebox
the new cost-effective distribution server

Film

Domino
the creative compositor for film

Print

Graphic Paintbox
the ultimate creative system for print design

USA Headquarters
Quantel Inc., 28 Thorndal Circle
Darien, CT 06820
T (203) 656-3100 **Toll free** 1-800-218-0051
F (203) 656-3459
E-mail quantel@quantel.com
www.quantel.com

Credits
With thanks to:

Lost in Space
Domino @ Men in White Coats,
The Film Factory @ VTR,
The Magic Camera Company,
Framestore, London UK:
Toybox, Canada
©MCMXCVIII NEW LINE PRODUCTIONS INC ALL RIGHTS RESERVED

BBC Ident
Hal @ BBC Scotland, Glasgow: UK

Calmeau 'Journey'
Henry @ the Mill, London, UK
Agency: BBH
Production company:
Rose Hackney Barber

QUANTEL
No limits. No compromise.

More Information Circle 426

Scientific-Atlanta, Inc.

Company Profile

Scientific-Atlanta is at the forefront of today's telecommunications revolution, helping people connect with entertainment, information, and each other. When broadcasters, programmers, and service providers in more than 170 countries around the world deliver the information and entertainment their customers want, they depend on Scientific-Atlanta satellite television transmission equipment. Headquartered in metropolitan Atlanta, Georgia for more than 40 years, Scientific-Atlanta is a billion dollar, global company that serves customers from its worldwide offices and representatives in more than 70 countries.

Digital Satellite Television

"Digital Television presents remarkable, high-resolution visual images and crystal clear, surround sound audio that draws viewers into a superior television experience," according to Tim Portland, vice-president, broadcaster business line at Scientific-Atlanta. "PowerVu digital video compression systems offer our customers the benefits and experiences learned from over 300 PowerVu system installations in over 170 countries. Now in its fourth generation, this Emmy Award winning, proven technology, combined with a focus on standards based, end-to-end system solutions is designed to enable future upgrades, expansions, and applications. The PowerVu system delivers the highest quality, complete digital solution for your high definition or standard definition digital television needs."

The PowerVu Digital Solution

PowerVu® enables you to encode your SD or HD video and audio programming, protect it with conditional access, and condition it as needed for terrestrial broadcast or satellite uplink delivery. PowerVu also provides a simple, yet powerful network management system and targeted decoders and receivers to provide secure program delivery to affiliate TV stations. The digital applications we can help you implement include:

SDTV - PowerVu enables you to deliver multiple digital channels immediately.

HDTV - New PowerVu *HD* products, available in 1998, empower you to begin offering the highest quality video available.

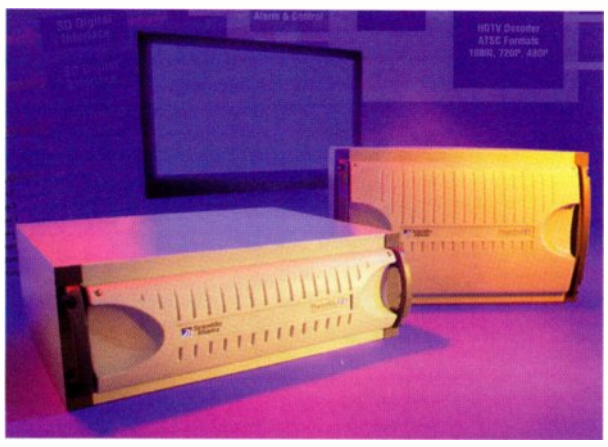
EPG - Our solution includes an electronic programming guide.

Data Broadcasting - Exciting new opportunities for customized data services over DTV.

Cable Interoperable - Ensures your programming reaches viewers with the quality levels you require.

Drop/Add - Customize your programming lineup to meet shifting viewer demographics or to enhance market penetration.

Future Proofing - We always have an eye on the future to keep you and the PowerVu system leading the way.



Service and Support

Scientific-Atlanta creates your custom-tailored system using our four-phase process to address your specific requirements.

System Engineering

Our system engineers create a system to help you meet your goals.

Program Management

We ensure that your system is ready on time and that it meets your, and our, criteria for performance, durability, and flexibility.

System Integration

We maximize your potential for success by assembling, testing, and taking your system through its paces before it leaves Scientific-Atlanta.

Customer Service

Our world-class customer service team gives you special attention and multiple support options.

Digital Delivery By PowerVu®

Scientific Atlanta®

4356 Communications Drive
Norcross, GA 30093
Tel: 770-903-6057
Fax: 770-903-6464
www.sciatl.com

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This is where you are with DTV now

This is where you can be with PowerVu®

Thirty Years Of Video Experience Counts.
Scientific-Atlanta Has It.
PowerVu Digital Broadcast Systems.
Any Questions?

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HD, SD, Terrestrial, Satellite

Digital Delivery By PowerVu®

Scientific Atlanta

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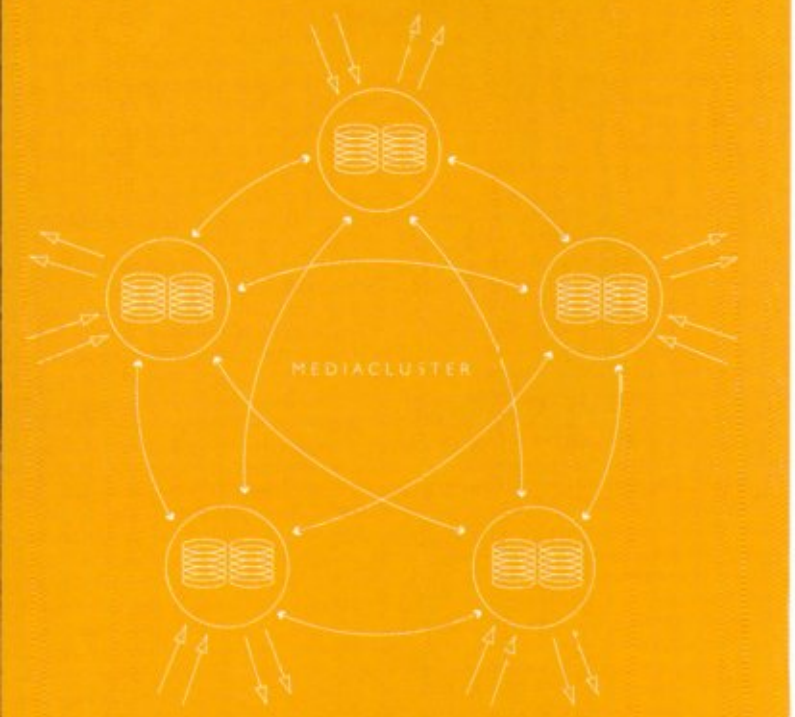
SEACHANGE IS THE WORLD'S LEADER IN MPEG-2 DIGITAL VIDEO SYSTEMS

with more systems serving more television operators than any company.

SeaChange International develops video server systems that help television operators use MPEG-2 digital video in new and efficient applications. Its turnkey systems automate the storage, management and distribution of video streams including ads, programs, promos, movies and other video.

Headquartered in Maynard, Mass., SeaChange (NASDAQ: SEAC) provides its digital video systems to the top television operators around the world. Its systems are serving more than 15,000 television channels, backed by a worldwide service and support organization.



SEACHANGE'S MEDIACLUSTER™ IS A BREAKTHROUGH TECHNOLOGY THAT PROVIDES A NEW PARADIGM FOR FAULT-TOLERANT, COST-EFFECTIVE STORAGE OF VIDEO. A KEY COMPONENT IN SEACHANGE'S SYSTEMS, MEDIACLUSTER IS A NETWORK OF DIRECTLY CONNECTED COMPUTERS THAT OPERATE AS A SINGLE SERVER.

FEATURED PRODUCTS:

BROADCAST MEDIACLUSTER: Designed for broadcasters and networks, it is a fault-resilient video server system combining SeaChange's patent-pending MediaCluster computer architecture with MPEG-2 4:2:2 video technology and interfaces with Louth Automation, OmniBus Systems, Odetics Broadcast, Storagetek and Sundance Digital for a complete "on-air" solution.

SEACHANGE SPOT SYSTEM: The world's most popular digital ad insertion system allows television operators to manage complex advertising schedules based on multiple channels and zones. The system uses advanced computer storage, software and networking techniques for digital management of the entire advertising process. It leverages SeaChange's Traffic & Billing application as well as others in use today.

SEACHANGE MOVIE SYSTEM: A turnkey platform for delivering multiple feature-length films, infomercials and other long-form programming, and is easily configured for pay-per-view and near video-on-demand.

VIDEO-ON-DEMAND: SeaChange's end-to-end system is built to make VOD a widespread reality. Compliance with OpenCable standards ensure interoperability, low costs and smooth integration. The system fully integrates with real-time two-way networks and set-top boxes.

GUESTSERVE NETWORK SYSTEM: This video server system allows cable operators to provide hotels with VOD and other interactive in-room television services. SeaChange develops interactive menus, and provides PC games, Internet access and video content through its relationships with top film studios.

SEACHANGE INTERNATIONAL

SeaChange International, Inc. **www.schange.com** 124 Acton Street, Maynard, MA 01754
phone: 1-978-897-0100 fax: 1-978-897-0132

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By the year 2004, there may be several intelligent choices for digital video servers.

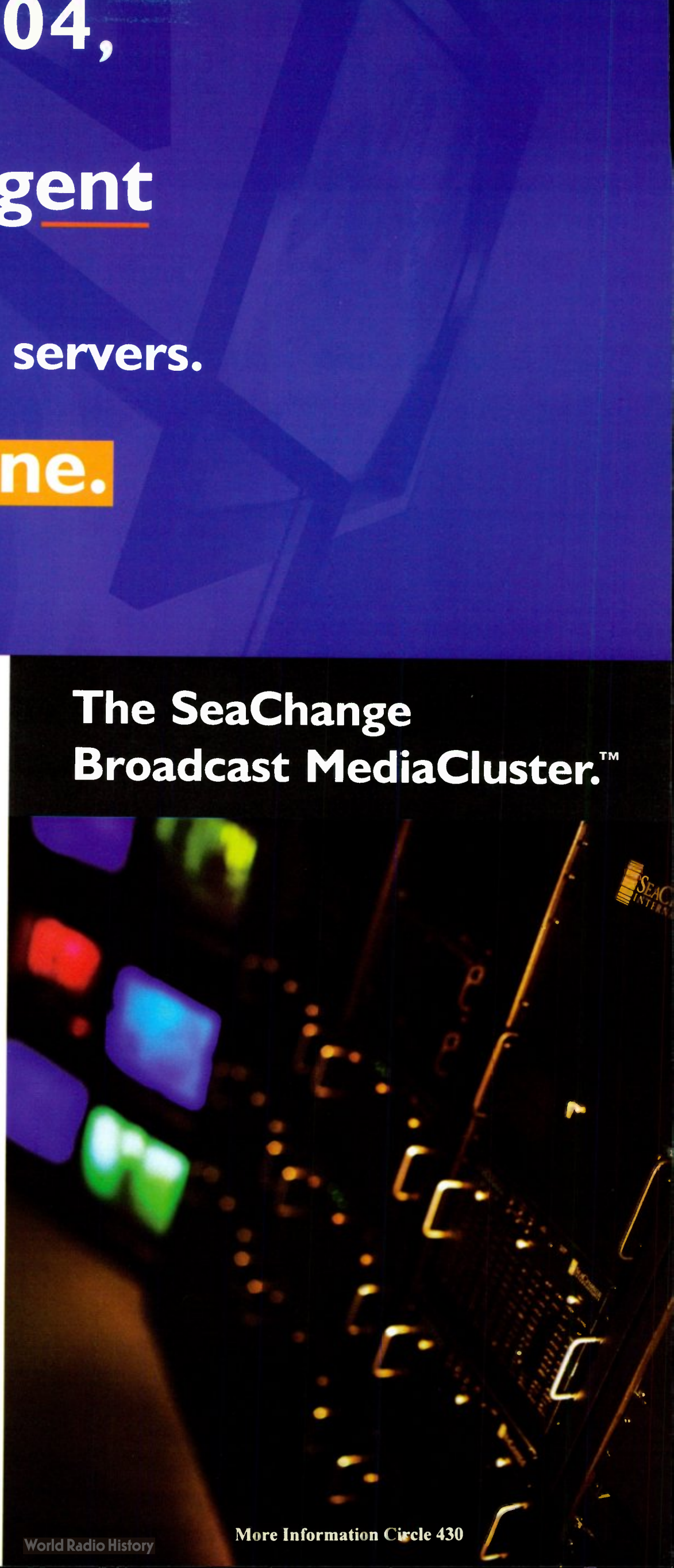
Today there's one.

We have more MPEG-2 video server systems installed than anyone else in the world. Find out more about this dramatic transformation—this SeaChange.

SEACHANGE INTERNATIONAL

SeaChange International, Inc. **www.schange.com**
124 Acton Street, Maynard, MA 01754
phone: 1-978-897-0100 fax: 1-978-897-0132

The SeaChange Broadcast MediaCluster.™



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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

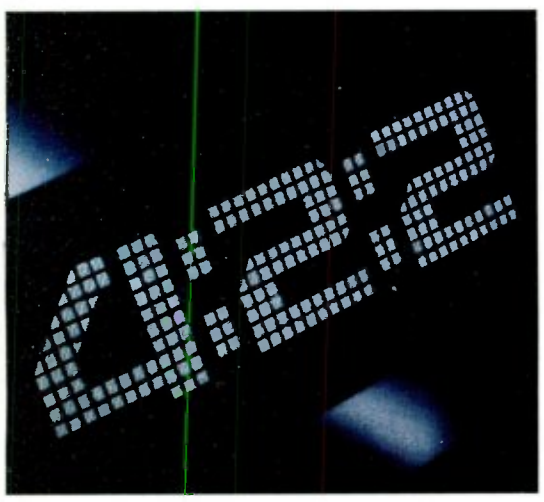
"Everywhere I looked, I saw television crews from all over the world unpacking their large crates containing editing machines. All I had was Sony's DNW-9WS camcorder in one hand, and, over my shoulder in a black canvas bag, Sony's DNW-A220 Portable Field Editor," said Asmus. "However, while everyone 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:

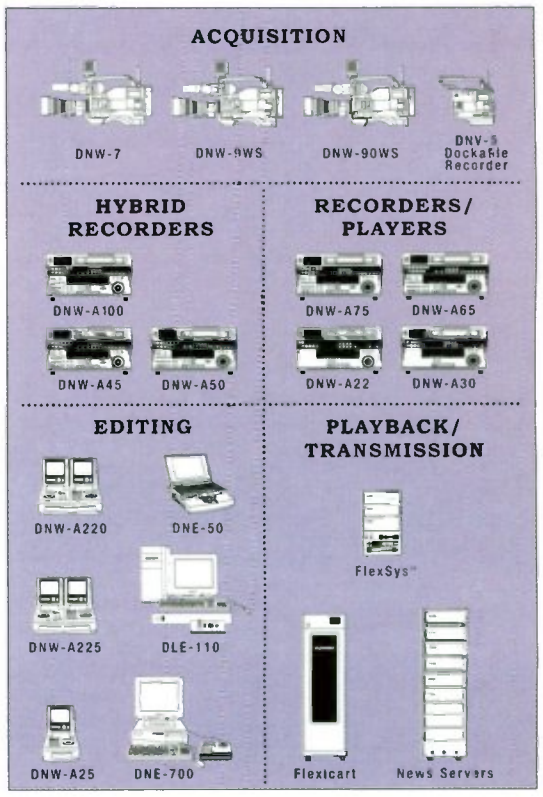
ALL DIGITAL

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.



Sony Electronics Inc.
3300 Zanker Road, San Jose, California 95134
For more information please call **1(800)686-SONY**
or visit our website at **www.sony.com/professional**

SONY

Tiernan Communications Inc.

5751 Copley Drive, San Diego, CA 92111 USA TEL: 619 587-0252 • FAX: 619 587-0257 • EMAIL: info@tiernan.com • http://www.tiernan.com

Catch the wave with the leader in digital television

Dr. James C. Tiernan
President and Chairman of the Board

Dr, Christopher Bennett
Vice President Systems Engineering

Robin Savage
Vice President Operations

Keith Dunford
Vice President Sales and Marketing

Recognized worldwide for excellence in technology, product innovation, overall value and extraordinary customer support.

Visit Tiernan Communications on the web at http://www.tiernan.com

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COMPANY PROFILE

Tiernan Communications, Inc. designs and manufactures digital video compression and transmission products used by Television Broadcasters, Common Carriers and Cable Television Operators worldwide. The Company's products are central to digital television satellite newsgathering, and in digital television program distribution over satellite and terrestrial microwave and fiber networks.

Tiernan has to date supplied over 500 digital television systems to some 150 customers in 25 countries around the globe. Building on this substantial base, the company has positioned itself to provide new and innovative product solutions in the global development of digital infrastructure in television, data and multimedia. The company is an acknowledged leader in high performance MPEG-2 4:2:2 Studio profile technology and in the new High Definition (HDTV) encoding and decoding products that will be needed by US television networks for the introduction of HDTV services in late 1998.

Tiernan Communications was recently awarded a major contract from Teleglobe International for the ***world's first*** MPEG-2 (4:2:2) Studio Profile @Main Level service using Asynchronous Transfer Mode (ATM) on terrestrial fiber networks.

COMPANY PHILOSOPHY

Tiernan Communications designs and manufactures technologically advanced products that meet or exceed the most exacting needs of their customers in every category. The Company is committed to staying on the leading edge of technological development. Evidence of this is readily seen in the high proportion of their over 100 employees who have Masters or Doctorate Degrees in Electrical Engineering and allied technologies. This commitment is also evident in the many industry firsts they have accomplished, which later became industry standards.

The Company is known for prompt response to customer concerns, before and after delivery of its equipment. As a result, Tiernan's customers know they can count on the company to ensure the highest possible level of uninterrupted performance of their systems.

TIERNAN PRODUCTS

Interoperability and reliability are key features of Tiernan's MPEG-2 / DVB compliant products.

Tiernan Communications, Inc. has recently introduced sixteen new products in twelve months. That's a remarkable new leading-edge product every 3.2 weeks. The newest products for HDTV include:

THE-1 DTV Encoder for HDTV and SDTV is full-featured. It supports both HDTV and SDTV services. The "plug and play" multi-slot architecture supports up to ten modules including main video and audio compression processors. It supports both digital and analog video and audio inputs, in both HDTV and SDTV formats. THE-1 provides a choice of DTV 1080I, 720P, and 480P. HDTV processing supports the ATSC-standard or the MPEG-2 Main Profile @ High Level with video rates from 10 to 160 Mbps. It provides for up to eight SDTV channels in MPEG-2 4:2:0 Main Profile @ Main Level or MPEG-2 4:2:2 Studio Profile @ Main Level. In either mode, adaptive field/frame (AFF) compression and automatic selection of horizontal and vertical resolutions provide enhanced performance of video compression for any required video bandwidth.

THE-10 HDTV-ATSC Broadcast Encoder is an economical HDTV real-time encoder meeting ATSC standards for HDTV broadcasting in either 720P or 1080I. It is a fully integrated encoder that captures uncompressed HDTV video and multi-channel audio, including ATSC compliant 5.1 channel and auxiliary data. It compresses and multiplexes the services according to the ATSC standard for delivery to terrestrial HDTV transmitters

TDR6 Modular Integrated Receiver Decoder (IRD) is the latest in modular IRD design configured to support HDTV network applications. The modular design allows it to be configured for HDTV and digital SDTV services. A basic TDR6H consists of a modular chassis supporting up to six option modules that configure the IRD for various HDTV applications. It supports up to eight audio channels, including ATSC compliant 5.1 channels and up to eight auxiliary data channels. It is ideally suited for HDTV networks where common equipment types can provide both technical and commercial advantages.

These and many other Tiernan products are ready for delivery.

In February 1998 Tiernan Communications moved its world headquarters to this 25,000 square foot facility in the heart of San Diego's telecommunications district.

Thomas Fabian
Director of Global Broadcast Marketing & Product Development, Teleglobe International Corporation

When Teleglobe's Millennium℠ service moved a virtual mountain by being the first to deliver MPEG-2 4:2:2 over ATM networking, Tiernan's high-performance compression equipment provided the necessary digital muscle.

Teleglobe's Thomas Fabian says it all: *"Enabling our client in Japan to transmit a digital television signal to Montreal and New York via British Columbia was a huge challenge. Selecting Tiernan's MPEG-2 4:2:2 video codecs proved to be an excellent choice. Tiernan met an incredibly tight deadline, the equipment's performance is true to their word, and Tiernan's amazing service continues to exceed our expectations."*

To see how the industry's most comprehensive range of MPEG-2 equipment can help you get a competitive hold in your marketplace, contact Tiernan today.

TE6 4:2:2 Studio Profile Encoder and TDR600 Integrated Receiver Decoder

CATCH THE WAVE WITH THE LEADER IN DIGITAL TELEVISION

WHEN TELEGLOBE WAS WRESTLING WITH AN EXCITING JAPANESE CONNECTION TIERNAN WENT TO THE MAT AND MADE IT POSSIBLE.

TIERNAN Communications

5751 Copley Drive, San Diego, CA 92111 USA
TEL: +1 619 587-0252 • FAX: +1 619 587-0257
EMAIL: info@tiernan.com • WEB: http://www.tiernan.com

Leaders in Digital Television

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Your Choice TV, LLC.

6400 South Fiddler's Green Circle, Suite 650, Englewood, CO 80111 • Tel. 303.566.5700 • Fax 303.566.5701 • www.yctv.com

CLOCKWISE FROM CENTER LOWER LEFT

Nancy G. Stover
President & C.E.O.

James F. Lightstone
Senior Vice President, Business Affairs & General Counsel

John McCoskey
Senior Vice President, Operations

Thomas F. Tepper
Vice President, Finance

Robert B. Campbell
Vice President, Marketing & Brand Integration

Julie Lucas
Vice President, Press & Communications

"Pay-per-view with a twist; the selection is far beyond movies and it costs less."

–Stephen Keating,
Denver Post Technology Reporter

"When you sift through the hype, it becomes clear that Your Choice TV is the only television application capable of delivering loyal involved viewers. And that is exactly the environment where we want our clients' ads."

–Cheryl Idell, Western International Media.

"Your Choice TV is actively involved with the key partner groups–the distributors, the program suppliers and the advertising community. Together, our primary focus is and has always been our television viewers."

–Nancy Stover,
President and CEO, Your Choice TV

Your Choice TV™

Same TV. Different Idea.

A precedent-setting new television service that combines digital technology and consumer demand, Your Choice TV recognizes the needs of today's viewers. Sometimes our lives just get too busy to watch the shows we like. Your Choice TV has the answer: for a suggested retail price of 99 cents, viewers can watch some of their favorite programs at times more convenient for them.

Viewers who missed ABC's "20/20," for example, could watch the popular news program shortly after its original broadcast. With the press of a button on the new digital navigator, viewers can surf the Your Choice TV schedule, or tune into the Your Choice TV Channel–a 24-hour channel featuring free samples of what's on Your Choice TV right now. When ready to order, viewers select shows and start times convenient to their schedule. Denver Post Technology Reporter Stephen Keating calls it "Pay-per-view with a twist; the selection is far beyond movies and it costs less."

A Powerful Strategy

Your Choice TV also provides exceptional opportunities for networks and programmers. Audience erosion is a reality in today's competitive marketplace. Your Choice TV is the best way to repurpose programming without eroding core audience. Your Choice TV helps programmers regain lost viewers who missed the original airing, promoting viewing loyalty to networks and their affiliates. "We're giving loyal fans more options to watch their favorite sports," said John Wildhack, Senior Vice President, Programming, ESPN. "Your Choice TV is working to build our brand."

For advertisers, Your Choice TV promises the most efficient ad venue ever: addressable advertising. Your Choice TV will be able to insert advertising targeted to specific households. That means two different households watching the same program, at the time, can be sent different ads based on unique demographic profiles. "When you sift through the hype, it becomes clear that Your Choice TV is the only television application capable of delivering loyal involved viewers," said Cheryl Idell, Executive Vice President and Managing Director of Research and Strategic Planning for Western International Media. "And that is exactly the environment where we want our clients' ads."

Cable and satellite operators understand the strategic importance of Your Choice TV. An independent research study confirms that the addition of Your Choice TV increases overall consumer demand for digital cable television by up to 67%. Better yet, Your Choice TV provides distributors a dual revenue stream from both transactional revenues and addressable advertising. Steven Brookstein, Senior Vice President, East/West Region of Comcast, believes "Your Choice TV is part of our strategy to give customers the best television service possible."

A High Technology Leader

Your Choice TV is commercially launched in the major markets of Chicago, Los Angeles, San Francisco, New Orleans, Detroit, Hartford, and Nashville, among others. A pioneer of digital television, Your Choice TV has extensive experience in technology development, integration, deployment and operation. A recognized technical leader in the television industry, its technology assets are protected by patents throughout the world.

Your Choice TV leads the way in forging ground-breaking alliances with major broadcast and cable programmers, cable operators and advertising entities. According to Your Choice TV President and CEO Nancy Stover, "Your Choice TV is actively involved with the key partner groups–the distributors, the program suppliers and the advertising community. Together, our primary focus is and has always been our television viewers."

With all due respect to messrs Jagger and Richards, time is not on your side.

Time *(or more accurately the lack of it)*, is putting a bit of a crimp into the lifestyles of a lot of people.

Correction. Make that a rather large wrench into the lifestyle of virtually every man, woman and child in America.

It's a reality that has given rise to one of the more prevalent sentiments of the day – that free time is now the most coveted possession of the American family.

Not money.

Not houses.

Not Beanie Babies.

Time.

And the reason is obvious. There simply isn't enough of it to go around.

Grim as this may seem, in our wildest dreams we couldn't have imagined a more perfect time to introduce you to Your Choice TV.™ Not to sound the least bit giddy, at all presumptuous or overly opportunistic in any way, but PEOPLE ARE GOING TO LOVE THIS!

(momentary pause to compose and refocus ourselves)

In short, we help busy people buy time.

Your Choice TV is a unique digital television service that gives people the ability to watch all the best programs available – when they choose to watch them. All for a hair under a buck, delivered oven-fresh just hours after their original airing.

And unlike the demon machine (also known as a VCR in some households), Your Choice TV doesn't require an advanced degree from M.I.T. to access. In fact, beyond locating the perpetually missing remote control, accessing us requires no mental gyrations whatsoever. All it takes is someone who can point a remote in the general direction of the TV and depress a thumb *(provided, of course, this takes place in a household where the cable provider has made the phenominally enlightened decision to make Your Choice TV available)*.

There you have it. Your Choice TV. Because regardless of what you've heard about time being on your side, there's one thing to remember.

It's not.

Your Choice™ TV

It's about time.

For more information contact Michael Feinner, VP Distribution • Your Choice TV • 6300 S. Fiddlers Green Circle • Englewood CO 80111 • 303.566.5647

Post Production

QuickTime 3 Could Help Create A True Global Village

Manufacturers already see benefits and potential in latest Apple offering

By Bob Paulson

DVD, DV, digital cameras, CD-ROMs, the Internet, videoconferencing, video editing, image editing, MIDI, audio CDs.

When Apple's Steve Jobs spoke at NAB in April he described the current incompatibilities among the above digital technologies as part of a "Tower of Babel" communications problem. And then he took the opportunity to show off what he believes is the answer to clearing up the lines of communication—QuickTime 3.

QuickTime 3 (QT3) has been adopted by the ISO as "the basis" for specifications to be included in the MPEG-4 document. This prompted Jobs to declare that QT3 is going to be "the digital standard for everything. You can now create and play QuickTime files on computers running Mac OS, Windows 95, or Windows NT."

He closed his comments with a very firm and bold statement: "QT3 is to digital media what Adobe PostScript was to printers."

If Jobs is right the introduction of QT3 could be a major watershed for the industry. And it could very well be a major force at NAB99.

Dimitri Chernyshov, marketing manager of Mercury Computer Systems Inc's (Chelmsford Mass.) Digital Video Products Group, points out the potential power of QT3.

"In my opinion, the built-in translation/conversion capability of QT3 alone could quickly establish it as a premiere video file format architecture, and eliminate the 'Tower of Babel' problem in today's NLE systems.

"From a manufacturer's point of view, I think the goal for any video equipment design team is to implement the features/capabilities required to be competitive, and then get them to the customer quickly. With the broad built-in media handling features/capabilities of QT3, and its ready availability on both Mac and NT platforms, I can't imagine any new video product design team not seriously considering using it as the basis of their media handling architecture. I think new product design teams that don't use QT3 from now on will be left behind."

Chernyshov points to how QT3 could improve one of his own company's products—SuiteFusionPro. SuiteFusionPro is the high-end member of its SuiteFusion shared storage area network (S-SAN) family. It provides heterogeneous volume sharing, allowing users of applications on Windows NT, Macintosh and Silicon Graphics platforms to simultaneously access the same files on disk storage across the S-SAN.

Chernyshov explains that SuiteFusion Pro takes care of the sharing of identical file formats between heterogeneous file systems. But the use of QT3 could greatly improve the system's capabilities.

"If all the workstations in a SuiteFusion Pro S-SAN were using QT3 as their file format architecture, those workstations could easily share dissimilar files such as OMF, DV, TGA, M-JPEG, or any of the other video file formats supported by QT3."

The problems that QT3 could potentially solve are so dramatic that supporters and detractors of QT3 should undertake serious and constant meeting since many of the standards, protocols, and practices which QT3 could become a part of are moving platforms.

One example of a moving platform is the Advanced Authoring Format (AAF) , an evolving specification set responsive to SMPTE's Metadata Task Force focus on post production. It's designed to replace Avid's Open Media Framework Interchange (OMFI) which was based on Bento, an earlier Apple technical foundation. OMFI is a file format for interchange of compositional metadata, such as Edit Decision Lists, special effects, transitions, text, and compositional layers with alpha-channel video, traveling mattes, moving still images, and 2D and 3D animations. It's supported by Adobe, Avid, Digidesign, Matrox, Microsoft, Pinnacle Systems, SoftImage, Sonic Foundry and Truevision.

How It Happened

So how did QT3 come about? QuickTime Product Manager Mitchell Weinstock says that QuickTime is an "inclusive technology.

"Our development team has held Open Forums for several years for third party developers three or four times a year. At first, these groups of 50 to 100 didn't provide much of an answer to our question, 'What do you want in QuickTime?'" But when we changed the question to, 'What do you hate about QuickTime?' we were deluged with negatives that we could turn into positives. And QT3 is the exciting result."

Weinstock points out just one example of the potential that QuickTime holds. "A QuickTime-based network camera input forwarded to air can be D-1 or Beta SP, or any of the compressed video formats now being standardized. It can even be native M-JPEG or an analog file. Saved in the QuickTime format, the originals can be repurposed at any time in output streams compatible with CD-ROM, DVD or whatever."

Think Global

QT3 could be the "open sesame" for creating one unified "Digital Aural/Visual Communications" market before New Year's Eve 2000. It could become the industry's standard "electronic mailer" (QTEM?) in both industry segments, as the wrapper for all digital video and audio and ancillary data. By NAB99, the slogan "QT3 at work" could become as noticeable as "Intel Inside."

But will it?

A global group of several dozen digital domain pioneers is plotting the Industry's course into the 21st century's All-Digital operating environment as the "EBU/SMPTE Task Force on the Harmonization of Standards for the Exchange of Program Material as Bit Streams." Apple has responded with a description of how QuickTime meets some of the specific requirements of an RFT (Request for Technology) by the "Subgroup on Wrappers and Metadata" chaired by Avid's Oliver Morgan.

This Subgroup of NLE experts is now evaluating many RFT responses from Apple, Avid, Microsoft and others, including the consortium developing the AAF proposal. Its mission is to produce pathways (Digital Interface standards, protocols, recommended practices) leading to DTV post-production facilities' open architectures, which are also upgradable without onerous cost and time penalties. And QuickTime could very well be part of that future open architecture.

One is forced to agree with Apple that their $29.99 download pricing strategy is on the money: It ensures that there will be no cost barrier to the potential adoption of QT3 as a global transmission standard in DTV Era facilities.

Marshall McLuhan first articulated the concept of the global village in the early 1960s. It may have taken a little longer than he would have thought, and you can be pretty sure that QT3 wasn't part of his original vision, but it looks like QT3 could very well make the world a smaller (and more compatible) place. □

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More Information Circle 434

Station Operations

HDTV Places New Demands On Routing Infrastructure

Defining a facility's needs the first step in finding the right solution

By Ken Kerschbaumer

The routing switcher.

It is the forgotten hero of the broadcast plant. Behind all the flashy graphics devices, pretty monitors, and fancy cameras, lies the routing switcher, faithfully fulfilling its duty to move signals around the facility easily. Engineers wouldn't even begin to think of the horrors of trying to get signals from point A to point B, C, and beyond without it.

For many stations, the routing switcher is still an analog device. The coming age of digital, however, will change that, as broadcasters and facilities will need to invest in a new routing infrastructure in order to handle the demands of HDTV.

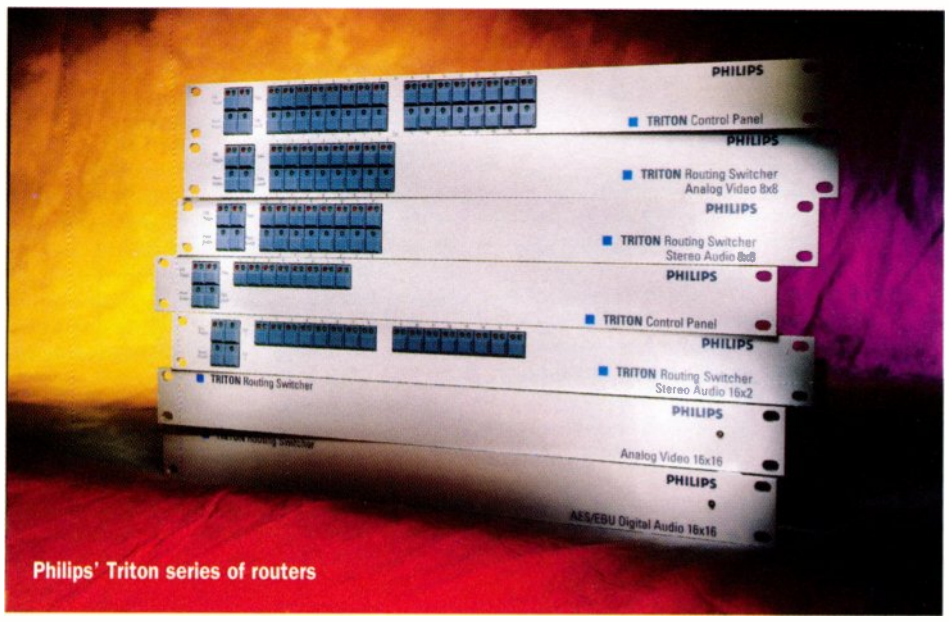
There will be one basic question to be answered by a facility putting in a new router for handling HDTV signals—will it be a serial digital router that will use mezzanine level compression to handle the signals or should a full-bandwidth HDTV routing system (most likely creating an HDTV island) be installed?

"If you're in a facility where you absolutely know you're going to go high definition, you know high definition is going to be your format forever, and you're absolutely sure that consumers are going to buy into HDTV then there are reasons to go into 1.5 Gigabit routing," explains Bruce Penney, head of Tektronix strategic planning, advanced television. "But for a local broadcaster, particularly in a mid or smaller market, if there's some uncertainty as to how much of a success the high definition part of DTV is going to be then a broadcaster who invests in a whole lot of 1.5 Gigabit equipment may find themselves spending a lot of money for little viewership. And that's where mezzanine compression comes in."

The key to mezzanine routing is the Serial Digital Transport Interface, or SDTI. Also known as SMPTE standard 305M, the Serial Digital Transport Interface (or SDTI) uses SMPTE-259M serial interface as a carrier or transport for other data. For HDTV, this means taking the 19.39 Mb/s signal and mapping it to 270 Mb/s so that it can be transported along an SDI link.

The benefit of the SDTI is that it allows the re-use of SDI equipment and wiring. It could also be used for any compressed video format, including 19.39 Mb/s in the studio or mezzanine level, lightly compressed in the studio.

Explains S. Merrill Weiss, SMPTE engineering director, television, "With mezzanine compression you can use existing systems and take advantage of what's already going to be in the tape machines. You can shuttle the signals back and forth at the reduced bandwidth without having to convert it back to full bandwidth and then back down again to go into another tape machine. The downside is that when you go through a compression system you pick up latency, and when you're trying to pass live programming through a system that runs at 270 or 360 Mb/s there will be some amount of latency. And when you bring in things from the field that run at a much narrower bandwidth you'll introduce even more latency. And that's a problem even when running at full bandwidth."



Philips' Triton series of routers

Scott Bosom, routing product manager at Philips, says that it would make more sense to build a 270 Mb/s facility today and then put in 360 Mb/s equipment as it becomes available.

"No one is asking or doing work in 360, so it makes more sense to build a system that is at 270 today," he says. "The choice of mezzanine level is almost academic."

Penney adds that a facility shouldn't get hung up on a particular choice of data rate because both the 270 and 360 rates are capable of handling a reasonable number of generations, adequately meeting the needs of local stations.

"I wouldn't be a bit surprised if those stations that have 360 Mbps capability decide to operate at 270 Mbps so they can operate with consistency with standard definition 601," he offers.

Different Needs

For local stations the mezzanine approach has practical advantages. But for a network level operation the needs and demands placed on a mezzanine system may not be good enough.

Paul Berger of CBS undertook a study of the cost of a compressed distribution system versus an uncompressed HDTV distribution system, and he concluded that a network facility using an uncompressed HDTV router is actually less expensive than a facility using a compressed router.

According to Berger's report, the uncompressed system is more attractive because it avoids the latency, signal impairment and codec cost issues.

"Systems that employ compression processing introduce signal delays that are directly dependent upon the GOP structure of the compressed signal," he says. "Use of long GOP structures creates a dependency of some frames on other frames which results in encoding/decoding delays that translate into signal latency."

The codec, Berger reports, is the most significant cost element of the compressed system. "Consequently, even if an existing digital router or any portion of it is used for compressed signal distribution, system costs will still be driven by the codec cost," he explains. "However, with improving technology and mass production of codecs, system costs are likely to decline over time."

Berger adds that when compressed DTV recorders are used with a compressed distribution system that differs from the machine's native compression, a separate codec is needed to handle its I/O requirements.

There was a mezzanine task force set up to address some of the interoperability problems but Weiss explains that realistic solutions didn't make themselves apparent.

"We tried to get some sort of better interoperability for HDTV than we currently have for standard definition products, and that has essentially fallen apart," he says. "At the last meeting manufacturers came to a conclusion that product development was already too far downstream for them to be able to come together. And that just shows that we'll have to lead the curve even more if we want to make those things happen."

The Island Approach

If you decided running the HDTV signal through your facility with mezzanine compression is not what you're interested in doing, then the HDTV island approach is your easiest option. Similar to the creation of digital islands a few years back as digital technology found its way into facilities, the island approach allows for the HDTV material to be handled and manipulated easily within its own little corner of the facility. The signal that is moved around the island is baseband, and odds are that the routing needs can be handled by a 16x16 or 32x32 1.5 Gb/s router because of the limited number of devices found in the island.

Rick Cannon, Leitch routing switcher product manager, says routing baseband HD is the most appealing migration scenario. "It makes sense because there won't be a whole lot of HDTV sources in the first year or two. Stations will basically only have to handle a compressed bitstream coming over the satellite link or public network."

According to Weiss, the island approach is really best suited if a facility plans on doing production or post-production work.

Berger says the advantage of the baseband approach is that problems with equipment interfacing are minimized because the signal interface is standardized, and other vertical interval data services such as captioning, rating codes, or proprietary data can be easily inserted and removed from the bit stream.

An uncompressed routing system also simplifies problems relating to the use of compressed video recorders. "Signal impairment due to concatenation of compression schemes is limited to concatenation of the decoder and encoder at the input and output of the plant with the codec employed in the recorder," explains Berger.

But even if an island approach is selected Bosom says that a good 270 Mb/s plant is needed to meet the needs of the rest of the plant. "The smart thing to do is to put out a digital channel and then incorporating HD becomes a side issue. We believe 270 is almost a no brainer at this point—it doesn't make any sense to feed a digitized version of an analog channel."

Need For Change

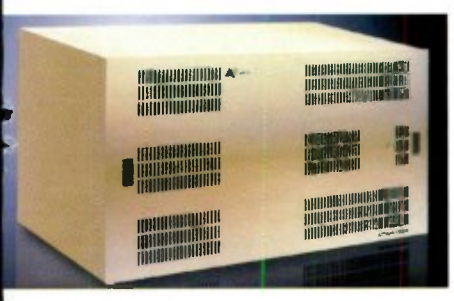
Penney laughs as he considers what may very well be the real driving force when it comes to making stations change out their NTSC infrastructure because it has nothing to do with the increased resolution of HDTV.

"The NTSC part doesn't readily accommodate 16:9," he explains. "We engineers can get very excited about that last pixel of resolution, but for the average viewer at home 16:9 aspect ratio is the thing we have to get right. And that isn't going to work very cleanly in an analog plant. Stations are going to find it a whole lot easier to go digital, and it won't matter whether it's 601, mezzanine, or HDTV. And that, to my mind, is the biggest issue in dealing with the analog part of the plant." □

ROUTING SWITCHER ROUNDUP

Artel Video Systems

The **UTAH 1500** is a full-bandwidth HDTV router that conforms to the SMPTE 292M standard. It's a compact, modular system that occupies 6RUs and can be easily expanded in increments of four coaxial inputs/outputs to a maximum size of 32x32. Key features



include internal reclocking, redundant power, input cable equalization to 100 meters, and increased flexibility with optional fiber input/output modules.

For more information contact Artel Video Systems at (508) 303-8197 or visit www.artel.com

■ For more information circle Reader Service #341

Leitch

The **Integrator** routing series can integrate all digital and analog signal formats, including HDTV at 1.5 Gb/s with advanced control software. The control system allows for flexible soft-matrix partitioning of hardware matrices to meet a facility's current needs, and can be easily re-configured for future needs.

The router is expandable from 32x32 to 128x64, and frames are available in 4, 6, and 8RU. As for signal formats, serial digital video with automatic equalization and re-clocking can be coaxial or fiber (SDI or DVB-ASI), HD 1.5 Gb/s (16x16 matrix only) or analog video and analog audio mono or stereo in all configurations.

For more information contact Leitch at (800) 231-9673 or visit www.leitch.com

■ For more information circle Reader Service #342

Miranda

The **SEL-1604** standalone router is a

16x4 serial digital video matrix designed to handle 525 or 625-line formats or standard 4:2:2 video in either 4:3 or 16:9 formats. It can accommodate various combinations of single-bus and multi-bus control panels on an RS-4:2:2 daisy chain. It also offers multiple remote control panel operation and can accommodate 360 Mb/s signals over its 10-bit signal path.

For more information contact Miranda at (514) 333-1772 or visit www.miranda.com

■ For more information circle Reader Service #343

NVision

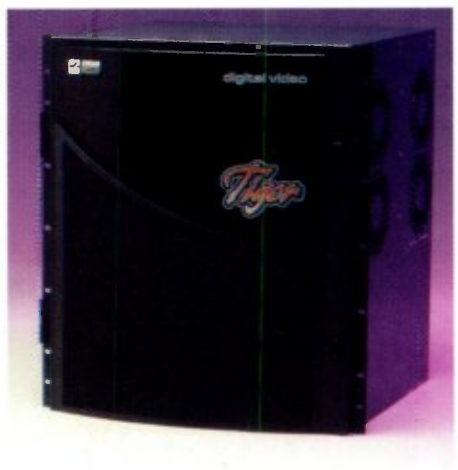
NVision, which has been known in the market for its digital audio, timecode, and data routers, has now introduced a digital video router series—**enVoy.** The enVoy series of routers can handle data rates in excess of 1.5 Gb/s, and this structure is combined with various I/O modules to accommodate several data rates. enVoy users will also be able to route any standard rate SDI signals and HD at 1/5 Gb/s within the same switch and at the same time. There are three models available—the EN6064 (11RU, up to 64x64), the EN6128 (16RU, up to 128x128), and the EN6256 (23RU, up to 256x128)—and all feature dual outputs.

For more information contact NVision at (530) 265-1030 or visit www.NVISION1.com

■ For more information circle Reader Service #344

Pesa Switching Systems

Pesa Switching System's **Tiger** audio/video router has a 144x144 matrix that fits in only 12 RUs of space. Scaleable from 8x16 to 144x144, it is designed to control audio/video signals and data in hybrid digital/analog television facilities. It conforms to 259M stan-



dards for component and composite signals to 360 Mbit/s and all AES/EBU specifications for digital audio. The video chassis can be equipped with both 60MHz analog and SMPTE 259M digital cards in the same frame. The 12RU frame also includes redundant power supplies, and the 8RU audio chassis provides two analog, or two AES/EBU digital levels.

For more information contact Pesa Switching Systems at (516) 845-5020 or visit www.pesa.com

■ For more information circle Reader Service #345

Philips Digital Video Systems

The **GS-400 Venus** Gigabit router is a 16x16 digital video router that handles bit rates up to 1.5 Gb/s. The 2RU chassis and an advanced input equalization circuit allows the switcher to be fed by cable lengths of more than 100 meters.

Philips' **Triton Series** of routers can be configured as 8x8, 16x16, and 16x2 matrices handling all signal types. The Triton Series has a unique package design that keeps the overall depth to less than 1.5 inches in the 8x8 and 16x2 switchers, allowing the unit to be used in a variety of potential applications in mobile systems and self-contained edit bays.

For more information contact Philips at (801) 972-8000 or visit www.philips.com

■ For more information circle Reader Service #346

Pro-Bel

Pro-Bel's **HDTV 16x16 serial digital router** is capable of operation at 1.485 Gbps. Housed in a 3RU frame, the router is available with dual power supplies and integral control system. Input cable equalization and optional output clock regeneration ensures compatibility with SMPTE 292M for uncompressed HDTV signals.

A 32x32 variant is planned for introduction this summer.

For more information contact Pro-Bel at (314) 980-1917 or visit www.pro-bel.com

■ For more information circle Reader Service #347

Sierra Video Systems

The 3RU Model **1616DEE** frame accepts a 504001 serial control module and one serial digital video crosspoint module. In addition, it accepts up to two audio modules, and can be any combination of 16x16 analog switching modules or balanced AES/EBU serial digital audio modules. Also available is the Model 3232D.

The Model **6464D** is a 4RU system designed for maximum ordering flexibility in input or output increments of 16, allowing for any size system beginning with a 16x16 up to a 64x64.

For more information contact Sierra Video Systems at (530) 478-1000 or visit www.sierravideo.com

■ For more information circle Reader Service #348

Snell & Wilcox

Snell & Wilcox's **HD1132** is a 4RU all-digital 1.5 Gbits/sec 32x32 HDTV router featuring full equalization on all inputs and re-clocking on all outputs. This allows the router to easily adapt to a wide range of cable configurations in a broadcast facility. The router is controlled through an optional control panel, through its RS-422 interface or through the Snell & Wilcox Rollcall interface network.

For more information contact Snell & Wilcox at (408) 260-1000 or visit www.snellwilcox.com

■ For more information circle Reader Service #349

Sony

Sony's **DVS-Series** 525 digital routing switcher is available in a 16x16 configuration, expandable up to 32x32 (in steps of 8 channels). It accepts both 1080 and 1035 active line signals, and offers dual SDI outputs incorporated with 8-channel video outputs independent from the prime outputs. It is furnished with GPI, three BNC, two 9-pin, and one 25-pin connectors for remote control, a built-in with backup control board and redundant CPU board, and backup power supply board available as an option.

For more information contact Sony at (800) 686-SONY or visit www.sony.com

■ For more information circle Reader Service #350

Tektronix

The Series **7000** HD router expands the multiformat routing capability of the Series 7000 signal management system to include routing of full-bandwidth HDTV signals. Series 7000 HD is compatible with existing Series 7000 matri-

ces and control panels, enabling the easy addition of an HDTV layer along with existing 270/360 DTV formats.

The **Performer HD** adds full-bandwidth HDTV routing capability to the Performer family of 10x1 routing switchers. The compact HD router meets the need for low-cost utility routing in the HDTV environment and also combines well with the M-2100 HD to provide bypass switching of master control.

For more information contact Tektronix at (503) 627-5151 or visit www.tek.com

■ For more information circle Reader Service #351

Telect

Telect has introduced new modules for its **VersaFrame 2000,** including a YC 8x8 routing switcher with S-Video ready ins and outs. It handles multiple levels and multiple system addressing for more control and flexibility. Front panel gain control for luminance and chrominance is available on each output.

For more information contact Telect at (800) 551-4567 or visit www.telect.com

■ For more information circle Reader Service #352

Videotek

The **SDR Series** from Videotek offers matrix router sizes from 4x4 to 16x16 with a variety of digital and analog video and audio options. The SDR Series master control panel features Videotek's From/To control scheme with alpha-numeric LCD display, allowing users to dial in the desired From/To and press Take. And an 8-character alpha-numeric display clearly identifies each source and destination.

For more information contact Videotek at (610) 327-2292 or visit www.videotek.com

■ For more information circle Reader Service #353

Station Operations

Audio Sync Problems Expected To Get Worse In DTV Era

Increased use of compression makes delays more noticeable

By Dan Daley

Transitions are part of life, and the television broadcast industry is in the midst of its most comprehensive and complicated transition—the transition to digital.

And while the transition may be a costly one, it's all supposed to be for the better. Better pictures, better audio, and hopefully better revenues.

But what good is all the talk of better pictures and better audio when the audio and the video aren't in synch?

The use of video compression throughout network operations, broadcast plants, and in the field has caused numerous headaches (and investments in audio delays) across the country.

And the move to HDTV is only expected to make it worse. For example, when's the last time you saw an HDTV demo with audio?

The reason for the problem is simple. Every time the video is compressed it gets delayed by hundredths of a second. The audio, however, isn't compressed with the video. So while the video is delayed the audio moves on. And when it's compressed multiple times between being sent from the network to reaching the viewer those little delays add up until it's noticeable.

In addition, the problems experienced are further exacerbated because the viewer is hearing the ball hit the bat before the viewer sees it. And that is much more noticeable than if it was the other way around.

So how are stations solving their delay problems? Discussions with three Network affiliates in Madison, Wis. show the varying degrees of problems (and solutions) that exist.

Kevin Ruppert, engineering maintenance supervisor at CBS affiliate WISC-TV Madison, Wis., says his station is using Rane audio delays in its trucks so the problem can be corrected before it gets back to the station. "As more digital [video] sources come in, we're going to have to keep adding more digital [audio] delays," he says. "When we put in a new video switcher, the manufacturers recommend installing digital delays for better lip sync."

Ruppert says that when his station handles network feeds digital delays are always used. "We use a Tektronix video frame synchronizer that has a digital delay mated with it."

He adds that the move to digital technologies has caused the synchronization of the audio to the video to fall through the cracks. "The philosophy of broadcast, especially at the affiliate level and particularly with news, is to get it on the air fast and cheaply."

While most broadcast executives—network and affiliate alike—now understand that audio quality is tantamount to video quality in importance, their awareness of synchronization problems is rarely high—with the exception of really badly looped Mexican horror films. As a result, the issue rarely makes a corporate agenda, despite its being an expensive problem.

With video compression technologies becoming more prevalent in the broadcast facility, audio/video sync problems are on the rise and could get worse as HDTV broadcasts begin.

Ruppert says he spent $20,000 to assure better audio/video synchronization, but that when the initial cost analysis was first submitted, management was "at first glance, reluctant to spend the money," he recalls. Approval got easier for him, however, when he pointed out that satellite hops can generate a difference of as much as 320 milliseconds—nearly a quarter-second. And that's not unusual as networks increasingly switch to MPEG-2 codecs, which compress data very efficiently, combining up to eight separate signals onto a single Ku-band transponder, in turn making satellite time a lot less expensive. But despite its efficient data compression scheme, MPEG-2 encoding/decoding induces longer signal delays for video.

Willy Halla, vice president of engineering support at TGS, Inc., in Fairfax, Va., has designed numerous HDTV facilities to date. He puts the responsibility for the issue primarily on MPEG-2 compression.

"MPEG-2 encoding takes time, and manufacturers are trying to solve the problem by using digital delays in the same way station engineers are," he says. "But that adds to the cost of the circuitry, and that means higher costs at affiliate stations. People are trying to squeeze more channels into the same space—putting four [audio] channels into 6 MHz bands, which is going to increase the delays."

Halla adds that the amount of delay is therefore a function of how much cramming a network decides to do and what equipment it uses to do it, and for the most part it's MPEG-2 right now.

"Sooner or later the technology is going to catch up to the problem, especially when you start seeing HDTV's six-channel audio becoming more common," he adds. "Frame synchronization is not on the way out, but the technology will adapt as time goes by."

Still, says Ruppert, "The problem is going to get worse as more digital television comes in."

Interestingly, those personnel who have migrated from film audio post production to broadcast are the most sensitive to the problem. "Hollywood people are very sensitive to sync, especially if they've had a lot of looping [ADR] experience," he adds.

Differences

There are also differences among the networks in the types of synching problems. Ruppert notices the problem less frequently on commercials, but Steve Zimmerman, chief engineer at ABC affiliate WKOW Madison, Wis., has observed just the opposite.

"There's an inherent delay there that's been around as long as we've been using frame synchronizers, and it's happening more now," Zimmerman says.

He says the reason for the upswing in problems is that the cost of frame synchronizers and quality digital delays have fallen so much that stations are expected to treat the symptoms of delay with the relatively cheap black boxes rather than have it cured.

As Ruppert says, "The only real solutions I see are using more and more individual digital [audio] delays and dialing delays values in manually as each situation warrants, since there's really no standard delay formula that we can establish reliable tables for."

Like Ruppert, Zimmerman sees the synchronization issue becoming more of a problem as DTV becomes more widespread, and sees it occurring increasingly on the affiliate and network levels. "My feeling is that no one is paying a whole lot of attention to it at the moment. But believe me, once DTV gets here big time, they will be."

Working It Out

Others seem less concerned. Tom Weeden, chief engineer at NBC affiliate WMTV Madison, Wis., says he's run into the problem a few times in recent years but that the network provided its affiliates with integrated receiver decoders (IRD) last year, which vastly increases the amount of transponder space available.

"We use digital video frame synchronizers for outside feeds, but we start the feed at a certain [offset] time and have the anchors talk in realtime on the Digital Processing System."

His offset times have been as little as 33 milliseconds, short enough to be virtually unnoticeable. However, he also finds himself relying on digital audio delays to maintain perfect sync in many situations.

"I don't know what the optimal solution, is," he says. "The only real confusion point is when we did a recent equipment upgrade. Programming now comes from NBC in analog but news is digital, so you assume some type of delays."

Many digital audio manufacturers are just becoming aware of the problem. Obviously, digital delays by the scores of manufacturers out there who make and market them don't keep track of every possible application for the boxes, and few companies are truly audio/video integrated manufacturers. But some audio console makers are becoming aware of the issue.

Steve Turley, marketing director for Harrison GLW, says, "The digital version of our Series 12 broadcast console has onboard delays, but to be quite honest, we never thought of that particular application when we designed the delays into the console. It's not normally a function that a console is designed to handle."

Turley says the board can do up to three frames of delay (at 30 fps, about 100 ms), but that 10 frames is out of the question. "It's more effective to deal with that using outboard DDL equipment. But an automated console like ours allows you to have pre-set delays for each type of offset coming in, assuming that they're at least consistent, which lets you solve the problem that way a lot faster. But this is an industry in transition, and the whole idea is to learn as we go along about what problems crop up in the transition to DTV. We're going to get some bumps and bruises along the way, because this is not going to be an overnight thing." □

Manufacturer Perspective

With Care And Planning A/V Sync Problems Can Be Solved

By Charles Meyer, Senior Vice President, NVision

DTV indeed presents a new set of synchronization challenges. Digital broadcasts will require compression technology to deliver video and theatre-quality sound over a limited bandwidth channel.

There are a number of environments where compression technology comes into play, and it's best to explore synchronization techniques in each one separately.

These environments include audio origination, contribution, and distribution. Each process is unique, and because of the rapid time frame mandated for DTV deployment, it's imperative that synchronization issues be addressed now.

Distribution

A number of synchronization problems are associated with distribution. Heavily compressed audio and video must be decoded and played back in sync. When lips move, it's acceptable for sound to arrive late, but if it arrives early, ahead of the event causing it, the listener is more likely to be annoyed.

Theatre sound is a little more complicated. Present technology provides a three-dimensional image greatly enhancing the listening and viewing experience. Consider an auto chase scene. Not only does the car move from left to right, but its sound moves with it. Now imagine the sound of the car leading, then lagging, then leading again. This contrived example could happen if the audio and video are not "synchronized" as part of the compression process.

One solution to distribution problems is packetized data transports, providing "time-stamps." These short data packets indicate synchronization points between related, but independent, signals. If these stamps are used as alignment points after decoding, the car and its sound maintain the desired temporal relationship.

A different example of distribution synchronization exploits the DTV signal's data transmission capabilities. DTV transmission channels can include up to 1 Megabit of additional data even when an HDTV signal is in the same 19.3 Mb/s stream. One application for this data might be advance shipment of commercials to the consumer. This data is then stored in its compressed form, in local receiver memory, and played back at a later time as indicated either by cue from the broadcast source, or by time match to a clock sent continuously by the broadcast host.

These two alignment processes can be implemented today using silicon components whose prices will drop, and contemporary computer technology at the broadcast tower. Additionally, because the signals are included in one common signal channel or path, and share a common origin, sync management is efficient and easily managed.

Contribution

Contribution requires the most work. Program input feeds over satellite, telco, and broadcast links exhibit different delay magnitudes and variances, as do their video counterparts. But, unlike the distribution path, these signals must be useable for further production prior to retransmission.

In this scenario, time stamp packets, LTC, VITC, or some combination thereof is used in conjunction with decoders, frame stores, and delay elements to realign the audio and video signals for editing, either to produce a news spot, or to insert remote programming.

Most of this production work occurs in the non-compressed domain, preserving the highest possible quality for both sound and pictures. The result is then compressed, and distributed.

The production core of the process uses conventional sync techniques, but the boundaries require engineering knowledge and careful design to determine the appropriate buffer lengths, and buffer dynamics needed to synchronize the different classes of external feeds prior to the processing core.

When it comes to a process as important as synchronization, there is no free lunch.

One approach might be to use the SDTI transmission. This data format, or ASI, the DVB equivalent, sends data in a packetized format within the SMPTE 259 digital framing structure. Here, a time stamp packet or message could be used by intelligent receive equipment to time align incoming feeds to a common point. For global applications, GPS clock derivation based on GMT (Greenwich Mean Time) UTC (Universal Time Code) would provide the reference clock to which all time stamps would be measured and aligned. This approach does not eliminate delay elements, but it might automate their usage.

While the price of delay equipment involved in this process will most certainly decrease, the complexity of the process and its quality requirement are likely to stay the same, or increase. And the use of a GPS system as described would increase costs substantially, at least in the near term. In short, advance planning and engineering are required to insure reliable, consistent results in for this area.

Origination

Origination processes for DTV signals can be synchronized in much the same way as they are presently for analog and digital signals; audio and video, AES and SDI. This bold statement is based on a philosophy of full bandwidth production; a concept gaining acceptance at a rapid rate since this years' NAB convention in Las Vegas.

This April, a significant number of manufacturers showed many of the necessary pieces allowing production of 1.5 Gb/s HDTV material. Using this equipment, audio and video can be timed using color black and AES3 signals. In fact, 525, 1125 and 750 material with common frame rates can even be synchronized to a common clock such as composite color black. Audio is then locked to the same color black signal providing AES and SDIF audio references; a technique that is well known and widely implemented today.

When it comes to a process as important as synchronization, there is no free lunch. However, with care and planning, it is possible to apply standard techniques and approaches to tomorrow's DTV systems. □

Can't Afford A DTV Transmitter? You Have Options

Manufacturers offer lower-cost interim solutions

By Edmond M. Rosenthal

With most station's HDTV transition deadlines still fairly far off, most tube transmitter manufacturers can count their DTV transmitter orders on one hand.

But that doesn't mean that transmitter manufacturers haven't heard from a lot of potential customers. Research has begun, and the challenge for broadcasters is trying to find a balance between offering the best signal quality and being cost-effective.

Most transmitter manufacturers agree that two separate transmitters for simulcasting DTV and NTSC offer the best in signal quality and redundancy. But for station's that can't afford this investment there are some lower-cost approaches offered as interim measures. These include:

- Converting analog transmitters to digital.
- Acrodyne's Adjacent Channel Technology (ACT), which allows a single transmitter to broadcast both an HDTV and SDTNV signal, as long as the channel assignments are adjacent.
- An adjacent channel combiner, which allows use of a single transmission line and antenna.
- Low-power DTV transmitters on a transitional basis.

While these approaches reportedly have their pluses and minuses, manufacturers say full-fledged digital transmitters have already reached a state-of-the-art, leaving little room for improvement. Operation is simple and efficiency is greater than with analog, they report.

Comark's Advantage transmitter

Adjacent Channels

One of the more interesting solutions to the HDTV transition is Acrodyne's ACT. With ACT, according to Dr. Tim Hulick, Acrodyne vice president of engineering, one high-power amplifier can be driven by both DTV and NTSC signals so long as the channels are adjacent (also referred to as N-1 or N+1 depending on assignment). ACT employs advanced tetrode and diacrode amplifiers that are capable of carrying dual analog and DTV adjacent channel signals, such as channels 40 and 41.

Hulick says the Diacrode's 104kW peak envelope power handling capacity can simultaneously transmit, for example, a 25kW NTSC visual signal with 10 percent aural and a 2.5kW DTV signal. These analog and DTV power contributors can be manipulated, he notes, for numerous power trade-offs within 104kW peak envelope power, and multiple tube configurations offer increased power output.

He estimates cost savings vs. buying a second transmitter are about $200,000, "and even more if you consider that there is only one transmission line and one antenna." The exciter and driver, he adds, must be separate for DTV and NTSC. "There's a relatively low driver power, compared with the output of the transmitter," he says.

The first buyer of an ACT transmitter was KBLR-TV Las Vegas.

An adjacent-channel single-transmitter approach is also being discussed by Itelco USA, Inc. Jack McKain, sales manager, high-power television, says his company's IOT transmitter for DTV allows N-1 performance. He says this can be achieved by broadbanding an IOT transmitter to allow transmission of both channels.

The costs beyond the single transmitter, he notes, would involve an exciter for $30,000 or more and a second exciter for about the same amount. "The major drawback," he notes, is significantly reduced power output because you're increasing the bandwidth. "The ideal situation is to have two transmitters for greater control over the power."

Meanwhile, Larcan is steering clear of an adjacent channel approach, according to Jim Adamson, president. "Significant compromises need to be made in order to pass all those signals through a single amplifier," he states. "For example, you have to significantly reduce the sync peak.

Another problem he sees is that the tuning of the tube would have to be broadened out so that it passes a total bandwidth of 12 MHz. That, he explains, reduces the efficiency of the tube and is another reason that you have to operate at a reduced power level.

Adamson says that unless a station runs only 3kW of digital power through that same tube, there will be degradation, particularly in the analog signal. "We also find users reluctant to be on the air with their analog signal on one tube," he adds. "Stations want redundancy, and here your potential exposure is doubled."

Advanced Broadcast Systems has been exploring adjacent channel technology, reports senior engineer Sonny Cavazos, but has yet to see an approach offering an acceptable NTSC signal. If there were more interest among prospective customers, he adds, his company would be working more aggressively on the technology. A possible alternative, he says, is using two transmitters and combining them in the filtering network.

Channel Combining

The approach of ITS Corp. is an adjacent channel combiner, where the existing NTSC transmitter continues to service the analog channel but a single transmission line and antenna are used and combining is accomplished after the transmitter's output amplifiers.

According to David Neff, vice president, broadcast systems division, this approach is appropriate for 190 N+1 stations—those in which the digital channel is higher than the analog.

"Some manufacturers have talked about combining the signals at a low level and amplifying them through a single tube amplifier," Neff comments. "The problem is that you can't use the existing analog transmitter any more because you're combining through the new transmitter. And when you combine the signals, the power capability is generally pretty low."

Harris Broadcast has attempted to output the two signals from a single transmitter, reports Bob Weirather, director of business relations, but this didn't have satisfactory results in either signal. Harris' alternative is to combine two transmitters side-by-side into the same antenna. He states this has been done at WGTE Toledo, Ohio, with excellent performance by both units. It only works, though, when the digital channel is below the analog, and Harris is attempting to solve this problem.

NTSC Conversion

While Comark reports among the strongest sales results in DTV transmission systems—10 so far this year and a total of about 30 anticipated by the end of the year, Mark Aitken, director of marketing, reports NTSC is "still the breadwinner." Part of customers' plans, he says, is to convert these systems to digital.

Conversion can be done, he notes, by adding a new exciter front end and a new or retuned RF system. Cost ranges from $50,000-$120,000, he says, depending on the number of amplifiers and system-level redundancy features. About 25% of those ordering NTSC transmitters are doing so with this in mind, he adds, noting that digital transmitters cost between $500,000 and $1.5 million.

Dr. Hulick also notes that any tube or solid-state transmitter that Acrodyne has made in the past five years can be converted to DTV. "We use the same high-power equipment for both," he explains, "but the power rating changes."

Conversion cost of a 60kW NTSC transmitter is about $100,000, vs. three or four times that amount for a new DTV transmitter. "What's different is the exciter and high-power output filter," he reports.

Low-Power Approach

Targeting the low-power markets, EMCEE Broadcast Products, is pushing a low-power transition approach. The company hasn't decided yet whether to make full-power DTV transmitters. Jim Zarodas, marketing product manager, holds, "Because of the high expense of digital television, we believe that there won't be enough high-definition receivers out there to authorize full power from the get-go."

He notes a 2,500w transmitter costs about $175,000 vs. $400,000-$500,000 for a high-power one-tube IOT transmitter. While many stations will want to extend their signal as the market grows, he notes, there are also stations with a lower ERP that will never need more power. An advantage of this approach is that full-power transmitter prices are likely to come down if their purchase is postponed, he says.

At that point, there are three options,

Zaroda points out. One is to use the low-power transmitter as a backup. Another s to take the Harris CD-1 digital exciter, which lists at $60,000, from the EMCEE TTU2500HD transmitter and lace it in the high-power transmitter. The final option is to sell the old transmitter.

Meanwhile, the tube of choice for digal transmission is the IOT, according to Mike Kirk, vice president of the EEV ommercial division. He holds, "The jury s out on whether klystrons represent a ongtime economic solution to digital ransmission. Some stations are looking an interim solution utilizing klystrons, ut the IOT offers such efficiency mprovements over the klystron that a staion would have to have severe budget constraints to want to do that on a long-term basis."

Once stations foot the bill for DTV transmitters, manufacturers state, it will be smooth sailing.

"We're using a tetrode tube, which is simple and proven technology," says EMCEE's Zaroda, "so no specialized training is required for the operator. The unit is air-cooled, so there is no investment in a water-cooled system that requires even more electricity consumption."

Acrodyne's Hulick offers, "Life expectancy of all the parts in a DTV transmitter will probably improve, because the transmitter power is constant. You can expect to get about 30 percent more life out of all components."

All the manufacturers point out that DTV transmitters will offer improvements over their analog predecessors.

With Larcan's Landmark DTV series designed for digital service from the ground up, according to Adamson, the product can accommodate desired changes, such as tightening the mask, or shape of the signal, to prevent interference.

Pointing out that Advanced Broadcast Systems pioneered computer-controlled design, Cavazos says this is becoming nearly standard in all DTV transmitters.

Digital technology also offers the ability to correct for linear and nonlinear system performance problems, says Comarks's Aitken, eliminating the need for much operator intervention. He adds that, because digital has an absolute peak power requirement, the service is always measured on a constant average power basis. This means power supplies can be sized more appropriately, cooling demand is constant and the systems can be more compact.

User-friendliness is also inherent in the digital systems. For example, Weirather notes, Harris' graphical user interface (GUI) is Windows-based and can be operated by anyone who is PC-literate.

While little new is anticipated in DTV transmitters, McKain of Itelco says, "Down the line, we can look for increased operating efficiency in tube output." To that, Neff of ITS adds, "At NAB, there was talk about power increases in the IOTs because people want to get to the desired power level with as few IOTs as necessary. Higher power also minimizes replacement costs." □

HDTV TUBE TRANSMITTER ROUNDUP

Acrodyne

Acrodyne offers the **AuDTV25D** diacrode-based UHF DTV transmitter. It s a 25kW average power TH-680 diacrode-based transmitter for 8VSB DTV. The TH-680 diacrode is a double-ended tetrode which doubles the etrode power in a single tube to 80 kW visual only or 60 kW visual and 6 kW ural in combined amplification. The uDTV25D offers a simple wideband rounded grid amplifier design, simple nstallation, tube life exceeding 30,000 ours in DTV service, and low-cost tube nd component replacements. An ptional HPA bypass provides 800 watts verage backup emergency power. Also om Acrodyne is the AU60D, available f a two-tube configuration for 120kW isual output, a three-amplifier configuation for 180 kW visual output, and a our-amplifier configuration for 240kW isual output.

For more information contact Acrodyne at (800) 523-2596 or visit www.acrodyne.com

■ **For more information circle Reader Service #354**

Advanced Broadcast Systems

The **CST-II** transmitter is both NTSC nd digital proven, for high power (up to 240KW NTSC/120 kW Digital Average) UHF Systems. It's the first in the broadcast industry to introduce computer upervision and Programmable Logic, making this transmitter very reliable and easy to maintain.

The BEST II is a Digital transmitter with a smaller footprint for use in stations where space is at a premium. It has the same design characteristics as he CST's, but in a smaller package for tations who would like to install a DTV ransmitter in their existing NTSC transmitter building.

For more information contact ABS at (606) 689-0075.

■ **For more information circle Reader Service #355**

Comark

The Advantage IOT transmitter is a dedcated DTV transmitter system designed from the ground up to serve the digital era. Among its features are a sophisticated, intuitive user interface, advanced monitoring and diagnostic capabilities, and simple, manageable cooling.

It also features Digital Adaptive Precorrection (DAP). DAP is an integrated function of the ATSC conforming 8-VSB modulator/ exciter that provides precise digital correction of various amplitude and phase distortions created by system non-linearities. According to Comark, it provides operational performance that isn't possible with any other available correction techniques, and it eliminates the need for manual correction.

For more information contact Comark at (413) 569-0116 or visit www.comarkcom.com

■ **For more information circle Reader Service #356**

EEV

EEV's latest is a digital IOT system, type IOTD3100W, suitable for DTV transmitters having output powers of 100 kW peak/25kW average. These new systems incorporate attractive features such as simple plug-in tubes which will substantially reduce installation and tube replacement times. The IOTD3100W also has a much smaller footprint than previous designs and is therefore particularly sutiable for compact transmitters as it can be installed in a 19-inch rack mounting.

For more information contact EEV at (914) 592-6050 or visit www.eev.com

■ **For more information circle Reader Service #357**

Harris

Harris SigmaCD transmitters are specifically designed for high-power UHF digital television applications. The SigmaCD transmitters provide from 40 to 400 kilowatts of peak power, and combines one or more high-efficiency Inductive Output Tube (IOT) or klystrode/IOT RF power amplifiers (PA) and Harris' CD 1A. Each transmitter includes a control cabinet which houses the CD 1A exciter and provides eye-level push-button controls and diagnostics, and a separate power amplifier cabinet for each IOT or klystrode/IOT. For redundancy, each PA cabinet includes a feed-forward IPA driver stage and its own high-voltage power supply. Each PA also has Automatic Level Control circuitry for overdrive protection.

For more information contact Harris at (217) 222-8200 or email hbd@harris.com

■ **For more information circle Reader Service #358**

Itelco

Itelco's DTV transmitters with IOT are available from 10 kW through 100 kW, operating in UHF bands IV/V (470-860 MHz), and fully comply with the ATSC 8-VSB DTV specification. They perform all of the required transport-to-transmission functions, from layer conversion and 8-VSB modulation of the incoming 19.39 Mb/s serial digital bit stream to the final RF amplification and output filtering.

Itelco's DTV exciter with integrated 8-VSB modulator generates an on-channel 1 W 8-VSB DTV RF signal. All functions of the DTV Exciter are implemented on plug-in cards, housed in a compact 19-inch by 7.25-inch frame. This design simplifies access to or replacement of any card for maintenance or upgrades, as well as the integration of future improvements.

For more information contact Itelco at (303) 464-8000 or visit www.itelco-usa.com

■ **For more information circle Reader Service #359**

Larcan

The Larcan Landmark series transmitter is designed for DTV, and has an ATSC standard 8-VSB exciter, assuring ATSC standard compliance. Features include digital linear and nonlinear correction to produce optimum output signal, and the use of a new SMPTE standard digital serial transport level interface. Its solid-state LDMOS Class AB broadband driver ensures linearity (lower intermodulation distortion products) and greater stability versus conventional bi-polar devices. It also offers conservative power ratings in 8kW to 25kW IOT socket modules, and up to 100 kW. Other features include fiber-optic LAN control infrastructure and an LCD touchscreen control panel backed up by a complete set of LCD bar graph meter.

For more information contact Larcan at (905) 564-9222.

■ **For more information circle Reader Service #360**

Transmission

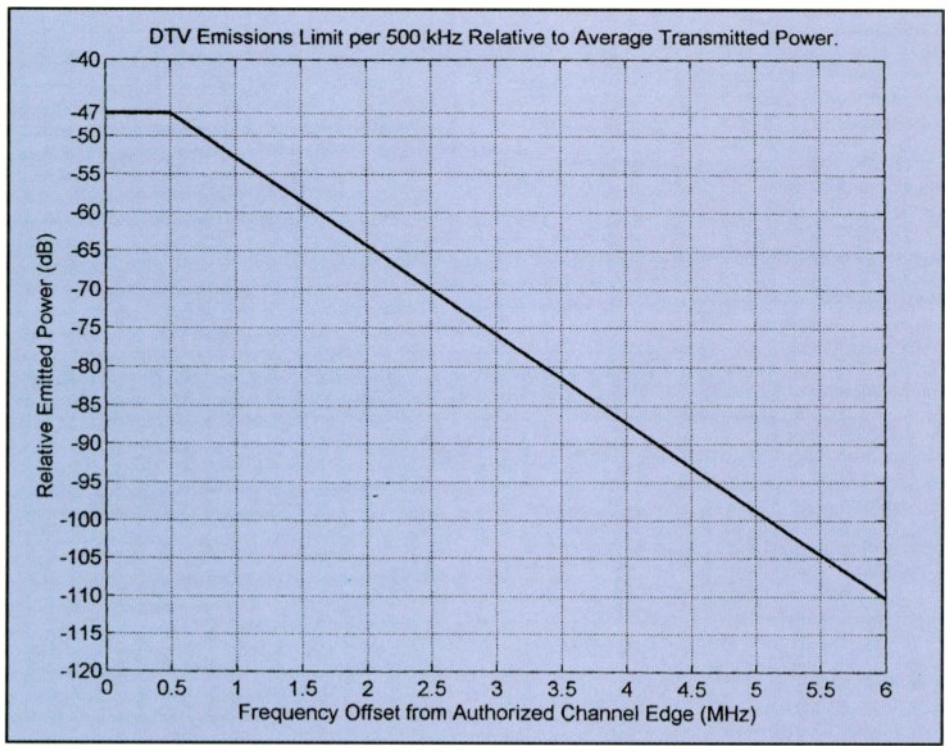
DTV Out-Of-Band Emissions Can Be Both Compliant And Non-Compliant

By Dr. Paul Smith

When the FCC adopted requirements for DTV out-of-band emissions in its "Memorandum Opinion and Order on Reconsideration of the Sixth Report and Order" (see sidebar) there was an interesting point that became clear upon taking a closer look at the requirements.

Simply put, as written, it's possible for a DTV emissions spectrum to violate the proposed mask in the adjacent 500 kHz and nevertheless be compliant with the FCC DTV emissions requirement.

How? If it exhibits a surplus of attenuation beyond the minimum limits specified by the mask over a significant portion of the adjacent 500 kHz. In fact, there exists an infinite variety of such possible mask-violating/FCC-compliant transmitter emissions.



A graph of the FCC's 500 kHz bandwidth DTV emissions limit requirement as a function of frequency offset from the edge of the authorized channel. This requirement cannot be interpreted strictly as a simple emissions mask. However, a simple emissions mask may be derived from this requirement that will be more restrictive than the FCC's requirement, but not by more than about 0.5 dB.

What The FCC Said Regarding DTV Emission Requirements

"...Accordingly, we are revising the DTV out-of-band 'emissions mask' to require that:

1) in the first 500 kHz from the authorized channel edge, transmitter emissions must be attenuated no less than 47 dB below the average transmitted power;

2) more than 6 MHz from the channel edge, emissions must be attenuated to no less than 110 dB below the average transmitted power; and

3) at any frequency between 0.5 and 6 MHz from the channel edge, emissions must be attenuated by no less than the value determined by the following formula:

Attenuation in dB=-11.5 (f+3.6); where f=frequency difference in MHz from the edge of the channel.

All attenuation limits are based upon a measurement bandwidth of 500 kHz. This mask will lower the power radiated in the adjacent channel as compared to our current mask by approximately 5 dB to a level of -44 dB below the average power transmitted. Other measurement bandwidths may be used as long as the appropriate correction factors are applied. As with our original mask, in the event interference is caused to any service, greater attenuation may be required."

The Basis

The basis of the FCC's DTV emissions requirements lies in the specifications of maximum out-of-band emissions levels relative to the "average transmitted power." Thus, the higher the average transmitted power the higher the out-of-band emissions may be.

In the absence of any limiting definition, the "average transmitted power" refers to the average transmitted power as measured over the entire transmitted spectrum by an infinite bandwidth receiver. For the sake of simplicity, let's limit this definition to include only that part of the average transmitted power which lies within the authorized 6MHz channel.

As inferred by the FCC, any transmitted output that meets the FCC requirement will have a minimum of approximately 99.996% of its average power within the authorized transmitted channel, with the remaining out-of-band power constituting only 0.004 percent (-44 dB) of the total. The resulting error to future calculations is thus equal to 10xLog10(0.99996)=-0.00017 dB.

How much variation can be expected in the distribution of the in-band average transmitted power of various DTV transmitters? The best case is when the basis (in-band average transmitted power) is maximized. This condition would be represented by a flat, in-band DTV transmitter spectrum that extends across the entire 6MHz of the authorized channel.

The worst case, or what we'll call the Minimum DTV Transmitter Spectrum, would be a DTV transmitter spectrum that is flat over the inner 5.4 MHz of the authorized channel and is zero at all other frequencies within that channel (the assumption made here is that no DTV transmitter will produce an output spectrum having a characteristic peak amplitude of less than 5.4 MHz in width).

The amount by which the basis varies between these two extreme cases is 0.46 dB. Because this is very small compared with the large attenuation levels that are required, we'll use the Minimum DTV Transmitter Spectrum for future calculations here.

Approximately Equivalent DTV Emissions Mask

Looking over the FCC DTV emissions requirement, it's easy to see where there is some confusion when deciding whether or not a transmission's out-of-band emission lies below the mask's limits.

When a transmitter output is to be checked for compliance with a given emissions mask, a sample of the transmitter's signal will typically be input to a spectrum analyzer.

Next, the relative attenuation starting from the desired in-band signal down to the undesired out-of-band emissions are read directly from the analyzer's display and compared to the mask to see if the emissions lie below the mask's limits.

A spectrum analyzer displays power-per-unit-bandwidth versus frequency, and the display scale is constant throughout the sweep (it should be noted that the spectrum analyzer does not display power versus frequency, as many engineers believe, and this is where much of the confusion starts).

The FCC DTV out-of-band emissions are supposed to be measured in units of power per 500 kHz, with this value then compared to the total average transmitted power.

But assuming that the Minimum DTV Transmitted Spectrum is used, and the out-of-band power is negligible, the average transmitted power is a power per 5.4 MHz.

As a result, some people may consider the FCC emissions requirement formula like comparing apples to oranges, but this is not true. The FCC compares power levels (Watts to Watts), not power densities (Watts/kHz to Watts/5.4 MHz). However a spectrum analyzer can only compare power densities and only will do so using a single, consistent set of units.

Thus, to convert the FCC DTV requirement for out-of-band emissions (see chart) to an equivalent spectrum analyzer type of measurement, the out-of-band emissions must be expressed in the same power density units as the desired in-band emissions (Watts/5.4 MHz).

Once the FCC DTV emissions requirement has been represented by an approximately equivalent mask, the mask is independent of the chosen units of power density.

In practice, this means that when checking a transmitter output for compliance with the mask, the operator of a spectrum analyzer is free to increase or decrease the resolution bandwidth (RBW) of the analyzer—the mask does not need to be scaled. This flexibility in measurement bandwidth may be useful in cases where the out-of-band emissions spectrum contains narrowband spikes of non-compliance. In such cases increasing the RBW will make the spikes less prominent.

Allowable Deviations

The FCC DTV emissions requirement incorporates a small amount of flexibility with respect to the distribution of out-of-band emissions that is not reflected by the DTV mask derived earlier. This flexibility may prove to be very useful when verifying emissions compliance within the 500 kHz bands that lie adjacent to the authorized channel.

Consider a DTV transmitter emissions spectrum which violates the proposed DTV mask by not achieving the specified 36.6 dB skirt attenuation level throughout the adjacent 500 kHz. The RBW of a spectrum analyzer cannot be increased to improve the appearance of the emissions near the channel edge. This is because increasing the RBW would allow powerful in-band signal components to enter the measurement bandwidth of out-of-band signal components that lie close to the channel edge. □

Dr. Paul Smith is director of product development for Micro Communications, Inc.

Cable News

Scientific-Atlanta offers Addressable Multimedia Stretch Tap

Scientific-Atlanta's new Addressable Multimedia Stretch Tap (AMST) is designed to allow customers to be connected almost immediately to a variety of two-way cable services, including Internet, video, data, and voice. The AMST will enable cable operators to remotely activate customers from the business office, saving operators the cost of many truck rolls to activate or de-activate service. Operating essentially as an on/off switch, the AMST will be capable of easily being dropped into existing networks and being deployed incrementally.

Contact **Scientific-Atlanta** at (770) 903-5057 or visit www.sciatl.com.

For more information circle Reader Service #361

Pioneer Signs Agreement With Time Warner Cable

Time Warner will purchase up to one million units of Pioneer's new 2000 Series advanced analog converters, to be deployed over the next four years. The 2000 Series offers high-speed data communication, encryption, near Video On Demand, digital music, near realtime two-way RF return, true downloadability, and a graphical user interface to enhance customer interaction with the system.

Contact **Pioneer New Media Technologies** at (310) 952-2111.

For more information circle Reader Service #362

Logic Innovations Demos Data Stream Transport System

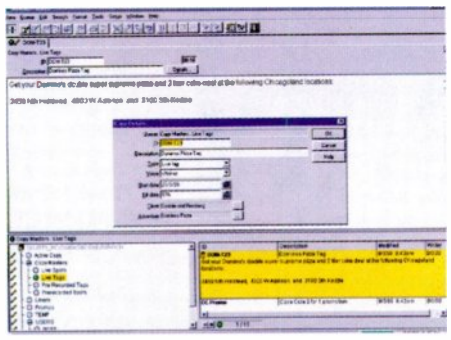
The Data Stream Transport System is designed for the capture and playback of digital transport streams such as MPEG-2, DVB, and D-1 uncompressed video. Target applications for the DSTS include prototyping, debugging, and testing of set-top terminals, cable modems, and multimedia chipsets. With direct connections to most industry-standard QAM and QPSK modulators the DSTS is capable of supporting many different applications.

Contact **Logic Innovations** at (619) 455-7200 or visitwww.logici.com

For more information circle Reader Service #363

Broadcom Demos Voice-Over IP

Broadcom introduced its Internet Protocol (IP) Voice capable MCNS cable modem reference design, the BCM93220B. The design integrates voice into next-generation MCNS



cable modems, allowing cable operators to enhance their services and increase their revenues. According to Broadcom, the BCM93220B is the first available reference design to incorporate a subscriber line interface card (SLIC), a USB interface, a Removable Security Module socket, and a low-cost RISC microprocessor. The SLIC supports IP Voice using a standard RJ-11 telephony interface connection, such as a telephone handset or headset. The USB interface allows the cable modem to be directly connected to the computer via the computer's USB port, creating a plug-and-play solution.

Contact **Broadcom** at (949) 450-8700 or visit www.broadcom.com.

For more information circle Reader Service #364

Phasecom Intros Wipro's Web-Based Network Management Suite For SpeedDemon Cable Modem System

Wipro's CyberManage web-based network management suite allows for Phasecom's SpeedDemon cable modems and cable modem termination systems to be remotely configured or managed from anywhere across the Internet. In addition to remote management, cable operators can now track usage patterns, understand potential faults and alarms, and service these faults and alarms all in realtime from a simple browser interface. Another advantage, according to Phasecom, is universal access to any network status information by various groups within the cable operator's organization.

Contact **Phasecom** at (408) 777-7799 or visit cybermanage.wipro.com.

For more information circle Reader Service #365

Bay Networks Rolls Out Business Class IP Services Over Broadband

Bay Networks has introduced a number of broadband business class services revolving around the following IP services: Virtual Private Networks (VPNs) and Extranets; Voice/Fax over IP (VFoIP); Directory/Policy Services; Progressive Traffic Management; and Security. The VPNs are the first step in Bay Networks' services, allowing businesses to use the Internet for private communication and collaboration between employees, business partners and customers. Bay Networks' solution will allow cable operators to service their business customers who have remote users with an affordable, secure, and easy-to-configure system.

Contact **Bay Networks** at (408) 988-5525.

For more information circle Reader Service #366

ADC Offers ACEngine Cable Data Modem

ADC Telecommunications' ACEngine cable data modem is an asymetrical modem that operates over a hybrid fiber/coax architecture. The ACEngine offers operators a choice of four tiers of service for data delivery, from contention-based to a pre-selected amount of upstream and downstream bandwidth for up to 1,200 individual Internet users. Benefits of the ACEngine include ADC's cable modem headend system, headend connection with industry-standard routers to provide connectivity from the service provider site to the Internet and with ADC's Fast EtherRing switch that allows native Ethernet connections over fiber-optic links, and status monitoring and remote network management through the cable modem headend system.

Contact **ADC Telecommunications** at (612) 946-3136 or visit www.adc.com.

For more information circle Reader Service #367

Hybrid Networks Demos Triple Play Modem

Hybrid Network's Triple-Play modem uses the company's Series 2000 system to support two-way cable and wireless transmissions and one-way with telephone and router return. The Hybrid Series 2000

product line includes headend equipment and cable modems, and Hybrid's QPSK has been implemented with advanced features for upstream transmission. Avanced PHY uses multiple narrow channels in the upstream which are easily placed in areas without interference and Forward Error Correction allows the system to handle more noise in the signal.

Contact **Hybrid Networks** at (408) 342-4266 or email info@hybrid.com.

For more information circle Reader Service #368

Thomson/RCA Provide Digital Cable Modems To TCI.NET

Thomson Consumer Electronics has been selected by TCI.NET, the broadband division of TCI, to provide two-way high-speed digital cable modems based on the latest CableLabs Interop DOCSIS standard. The agreement includes a retail distribution arrangement for Thomson's RCA DCM-105 digital cable modem. The modem utilizes technology developed by Thomson engineers, and provides access to the Internet and other data services at speeds 50 to 100 times faster than traditional modems.

Contact **Thomson Consumer Electronics** at (317) 587-4450.

For more information circle Reader Service #369

Sharp TU-DTV1000 Set-Top Converter Box

Sharp's TU-DTV1000 set-top converter box is capable of receiving all 18 ATSC DTV formats and will enable consumers to easily migrate from NTSC to HDTV. It is also capable for use in a wide range of applications, including broadcasting, production, corporate, government installations, and content providers. It is scheduled for sale by late 1998.

Contact **Sharp** at (800) BE-SHARP or visit www.sharp-usa.com.

For more information circle Reader Service #370

Systems, GI Collaborate To Deliver VOD Services

DIVA Systems and General Instrument have entered into a letter of intent defining a system solution to jointly enable and market DIVA's OnSet video-on-demand service on GI's DCT-1000 and DCT-1200 interactive digital cable platforms. For operators currently deploying GI's DCT-1000 interactive digital cable platform, the integration of DIVA's OnSet VOD service will provide them with a complete solution from equipment to content for a commercially deployable VOD system.

Contact **DIVA Systems** at (650) 859-6400 or visit www.divatv.com or General Instruments at (800) 225-9446 or visit www.gi.com.

For more information circle Reader Service #371

DTV Tech Talk

The Naked Truth On The Full Monty

Why upresing isn't a dirty word at Quantel

In the world of broadcast equipment manufacturers, the name Quantel has become synonymous with uncompromised video quality. Of course, Quantel's lack of the use of compression and proprietary "black box" technology has come at a cost—a cost that many broadcasters still find off-putting.

But in the post-production world that need for highest-quality resolution has placed Quantel at or near the top of the manufacturer heap (there's no denying that the two juggernauts battling it out on that front are Quantel and Discreet Logic).

With HDTV soon to become an everyday reality for many production companies and networks, the definition of highest-quality video is changing. The numbers 601 will no longer mean the pinnacle of video quality—so how is Quantel reacting to the raising of the resolution bar from 601 to HDTV? Ken Kerschbaumer recently talked with Jon Pannaman, Quantel vice president of engineering, to see where Quantel sees the post market headed, and how Quantel is responding.

Quantel's Jon Pannaman

DTV ■ Can you give us a brief walk through the Full Monty concept and the reasons for the approach that you're taking?

Pannaman □ A lot of it revolves around our thinking that the move to HD is a migration path, not a step change, and we wanted to establish the most flexible progression we could give. We came up with two things—ClipNet and Monty.

ClipNet is for those who like a transport mechanism that we feel brings everything together, regardless of what resolution or format people are going to work in. Having gotten into the Gigabit technology we're using for ClipNet we feel that it offers tremendous benefits at the lower resolutions and also manages the higher resolutions very well. We think it's a bit more universal, and with the rate at which the industry wants to get into managing metadata it combines that functionality as well.

We also think there will be some people who will want to still work with 480i/16:9 before taking the next step to higher resolution, and we feel that's where Monty comes in.

The first part of Monty is a resing node because many of the assets produced in the past and those produced between now and the time facilities move to a higher resolution will be produced at 601 resolution. [The node] gives the user the ability to move media between the various resolutions with very high-precision resing, giving the ability to move 601 up to high-def as in a finished piece, or it can also be used to composite an element with real high def material. It also will be good for situations where high def may come in the door to a plant that is still 601, giving that plant a chance to pull that material in and work with it.

A step beyond that is where Monty becomes a workstation and is capable of manipulating any and all material. You could have a primarily 601 plant with a high def workstation center capable of moving material from resolution to resolution or producing material at any resolution. So whether you're going to have five 601 rooms and one high def or five high def rooms and one 601 the flexibility exists in the architecture to do it any way you want.

DTV ■ So the challenge for post facilities will be producing work for multiple resolutions.

Pannaman □ Yeah, absolutely. I think that the real problem is that until this workstation technology exists they're stuck with tape formats of a particular resolution, or a number of resolutions but they still need access to the other formats. It's kind of like the tape formats, in the sense that all of them store NTSC or 601 but you need one machine to handle the different physical tapes.

Now facilities will be getting into the different resolutions, and they'll need different equipment, but we're trying to overcome that.

DTV ■ Where do you see 601 equipment fitting into future facilities?

Pannaman □ Equipment that is 601 is going to play a role for a long time, and we're not trying to crowbar a 601 machine so that it can handle high def. If you do that you divide up the processing power quite significantly because high def has six or 10 times the amount of processing. So a job that processes in 10 minutes today could literally take hours.

We feel there's an optimized collection of equipment that will produce an optimal facility handling everything rather than trying to compromise a machine that is built today.

DTV ■ The argument I've heard against the Full Monty approach is that up-resing isn't the same as HD.

Pannaman □ Well, it's not HD in one sense, but it's amazing how much you can get out of 601 when you upres it. You can't create detail that wasn't captured, but you can maintain the crispness and maintain the detail at a higher resolution.

So the argument that it isn't HD is right—it isn't. We're not proposing it as a replacement for HD, we're proposing it as a cost-effective step along the way and proposing Monty as a device that can start off life as a resing engine that can later become the workstation.

We're not in any way trying to promote upresing 601 material as the long-term solution for high def. But we feel equally that somebody who says throw it all out, do it all in HD, is equally causing a horrendous misperception because people are going to spend millions of dollars making a step change in their facility that no one in the market can see or pay for.

DTV ■ If you look at the development of post-production technology over the past few years it's gotten to the point where capabilities on the PC and Mac platform allow smaller post facilities to more easily compete with larger ones. How will HDTV impact that competition? Will this shift it back again so that the difference between a big post house and a little one is HDTV equipment?

Pannaman □ I think to a fairly substantial extent it will reset the clock in that way, and I think you're right on the money there. There is going to be a replacement of the technology needed for the high end, and I think what really hasn't been explored is the impact on a medium market.

Within a major market the issue will be the one of old, where it's a question of equipment they can buy dictating the type of market they can get into. It's not so much the cost of the technology but the type of technology and how it operates.

Something we've been very keen to profess is that to some extent it's the quality of the technology itself, but the other side is removing the technical hurdles, and that brings it right back to the talent and the operator. Almost anyone that can get hold of a box that has the raw creative talent can produce an end product that traditionally couldn't be done with linear-based suites, analog or digital.

We've removed some of those technical hurdles, so it's not a pure resetting of the clock because the creative talent that have the equipment will prevail in some sense because they build up a reputation with that equipment at 601 resolution. There's a very good chance they can build the company they need to then move into a costly but feature-based high def technology.

DTV ■ How do you think the needs of broadcasters will push the post market?

Pannaman □ Well, the demands of the broadcasters is what pushes production quality along. The advertising community is one of those areas where as long as they're all upresing they'll be happy upresing. But the day that someone like Nike goes out and does a big thing in HD that's the sort of Domino effect, and it's going to pick up quite quickly.

The thing is, advertising has gotten very creative but it's also gotten very cost conscious. So I think it may be one of the last areas to go HD. It'll be a very sharp climb once it does, but it'll be a while before it starts.

Programming will, on the other hand, be a very gradual, slow climb. We've seen a couple of the production companies go from 16 to 35 mm film, and that's the best protection for HD. We've also seen a push to output their cuts list and things like that so they can take their program and produce proper high def for syndication. But they may also try upresing as well. I think all of these permutations will take off. □

Technology Watch

New Words For The New Age

Splicing, conditional access, statistical multiplexing—what does it all mean?

By Barry Hobbs

In November, 1998, when American broadcasters begin the FCC mandated transition from analog NTSC to the new ATSC digital broadcast standard, the move will constitute more than an upgrade in picture and sound quality. When broadcasters bring their new DTV transmitters online, the very nature of their business will change. Now they can use the free spectrum they've been granted to carry not only HDTV, but multiple data and video services.

By using MPEG-2 compression, broadcasters can fill their new 6 MHz (19.39 Mbps) DTV channels with one HD signal plus SDTV and data services. In addition, the ATSC signal will carry information which will provide service information such as electronic program guides.

As the bandwidth permits, the broadcasters may multicast several SDTV channels, high-speed data services, pay television packages, interactive programming, shopping and other services, and make them available on a subscription service basis.

This new freedom initiates a dramatic paradigm shift that will change the nature of broadcast television, transforming passive home viewers into proactive consumers of entertainment and data services.

Part of this new challenge will be a number of new technologies and disciplines— MPEG-2 encoding and bitstream splicing, signal protection and conditional access, transcoding, and statistical multiplexing are just a few. Let's take a look at some of these new disciplines and their implications.

The Facility

The DTV facility will feature an integrated, end-to-end portfolio of products designed to support every step of the broadcast process—including the encoding of video for backhaul from the field, the coordination, encoding, and multiplexing of signals for broadcast, and the decoding and management of multiple data streams in the home environment.

One of the hottest topics for industry debate is which of the 18 video formats listed on Table 3 will deliver the best performance and picture quality. There are valid technical arguments for using a progressive scan format due to the efficiency gained while coding a progressively scanned frame over an interlaced frame. The progressive scan formats also allow a more cost-efficient and effective convergence with multimedia computer-based applications.

The argument for the 1080-interlaced format centers around providing the consumer with the highest resolution for picture content.

To further complicate matters, it's unclear whether TV sets will be able to handle the display of several different native ATSC formats, or if they will handle one native format, and convert any others they receive to that one for display.

In time, the market will decide which of the ATSC formats will be supported, and which ones emerge as winners. But, broadcasters can't afford to wait for the format war to resolve itself, nor can they afford to wait to make the wrong choice. To provide utmost flexibility, equipment must be fully scaleable, providing broadcasters with the choice of configuring their encoders to each of the ATSC Table 3 formats.

Like consumer prices, the professional equipment needed to produce compelling, original hi-def programming is also very expensive. And without unique HDTV fare, broadcasters will have to resort to filling time with the same movies being shown by their cable, DBS, and MMDS competitors, making it more difficult for consumers to see the value of buying HDTV sets.

Despite the "chicken-and-egg" dilemma that engulfs HDTV, those major market stations wishing to broadcast in HDTV this Fall must proceed with the purchase and installation of HDTV equipment. Dedicated HDTV-only encoders can cost as much as $400,000 each, and if broadcasters only carry HDTV programming in prime time, that expensive device must sit idle all day until it's needed again. If they want to have a back-up unit, in the event of failure, that figure doubles. And, considering that they must carry a minimum of one SDTV signal at any time, they must also purchase an SDTV-quality encoder, making the overall investment financially crippling.

For those stations that can't afford to invest in more than $400,000 for an HDTV encoder and a back-up unit of some type, a cost-efficient solution will be to install a scaleable, modular configuration.

The modular configuration consists of combining six SDTV encoders. The total investment for the six would be in the neighborhood of $300,000, and would offer users realtime MPEG-2 encoding of a 1080-interlaced, 720-progressive, or other HDTV signal. Also, any one of the six units may be used to encode an SDTV signal whenever HDTV is not being shown. And if one of those six encoders fails, a spare can be brought online immediately for redundancy.

SDTV Opportunities

With SDTV comes the opportunity to devote any excess bandwidth in the 19.39 Mbps channel to other SDTV channels, or services such as interactive advertising and data.

For this type of work the signals will have to be multiplexed into a single bitstream for transmission, in addition to being MPEG-2 4:2:0 encoded. Since bandwidth requirements fluctuate relative to the resolution and content of the picture information, multiplexers should automatically adjust the bit rate frame by frame so that channel capacity—and revenue potential—is never wasted.

By dynamically optimizing the picture quality, and utilizing the limited bandwidth efficiently, broadcasters can add up to 30% more channels without sacrificing quality. Broadcasters also need software that provides coordination and management of channels to be multiplexed.

With multicasting, terrestrial television becomes more like Internet, DBS, or cable television because it involves packaging subscriber-based services. Because of this, broadcasters will need to take the same kinds of addressable measures that Internet, DBS and cable operators have been using.

Without conditional access technology, DTV broadcasters will never be able to realize the profits promised by multicasting. However, the affiliate and independent station operators marketing these new services are now challenged to track customer usage, providing access, and collecting revenues.

These are not the only challenges the affiliate stations are facing. Affiliates will continue to package their networks' feeds with their own local identification programming. Rather than just switching on the vertical interval of baseband video, affiliates must now interrupt an MPEG-2 bitstream consisting of groups of pictures, or GOPs. Since MPEG-2 was developed as a means of radically compressing moving images, the GOPs are essentially an encoded shorthand representing the picture content.

MPEG-2 decoders read the shorthand— typically Intra (I) frames, Prediction (P) frames, and Bi-directional (B) frames— and reconstruct the picture information. If networks compress a D1-quality video of 270 Mbps down to 19.39 Mbps, the affiliate station runs the risk of introducing artifacts if it decodes that contributed content back to baseband to add commercials or other locally-sourced elements, then re-encodes it to 19.39 Mbps for delivery to the home.

Networks can reduce the risk of concatenation if they send their ATSC contribution feeds compressed at 30 to 50 Mb/s, because the more information in the bitstream, the better the picture quality will fare after re-encoding. If, however, the content is HDTV resolution, even a small amount of concatenation may be objectionable to viewers.

To avoid this quality compromise and address the local identification and branding issues, the industry is developing MPEG Bitstream Splicing whereby television programs may be switched in the compressed domain in a similar manner to conventional, uncompressed video and audio switching. While MPEG bitstream splicing is perhaps the most critical and complex piece of the affiliate's DTV operation, this matter has not yet been adequately resolved since some splicing techniques can introduce delays of up to three seconds. Ideally, MPEG-2 bitstream splicing should be seamless, instantaneous, and in accordance with SMPTE in-point/out-point guidelines.

Barry Hobbs is director of engineering and systems support at NDS Americas Inc. □

Bob Aldrige, television mixer, gets behind an AMS Neve 48-fader, 96-input Libra Live broadcast console for PBS' recent James Taylor concert broadcast. The console is part of All Mobile Video's newest all-digital audio and video truck which also features Sony gear.

Product Review

Evertz HDTV Ancillary Data Encoder

Evertz Microsystems has introduced the HD9570 ANC. data encoder. It is designed

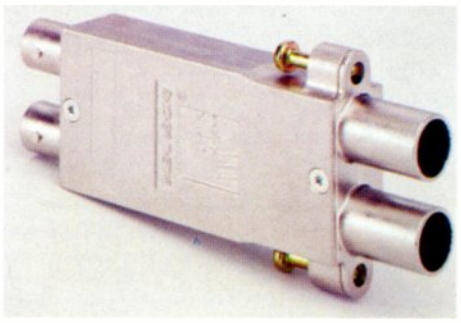
as a solution for high bit rate data handling requirements such as closed captioning, source ID, timecode, VITC, and other Metadata application requirements for HDTV. Housed in a compact, 1RU frame, it consists of one front processing card and a 1.5 Gb/s I/O rear connector card. It can accommodate up to three processing cards and up to three rear I/O cards. This allows the unit to be optioned to house up to two 1.5 Gb/s DAs as well.

Contact **Evertz Microsystems** at (905) 335-3700 or email sales@evertz.com

For more information circle Reader Service #372

ADC Telecommunications Super Video Jacks

ADC Telecommunications is now offering its SVJ-2 and MVJ-2 super video jacks,



designed to meet the SMPTE 292M requirements for uncompressed HDTV and lower data rate signals such as digital video and all existing analog video formats. The family of jacks have closed-entry BNC contacts, diecast body and cover, and new captive-mounting screws. The SVJ-2 is a standard-size jack, has a characteristic impedance of 75 ohm in the normalled state, and will provide an industry-exclusive 75 ohm in the patched state. It has a rated bandwidth of 2.4 GHz. The MVJ-3 is a mid-size jack for mobile systems, and allows for up to 32 jacks to be mounted in one standard rack space. It exhibits 75-ohm performance in both the normal or patched state, and has a rated bandwidth of better than 3 GHz.

Contact **ADC Telecommunications** at (800) 726-4266, ext. 3126 or visit www.adc.com

For more information circle Reader Service #373

Accom PreRead DDR

The world's first PreRead DDR is now available from Accom, in the form of the Accom Professional Recorder. The APR Attache digital disk recorder has 32 minutes of 8-bit storage (or 26 minutes of 10-bit storage) and is priced at $29,900. It is the first uncompressed DDR to offer VTR-like PreRead and Confidence record functions, and the Offset/PreRead function is a non-destructive PreRead mode that allows simultaneous record/play operation. Key-Track option provides a synchronized parallel track for 4:0:0 luminance key signal, and video and key can be recorded independently. It can also switch to a 4:2:2/0:2:2 recording mode using the ITU-R/BT.799-2 spec for two-wire serial digital RGB.

Contact **Accom** at (650) 328-3818 or visit www.accom.com

For more information circle Reader Service #374

Videotek Demodulator

The DM-100 demodulator has all of the features demanded for basic demodulator

applications. It accepts either antenna or cable TV RF inputs, and outputs both video and balanced BTSC stereo audio. The compact size of the DM-100 allows for up to three units to be placed side by side in only one rack unit of space. A rear panel switch allows for locking the DM-100 to all selected functions, including channel tuning, video and audio level, and stereo balance. Other functions include selection of channel fine tuning offsets and forced HRC tuning.

Contact **Videotek** at (800) 800-5719 or visit www.videotek.com.

For more information circle Reader Service #375

Euphonix CS3100B Console

The CS3100B is Euphonix's latest digital control audio broadcast mixing system, and it will ship with Backstop PFL-equipped motorized or non-motorized faders and Version 3.1.1 MixView software. In addition, improved redundant power supplies insure flawless on-air performance and the system's rackmounting hardware allows for easy installation. The AudioCube, a versatile routing matrix together with the new TrackPanner controller provide dedicated 5.1 surround panning from every console fader. The console is available in a range of configurations from 16 to 104 inputs with a wide variety of signal processing and bussing options.

Contact **Euphonix** at (818) 766-1666 or visit www.euphonix.com.

For more information circle Reader Service #376

Pinnacle Systems BroadNeT

BroadNeT enables broadcast products to be networked together over both standard video and computer networks, creating a collaborative environment between Pinnacle's broadcast products and those offered by third parties. In addition, images and information from the Internet or remote intranet file servers can be imported to Pinnacle's BroadNeT applications and converted on the fly into ready-to-air graphics.

Contact **Pinnacle Systems** at (650) 526-1600 or visit www.pinnaclesys.com.

For more information circle Reader Service #377

Telex RTS Zeus 2400 DSP Matrix Intercom System

The RTS Zeus 2400 DSP intercom system provides 24 channels of better-than-CD quality audio in a two rack package. The heart of the system is a TDM ASIC that performs all audio switching and mixing in the digital domain, and the CD-quality sample rate of 44.1 kHz is enhanced by 20 bits of resolution yielding superior audio clarity. The TDM ASIC processes 45-bit word length, insuring full performance regardless of the number of users on a given path. Zeus offers eight GPI inputs and outputs to trigger external devices including two-way radios, voxes, tally, and alarm indicators. It offers balanced inputs and outputs at an operating level of +8 dBu, and the maximum level is +20 dBu with a frequency response of 20 to 20kHz +/-1.0 dB and total harmonic distortion of .01 percent.

Contact **Telex** at (612) 884-4051.

For more information circle Reader Service #378

Angenieux HR Series Wide Super Zoom Lens

Angenieux's new 12x5.3 AIF high-resolution (HR) series wide super zoom lens is

compatible with 2/3-inch, digital 16:9 format cameras, and is usable on 4:3 cameras with the use of a 0.8x converter option. It combines f5.3 wide-angle capability with a 12x zoom range of f5.3 to f64mm. Its zoom range can be extended to f128mm with the use of a standard 2x range extender, and the lens also features a fast aperture of f1.7.

Contact **Angenieux** at (973) 812-3858 or email angeniue@tctus.com.

For more information circle Reader Service #379

Tekniche Ixion Motion Adaptive Standards Converter

The IXION is a high-end standards converter condensed into 1RU. The system's architecture allows the input and output processing to be configured according to needs, and particular attention has been paid to the critical stages of decoding and encoding composite video signals. Serial digital inputs and outputs are also avail-

able, and the core conversion process is a high-precision motion-adaptive four-field by four-line process retaining full 10-bu resolution.

Contact **Tekniche** at (201) 784-2288.

For more information circle Reader Service #380

Nova Systems Signal Processing Modules

Nova Systems has introduced a number o new signal processing modules for its Stu dioFrame signal processing system. The

new modules include a digital 4:2:2 (D-1 frame synchronizer; fully ITU-R601 com pliant serial digital converters; serial digi tal converters with on-board synchroniza tion/genlock; SuperTrol enhanced remote control panel; and a 10-bit timebase cor rector.

Contact **Nova Systems** at (408) 866-830 or visit www.videonics.com.

For more information circle Reader Service #381

Hewlett-Packard MPEGscope Plus Enhancements

Hewlett-Packard has introduced its first enhancements to its MPEGscope Plus digital video test system. The system allows network service providers and manufacturers to speed testing and qualification o MPEG, DVB, and ATSC equipment an services. The enhancements include the ability to define, compile, and then display decodes of their own private tables and descriptors, such as electronic program guides, in plain English. It also includes Transport Stream composer that allows users to create multiprogram Transport Streams, based on raw Elementary Streams for testing MPEG-2 re-multiplexers and decoders. The product's standard hardware platform has also been upgraded to a 300 MHz Pentium II processor tha supports capture and playback at rates up to 90 Mb/s.

Contact **Hewlett-Packard** at (800) 452-4844 ext. 5879 or visit www.hp.com/go/MPEGtest

For more information circle Reader Service #382

Silicon Grail Chalice

Silicon Grail's 2D compositing software Chalice, is the first to run on either SGI or

Windows NT platform, according to the company. It is also the first software to include Substance, the next-generation blue screen matting technology from Ultimatte. Substance allows users to automatically correct problems in the blue and green screens in shots that include camera movement but where a clean plate is unavailable. The system also has nine new nodes included in the software, including the most powerful suite of color correction tools of any digital compositor. Other new features include nodes for producing posterized effects, warp effects, and area filters.
Contact **Silicon Grail** at (213) 871-9100 or visit www.sgrail.com.

For more information circle Reader Service #383

Video Data Systems LogoSTAR

LogoSTAR provides a simple and cost-effective means of keying logos over incoming video. For use in cable, satellite, or TV broadcast operations, the LogoSTAR is ideal for storing and inserting on-air standby slides, channel IDs, copyright warnings and other frequently used images. It occupies only 1RU, and logos can be stored and displayed in up to 256 colors selected from a palette of more than 65,000 colors. An LCD panel and keypad are provided for local system status information and user control.
Contact **Video Data Systems** at (800) 858-5850 or visit www. videodatasys.com.

For more information circle Reader Service #384

Faroudja Digital Format Translators

The Faroudja Digital Format Translators provide a range of modular solutions for broadcasters, cable, and satellite services seeking to deliver a variety of DTV and HDTV video formats. The translator provides HDTV-quality video in formats including 480p, 720p, and 1080i, from today's analog and digital sources. With the unit, stations can now seamlessly insert archived videotape and electronic feeds into HDTV network feeds.
Contact **Faroudja** at (408) 735-1492.

For more information circle Reader Service #385

Azden UHF Wireless Microphone

The 400UDR is Azden's first portable UHF receiver, and is designed specifically for broadcast applications. Designed to mount directly on the camera, the receiver is 63-channel switchable in the 794-806 MHz bandwidth, and it's also true-diversity, crystal-controlled, and PLL-synthesized. It has dual antennas with BNC connectors and an XLR output jack. LEDs are included for the following functions: low battery condition, RF and AF levels, and antenna A or B reception. It also comes complete with output and headphone volume control, channel selectors, and a 12-volt DC input jack. Corresponding transmitters include the 41HT handheld microphone/transmitter and 41BT bodypack transmitter.
Contact **Azden** at (516) 328-7500 or visit www.azdencorp.com.

For more information circle Reader Service #386

Drastic Technologies VVW-1500 Digital Disk Recorder

The VVW-1500 Digital Disk Recorder provides complete VTR replacement with a sophisticated interface, robust RS-422 control as well as network connectivity.

Features include proven MJPEG variable compression up to 4:1, two or four channels of CD-quality audio, and SMPTE timecode with chase support. Drastic also supplies hardware options such as external SCSI or Fibre Channel for up to 96 hours of storage, 100 BaseT, Gigabit and wideband backbones.
Contact **Drastic Technologies** at (416) 255-5636 or visit www.drastictech.com.

For more information circle Reader Service #387

SyntheSys Research HDTV Video Analyzer

The BitAlyzerHDTV, Model HDVA292 is a comprehensive digital analyzer for high definition serial digital video signals. It tests for compliance with 1035i and 1080i standards, and operates at a serial data rate of 1.485 Gbps, with frame rates of either 60 Hz or 59.94 Hz. Views for analyzing input signals with the BitAlyzerHDTV include Error Status, Error Statistics, Error Log, Error Detective, Data Waveform, Data Analyzer, and Data Picture. The simple touchscreen control graphical user interface is presented in color on a 9.4-inch active matrix LCD display.
Contact **SyntheSys Research** at (650) 364-1853 or visit www.synthesysresearch.com

For more information circle Reader Service #388

Ross Video Synergy Serial Digital Production Switchers

The Synergy Series of digital production switchers is designed for live news, sports, and production. Over-the-shoulder boxes, picture freezes, repositioning of keys, pushes, and more are available with the Squeeze and Tease feature. Complex

switcher and remote control operations are made simple through the unique custom control hot buttons, and additional features include: preview overlay, 12 aux busses, up to 64 inputs, VTR control, external DVE integration, and redundant power. It's packed in an 11RU, 600 watt frame and is available with either 4, 3, or 2 MLEs.
Contact **Ross Video** at (613) 652-4886 or visit www.rossvideo.com

For more information circle Reader Service #389

Odetics SpotBank Pro Enhancements

The SpotBank Pro automated management system now has a number of enhancements, including resource sharing for VTRs and DDRs used for media production and recording, and ViewBase, a powerful new database management tool which allows users to search and sort a media library with a Windows Explorer-type geographical user interface. Several options were also added. The RecordDDirectoR software automates up to eight scheduled, simultaneous recordings of incoming feeds from satellite networks. VideoSpy enables users to efficiently review spots dubbed into the video server and allows the playback of video and audio in a video window on a single PC display. Also added is the Data Library Manager, simplifying video-data archive backup by enabling users to manually or automatically transfer video-data files between the video server and an Odetics automated data-tape library. The SpotBank Pro software is available for immediate delivery.
Contact **Odetics** at (714) 780-7502 or visit www.odetics.com

For more information circle Reader Service #390

Leitch BO/S

The BO/S broadcast operating system advances the control functionality of Leitch's DigiBus product line and prepares users to control future Leitch products. BO/S centralizes users' controls and governs Leitch DigiBus's control panels, frame controller and configuration. With updated realtime software that runs on DigiBus bus controllers, BO/S includes Leitch's DigiWorks PC-based configuration utility. The configuration utility maintains a database of installed frames, represents the frame configuration with a graphical user interface, contains a global database of over 500 DigiBus products, and provides device naming and grouping, control locking, and back-up capabilities.
Contact **Leitch** at (800) 387-0233

For more information circle Reader Service #391

Bogen Roll-Pod

The Roll-Pod provides users with the quickest way to move their tripod and camera equipment over the most demanding terrain. It consists of a custom aluminum alloy frame with 16-inch wheels and pneumatic tires, plus a rugged handle for maneuvering. The user raises the handle to roll the camera and tripod and lowers the handle to put it back on all three tripod feet. Camera bags, monitors, battery

packs, and other accessories can also be attached to the tripod frame with the Manfrotto Super Clamp system. The Roll-Pod fits the entire line of Gitzo Studex Series tripods and Manfrotto 3021, 3033, 3036, 3051, 3058, 3061, and 3068 tripods. Mounting kits for other tripods are expected soon.
Contact **Bogen Photo Corp.** at (201) 818-9500 or visit www.bogenphoto.com

For more information circle Reader Service #392

For.A LDR-200 Live Digital Recorder

The LDR-200 is a nonlinear, random access compression-based disk recorder that can provide superb support in a variety of applications. Simultaneous record/slow motion can be performed, or it can be used for unattended automatically delayed A/V playout of program or satellite air material. It is NTSC, PAL, PAL-M, or PAL-N selectable and multi-format video I/O capable. Selectable JPEG compression ratios from 1:3 to 1:20 can allow for longer standard capacity, and full process comb filtering for maximum analog composite signal quality is offered. Options include letting users add timecode input/output capability, and different capacity external hard disk drives to expand recording capacity.
Contact **For.A** at (714) 894-3311

For more information circle Reader Service #393

Telect VersaFrame II

The VersaFrame II Digital Conversion System provides a comprehensive range

of conversion tools for A-to-D, D-to-A, component, composite, and countless other applications. It has a modular archi-

COMING ATTRACTIONS

AUGUST

Special Report
SILICON VALLEY REPORT CONVERGENCE 1998

Special Supplement
DTV POST: POST FOR PC

Production
VIDEO MONITORS

Station Operations
SERVERS AND CARTS, STATION AUTOMATION

Transmission
SOLID-STATE TRANSMITTERS

SPACE CLOSING 7/12
MATERIAL CLOSING 7/16

SEPTEMBER

Special Report
DTV IN THE NEWSROOM

Special Report
IBC COVERAGE

THE INFLUENTIALS

Special Supplement
DTV POST, POST FOR MACINTOSH

Production
AUDIO CONSOLES

Station Operations
ASSET MANAGEMENT, ARCHIVING

Transmission
FIBER TRANSMISSION

BONUS DISTRIBUTION
IBC Amsterdam, Sept. 12-16
RTNDA San Antonio, Sept. 23-26

SPACE CLOSING 8/16
MATERIAL CLOSING 8/20

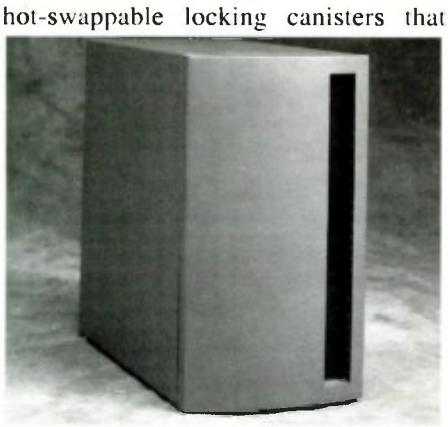
Product Review

tecture that is easy to use and is easily expandable for future growth. Each frame handles up to four modules and features power supply redundancy by interconnecting two frames through a rear panel patch. Several major conversion modules for the VersaFrame II were introduced at NAB, including a component analog video to 4:2:2 converter, a 4:2:2 to 4 fsc and NTSC/PAL converter, a 4:2:2 to component analog video converter, and an NTSC/PAL to 4:2:2 decoder with TBC. Contact **Telect** at (509) 926-6000

■ **For more information circle Reader Service #394**

JMR Electronics Modular Desktop Tower

The Modular Desktop Tower from JMR Electronics accommodates four 3-1/2-inch FH or 1/6-inch high fibre devices in hot-swappable locking canisters that



include a canister-mounted power supply for easy removal. Features include a power supply and fan, audible and visual alarms for fan temperature and power supply, dual I/O fibre ports, and jumper-selectable device ID's between 0-125 for each slot.

Contact **JMR Electronics** at (818) 993-4801 or visit www.jmr.com

■ **For more information circle Reader Service #395**

Matrox Adobe Premiere 5.0 On DigiSuite Platform

Matrox is porting its realtime plug-ins to Premiere 5.0 to give users access to the advanced realtime feature set of the dual-stream DigiSuite hardware. Matrox plug-ins control two streams of D-1 video (up to uncompressed quality) plus 32-bit animated graphics in realtime—without rendering. Advanced realtime features include hundreds of user-customizable transitions, independent transparency, and proc amp control on all layers, multiple channels of keyframeable 2D DVE with high-quality scaling, subpixel motion, and transparent shadows, and two channels of advanced chroma/luma keying with chroma suppression, shadow preservation, and anti-aliased edges.

Contact **Matrox** at (514) 685-2630 or visit www.matrox.com/video

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Parkervision CameraMan Studio

The Parkervision CameraMan Studio gives one person control over multiple CameraMan cameras, digital video effects, digital audio mixing, VTRs, other

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Contact **Parkervision** at (800) 532-8034 or visit www.parkervision.com

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Eurologic Voyager 3000 SCSI RAID Array

The Voyager 3000 is a mid-range SCSI Raid Array with concurrent support for

RAID levels 0, 0+1, 3, and 5 and up to 32MB of high-performance EDO cache. Vision storage management software enables complete control of the storage system from a remote location as well as a complete suite of notification utilities. Users can start with as little as 4GB or be expanded to support 117GB on a single controller.

Contact **Eurologic** at (978) 266-9224 or visit www.eurologic.com

■ **For more information circle Reader Service #398**

Islip Media MediaSpeak Solo, Chorus

MediaSpeak Solo and MediaSpeak Chorus software allow users to automatically process live and archived video by using spoken annotation to quickly captur more detailed information about video Both software packages convert speech to text, with MediaSpeak Solo optimized for a single speaker and MediaSpeak Chorus optimized for multiple unknown voices. Realtime news logging, sport archiving, and building stock footage collections are just a few of the applications of the system. MediaSpeak Solo requires an Intel Pentium 200 MHz MMX processor and 64 MB RAM, a Creative Labs Sound Blaster 16 or compatible audio board, and Windows 95 or NT. MediaSpeak Chorus requires an Intel 266 MHz MMX Pentium II Processor and 128 MB RAM, 16-bit audio board and Windows 95 or NT.

Contact **Islip Media** at (412) 687-0530 or visit www.islip.com

■ **For more information circle Reader Service #399**

CEMA, NAB Sponsor DTV Summit

NAB and CEMA will sponsor the third DTV Summit in Dallas, Texas, from July 15-16. The summit will feature leaders from consumer electronics manufacturers, retailers, and broadcasters, and provide attendees with the latest information and strategies for transitions to digital television.

Chuck Sherman, senior vice president, NAB Television, says, "The DTV Summit is an opportunity for all those interested in digital television to begin to learn what is going to be successful in the digital broadcasting era."

Summit programs will highlight the latest consumer research, market projections for DTV products, regulatory issues affecting the rollout, manufacturers' plans for digital and HDTV, broadcasters' transition efforts, and retail solutions and strategies for DTV and related technologies.

The summit will be held at the Omni Park West in Dallas. Pre-registration costs (before July 10) for CEMA and NAB members and retailers are $175, and $225 for non-members. For more information call (703) 907-7605 or visit www.cemacity.org.

HDTV Products

(Continued from page 1)

00x800. So all those extra pixels that BC and CBS are offering with 1080i lecasts aren't passed on to the viewer.

Set manufacturers don't see this as a otential concern. Discussions with manfacturers show they believe the impornt thing is that the viewer gets the same icture quality at home that they see in he store.

This does make sense, but for many onsumers a big ticket item is associated losely with ego and wanting to feel like "have." So how will consumers react to helling out thousands of dollars to feel ke a "have not?"

2) 16:9 and 4:3

Ah, the contentious issue of aspect tio. Everyone knows how the vast ajority of consumers hate letterboxing. nd with programming expected to still e primarily 4:3 for the next few years hat means that viewers who purchase an DTV set will have to get used to black rs on the sides of the 4:3 image.

Or does it? The SVGA DTV sets on the arket are actually 4:3 with 16:9 proramming letterboxed. According to pfelbaum, a boxed-in 4:3 picture on a 2- or 36-inch set would be unattractive consumers, especially since most of eir viewing will be of 4:3 material.

But the larger projector sets, like Panaonic's 56-inch HDTV compatible proection TV, will be 16:9 because boxed-in :3 images at that size will be large nough to be unobjectionable.

Will the 4:3 monitor lessen the impact of DTV images in the showroom? Will potential customers be more apt to stroll by a 4:3 DTV-compatible monitor without even blinking an eye because it looks like a regular television? After all, when a stretch limo goes by heads will turn. But as nice as a Lincoln Towncar is, the impact isn't quite the same (although in the same respect, the new Volkswagen Beetle is turning heads, so...)

3) Decoder Confusion

Then there is the digital set-top decoder. Without the set-top unit the DTV or HDTV set is not capable of decoding the DTV or HDTV signals. So the consumer buys the television set and then buys the set-top box. The only problem, at least for the consumer, is that the set-top may cost as much as the set itself. Panasonic's set-top box is $1,700, with other manufacturers offering boxes at about the same price or more. So the stickershock consumers will have when they see the price of the sets will only be compounded.

"No matter what we do and what kind of promotion we put around it its still going to be expensive to purchase the set and the set-top box," explains Apfelbaum. "All of the projections indicate that the first year sales will amount to about one percent of the total unit population. And that's okay, we understand that's the marketsize."

In addition to the cost, customers could be confused by the need for a set-top box. After all, why not include it within the set itself? Who needs another box?

Perry explains that the component approach taken by some of the manufacturers is actually great for the consumer because it future-proofs the sets. The 1080i display technology available today won't evolve over the next couple of years, but with the potential for standardization in things like encryption or datacasting the same can't be said of the decoder boxes. So even if the decoders were built into the set there may be the need for add-on devices in the future.

In addition, because the decoder is an outboard device it allows for customers in markets that don't have DTV broadcasts to purchase the sets. They can watch DVDs in full 16:9, and analog NTSC signals (offering some picture improvements) without having to pay extra for a built-in decoder they can't take advantage of. Then, when DTV signals are available, they can make the set-top purchase.

It'll also be interesting to see what reaction RCA's DTC100 set-top decoder gets from the public. Priced at $700, it will allow today's analog sets to display the digital signals, albeit as an analog signal. The unit will also serve double duty as a Digital Satellite System receiver, and will be sold with a standard 18-inch DSS antenna.

4) The Antenna Thing

When Lin Television broadcast this year's Texas Rangers season opener in Dallas, Panasonic was taking part in set demonstrations at local retailers. Customers loved the picture, and were interested in getting more information, but they also believed they would be able to plug their cable right into the back of the set and start receiving glorious pictures.

This isn't going to happen, at least not in the near term.

Instead, consumers will have to climb up on the roof and install a new antenna. A set-top antenna may do the trick, but the roof top will probably be the best bet for getting a DTV signal.

So the question retailers will face is how will consumers react to a technological leap forward that's going to bring back memories of watching television at grandma's house?

Gary Shapiro, president of CEMA, says that today's antenna designs are sleek and innovative, and that if the correct antenna is used reception of DTV signals is remarkable. CEMA also recently organized an Antenna Subdivision to help coordinate and energize technical and market developments.

There is also some concern with regards to the ability to receive signals in certain areas that are challenged geographically. Needless to say, the cliff effect, where there is no gradual signal degradation, just a blank screen, could be a major turnoff.

5) Cable TV

As mentioned above, potential customers may expect to be able to hook up their new DTV set to cable. And all manufacturers (and broadcasters) seem to agree that until cable systems offer DTV and HDTV signals DTV sets will be a tough sell.

"I think that if cable supports HDTV then HDTV will become a defacto standard," adds Apfelbaum. "If cable allows a pass-through of the signal and allows the manufacturer to decode it, that's fine too, as long as the consumer has the opportunity to receive a DTV signal. So many of the consumers receive their television signal through cable that we have to have cable support one way or the other. Otherwise it's going to be a long uphill road to get this thing out to the consumer."

Let's face facts. Getting this far in the HDTV process has been a long uphill road as well. So what's another couple of miles?

Digital Television staff report

Consumer Watch

Here's a quick look at some of the consumer sets that are set for sale this fall.

Mitsubishi

Mitsubishi Electric is offering the most extensive lineup of HDTV televisions to date. Mitsubishi has seven "HDTV-upgradable" rear-projection TVs, which will show analog NTSC programming and full 1080i HDTV programming when connected to an optional $3,000 set-top DTV tuner/decoder. The company's strategy is to let consumers upgrade to HDTV in a building-block fashion, while ensuring against obsolescence.

All seven HDTV-ready sets incorporate analog tuners for use with current broadcasts. Mitsubishi also adds a proprietary HDTV Interface to connect sets to current and future Mitsubishi-branded set-top DTV tuners.

The company says the interconnect will be included in all future Mitsubishi DTV set-top tuners. The system fully integrates the tuner circuitry with a television's control circuits to provide seamless access of both analog and digital channels, the company says.

Each of the sets is capable of displaying up to 1080i HDTV images. The first-generation set-top tuner, using a Mitsubishi/Lucent chipset, will upconvert 720p broadcasts to 1080i. Coupled with a new DiamondDigital Pixel Multiplier system in the sets, NTSC, 480i and 480p standard-definition TV signals produce a line-doubled 960i picture with quadrupled pixels.

For this year, the company's DTV tuner will carry a $3,000 suggested retail price. Mitsubishi sees the device eventually being used as a junction box for other digital devices that can share a central MPEG 2 decoder.

Bob Perry says Mitsubishi isn't expecting heavy volume of first-generation set-top units. However, he adds that production costs and unit pricing should decline rapidly, and prices could come down as much as 50% for second-generation tuners.

Prices for the HDTV line run between $4,299-$9,999 and include five models with 4:3 aspect ratio screens in the 50-inch ($4,299), tabletop 55-inch ($4,299), 60-inch ($5,399), 70-inch ($6,499) and 80-inch ($9,999) screen sizes, and two 16:9 widescreen rear-projection sets in the 65-inch ($6,499) and 73-inch ($9,999) sizes.

The first models are slated to ship to dealers in September. Others will follow in October and November. The set-top tuner ships in October.

Panasonic

Panasonic will enter the DTV age in a modular fashion, with its flagship product being a 56-inch widescreen projection TV that comes with a conventional tuner but has 1080-interlaced and 480-progressive display capability. A companion set-top decoder, which can be used with any digital-ready or conventional TV, can output all 18 of the approved DTV formats or convert them down for 480p or regular 480i display. This set is the only one in Panasonic's lineup that offers an actual 1080 lines of resolution.

While the projector carries a suggested retail of $5,999 and the decoder is pegged at $1,700, the anticipated minimum advertised pricing will allow dealers to promote them in an under-$7,000 package.

Also coming this fall are a 32-inch DTV-compatible flat-tube TV at $1,799, a 36-inch DTV multi-scan monitor at $3,199, and a D-VHS VCR that will retail for less than $1,000. The 32-inch and 36-inch monitors are both SVGA, and are also 4:3.

RCA

RCA's top-of-the-line HDTV set is the P55000 55-inch 16:9 display format rear projection monitor featuring three CRT HD display drivers with HD optics ($6,999). It offers a digital resolution of up to 1920x1080 pixels and has an all-ATSC format decoder with NTSC upconversion.

RCA also is offering the MM36100 ($2,799), a 36-inch SVGA monitor available in the first quarter of 1999.

RCA's DTC100 is a converter box that will allow existing analog sets to receive and display DTV broadcasts as an analog signal ($700). The unit will also serve double duty as a Digital Satellite System receiver and will be sold with a standard 18-inch DSS dish/antenna

Toshiba

Toshiba's three DTV-ready models ship in September, and include the 65-inch TW65H80 TheaterWide ($7,299), and the 71-inch TP71H95 ($7,299) and 61-inch TP61H95 ($4,099), both of which part of Toshiba's high-end Cinema Series line. The DTV models list a 34.7 kHz scanning frequency. All three add the non-proprietary DTV Interface Terminals.

News

HDTV in Philly

(Continued from page 1)

they don't hurry up and issue a construction permit then we're going to have some timing issues because of how long it takes to put the transmission equipment in place."

WTXF will lease space for its antenna on an already existing tower in Roxboro, Penn., and Krach says the station is prepared to move as soon as the FCC gives it permission.

"We've done the lease, we have the tower, and we're ready," she adds. "We are having the mount for the antenna designed and fabricated while we wait."

Making Modifications

WCAU is currently modifying its existing broadcast tower, putting a stacked Dielectric TFU-28 antenna on top in order to transmit on channel 67. Kollinger says that will take some strengthening of the tower, and some modification. The station is also building a small expansion to its transmitter building to house the Comark 50 kW transmitter.

"The transmitter end of DTV is very straightforward," he explains. "It's different cause we're broadcasting digits instead of analog audio and video, but RF is RF. We still have antennas, transmission lines, 40 volt power, it's a UHF transmitter. It's just that when we hook the B&C up to it it'll be a little different as far as what's going in there."

If everything goes according to plan, Kollinger says the station should be testing the DTV transmitter by the end of September or October.

For two of the stations, WPVI (ABC) and KYW (NBC), the move to DTV transmission builds on an existing relationship. For 40 years KYW has leased space on WPVI's tower, and that will continue with the construction of a new Kline tower that will be owned by WPVI.

"After 40 years we're used to each other," says Jim Chase, KYW chief engineer. "This buildout is a project, that's for sure, and we're hard at work trying to meet the November 1 deadline."

Chase says KYW's Harris Sigma transmitter and Dielectric antenna should be in place and broadcasting on November 1, barring some unforseen event.

Jim Gilbert, engineering director at WPVI, says his station's Sigma transmitter and Dielectric antenna and transmission lines should be in place sometime in early July. The tower will be located on 20 acres in Roxboro.

"We already owned the land, so that was the impetus for the new construction," he explains. "But even though we already owned the lands there were still a lot of zoning meeting and a slew of other things involved in getting it up."

The Signal

WCAU is initially planning to do a basic pass through of the HDTV signal. "After that we'll be looking at some local playback from a server. But it's an evolutionary thing. We'll be doing everything in 601 to get it through the system, and the NBC network made that decision based on Project Genesis, and it's a good decision."

Kollinger says he'll probably put some 601-converted 1080i on his server, but the first year of HDTV broadcasts will really consist of testing and experimenting.

"As a natural evolution to the facility we're migrating to digital like everyone else in the business," he adds. "And we're trying to blend that with a conversion to a higher-resolution facility—in our case 480p to 1080i."

Kollinger says WCAU still hasn't decided how much upconversion it plans on doing. "I base that strictly upon what gives the viewing public the best quality. If I can't get a really good looking upconverted 1080i out of 525 NTSC then I'm not going to run it because I'm not going to anger people who've just spent thousands of dollars on a new TV set. I want to take full advantage of the technology and give them the best I can."

Audio is another important part of the equation for Kollinger. "The 5.1 channel audio is important for movies and some other things, but the important thing is the improved stereo," he offers. "And I think the viewing public has become very smart and up on the technology, and is demanding home theater. They want to be moved by what they see in the living room, not just the theater."

Gilbert holds that WPVI will probably not do anything fancy in terms of delivering the signal, even though the station has a Grass Valley M2100 HDTV master control switcher.

"It'll be the ABC HDTV signal and then the other source will be an upconverted NTSC signal from us, and we'll switch between them," he says. "The control apparatus will still be an old four-channel Grass Valley 1600 four input switcher. Until we build our new control room we won't be able to automate that."

Gilbert says there are still many unanswered questions regarding equipment, but that evaluations done in the ABC Labs on equipment like encoders will help with the purchasing decision. Also helping will be the eventual availability of 720p equipment.

"The proponents of 720p said there would be a lot of equipment at NAB, but there wasn't," he adds. "There was actually more 1080i equipment, but I think the deliverability of both formats is somewhat the same."

PSIP Helps Viewers

(Continued from page 4)

From the general manager and station imaging perspective, the branding issue was largely ignored on the previous system (standards A/55 and A/56). But PSIP is a technical solution that builds upon marketplace and consumer education reality."

What PSIP offers is guaranteed to put a smile on any general manager's face. It's a system designed to build upon what the viewer already knows, today's NTSC channel, by adding new digital services to the NTSC channel number. For example, 2-0 would take the viewer to the NTSC service, 2-1 to the first digital service, 2-2 to the next, and so on (the dash in this example is known as the delimiter, and the standard does not specifically detail what that delimiter should be).

With PSIP, digital television sets or set-top boxes will receive a stream of program information within the station's DTV signal. The receivers will scan and gather "event information tables" (EIT) even when they are turned off. When the viewer turns the set on they'll be able to view a program guide showing all over-the-air programming.

The tables will be broken up into three hour segments, and at least the next 12 hours must be available to the viewer.

Allison explains that PSIP came about when the ATSC realized that broadcasters were leaning towards standard A/55 which would offer a program guide but wouldn't send signal information. Once the possibility of multichannel broadcasting came up it became apparent that A/55 wouldn't make multichannel navigation easy. So the T3/S8 group took some stuff from A/55, some stuff from A/56, and threw in some new things to create A/65.

"All the broadcasters that go on air in November will have PSIP, with the possible exception of PBS because they're using a slightly different distribution method," says Allison. "They'll have PSIP in the stream but the question is whether it will be overwritten by the local PSIP."

Where It Fits In

Body:The PSIP information will be very easy for broadcasters to work into the signal, with the PSIP generator being either a software or hardware device, integrated into the station's ATSC emissions multiplexer or connected to the multiplexer via a port.

"From a system standpoint you'll need PSIP generator functionality somewhere, either in the multiplexer or in an external box," explains Allison. "It could be part of the traffic system, or any workstation or PC. But saying specifically what box it is in is up to the station.

"The difficulty," he adds, "is telling people what PSIP is without telling them how to build it."

The PSIP information fits into the equation once the multiplexer has encoded the video and audio. The programs and information from the PSIP generator would be sent out together in the final multiplex. The reason for its working in conjunction with the multiplexer is that it needs to know which packet identifiers (PIDs) have already been assigned by the multiplexer.

Allison says he believes most stations will broadcast PSIP information in 48-hour segments. "That way the TV set has two chances during its 'sleep' mode to get the program information."

Set-Top Boxes

Body:PSIP sounds great for those who can afford digital television sets, but there is a good chance that many consumers will get their first taste of digital television from cable set-top boxes. Will those viewers be able to take advantage of the PSIP information?

Allison explains that the cable set-top box presents a number of complexities. "Does the signal come out of the box on IEEE-1394 as a 200 Mb/s data stream or is it an 8-VSB modulated signal? How do you handle the tuning for both of those circumstances?"

The fundamental need is creating some sort of a user interface for the display on an NTSC set, also creating some interesting problems.

"The user will need input and response fed back to the set-top box so they can communicate with the set based on what's happening on screen. They'll need a two-way path and user interface so they can use the NTSC set by proxy. And that will actually add some complexity to the set-top box."

Allison adds that current set-top boxes don't do that too well, and that even if they output the signal at 8-VSB from the cable box as if it was tuning a channel the viewer wouldn't get the benefits of PSIP.

"If the cable system put the 8-VSB on an arbitrary channel he could have the DTV channel on channel 7, for example. But the cable box can't do things like 7-1 or 7-2, and if the 8-VSB signal is taken out and the signal is transferred in frequency there's a problem also because the same RF frequency will be mapped to the virtual channel table."

IEEE-1394 could go a long way towards solving some of those problems because it allows the important elements to communicate back to the box so it can know what true RF channel it came in on. Then, according to Allison, the cable system could shift the signal to a QAM modulation scheme and transfer the whole stream in its entirety, including PSIP information.

"Now the set-top box is intelligent enough to use the PSIP tuning or even a cable-ready TV set would be able to do the same thing," offers Allison.

He adds that the cable industry has been looking at the in-band PSIP standard, and the SCTE has ballotted and it awaits formal adoption.

For all of the interesting questions that remain, Allison is certain of one thing—PSIP will be deployed.

"What we have is an easy way for the consumer to associate the new DTV service with what they're used to, and we didn't have that until PSIP. And the system is designed so that if broadcasters don't broadcast it then the receivers won't be able to find their channels. And the receivers that don't know PSIP won't be able to find all the channels. So there's a very positive feedback loop, and it's in both industry's interests to have PSIP deployed."

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Zeros and Ones

Commentary from the Editors of Digital Television

Down With Separatism

It's no secret anymore. HDTV is coming, and it's coming fast. Consumer set manufacturers are just days away from starting up their production of DTVs and HDTVs, voluntary broadcasters are either testing or will be testing within days or weeks, and the consumers are actually starting to become curious about what it all means.

Yes, it seems everyone is in place to start the transition to HDTV.

Except the cable industry.

There is already serious concern in some camps (namely those that have been mandated by the government to spend hundreds of millions to begin the transition to HDTV) that the 70% of Americans who receive cable will be unable to receive broadcast HDTV signals over their cable system, a serious potential impasse to consumer acceptance.

There is valid reason for this concern. The amount of HDTV doublespeak within the cable industry grows larger every day. And when cable giants like John Malone make the statement that 1080i signals won't be carried on TCI because they take up too much bandwidth it only raises the eyebrows further (Malone quickly recanted, but not before it was widely reported).

On the flipside, Leo Hindery Jr., president and COO of TCI, told a congressional hearing in April that, "Our upcoming advanced digital customer terminals will be capable of passing through to HD televisions all HDTV formats, including the 720-progressive and 1080-interlaced formats."

So where does the truth lie? Hopefully with Hindery, but probably somewhere in between. The important thing, however, is that the FCC has to find out exactly where the technical truth lies as soon as possible. Because if there is one industry that can bring the move to HDTV to its knees, it's cable.

The cable industry offers a long list of technical reasons why carrying digital signals to the home would be bad for consumers. At the same hearing where Hindery made the above comment he also added, "Should we drop Lifetime, one of the most popular cable programming services among woman? Should we drop Fox News, MSNBC, C-SPAN, Black Entertainment Television or The Family Channel? Which would it be?"

The answer, of course, is none. Like the broadcasters and the consumer set manufacturers, the cable industry has known that HDTV was coming for years. This is not a surprise, jack-in-the-box technical revolution. If it were, DirecTV wouldn't be planning on offering HDTV services later this year. HBO wouldn't have announced its plans to offer a 1080i HDTV service. Nor would the Discovery Channel, for that matter.

So what should the digitally-equipped cable viewer be able to receive by December 1999? The way we see it, every available HDTV signal at its originated resolution, subject to the limitations of must carry. Like the broadcast stations themselves, the cable industry must see this move to HDTV as a cost of doing business, and of serving the public interest.

The cable industry should be flattered that people like Gary Shapiro and others are concerned that cable gets on board with HDTV. If anything, it points to the growing importance of cable to the consumer, and to the strength of its industry.

Simply put, HDTV will not take off without the support of the cable industry. Hopefully the leaders of that industry will recognize HDTV for the business opportunity that it is, and realize that they have an obligation to offer their customers HDTV services.

Wag Truman

In the past seven months there have been two movies, "Wag The Dog" and "The Truman Show," that have shown the dark side of television technology. Both offer supposedly extreme examples of how technology has advanced to the point where it can allow television producers to create virtual environments. In "Wag The Dog" the fooled is the public, in "The Truman Show" it's the show's star.

People have left the theaters after both movies shaken by thoughts that what they just saw could really happen.

The fact is, both of those movies have already happened. In recent years reporter's have stood in front of a blue screen and claimed to have been "live" at the scene behind them. And with the amount of reality-based programs aren't we all just a disaster away from becoming a television star for at least one segment?

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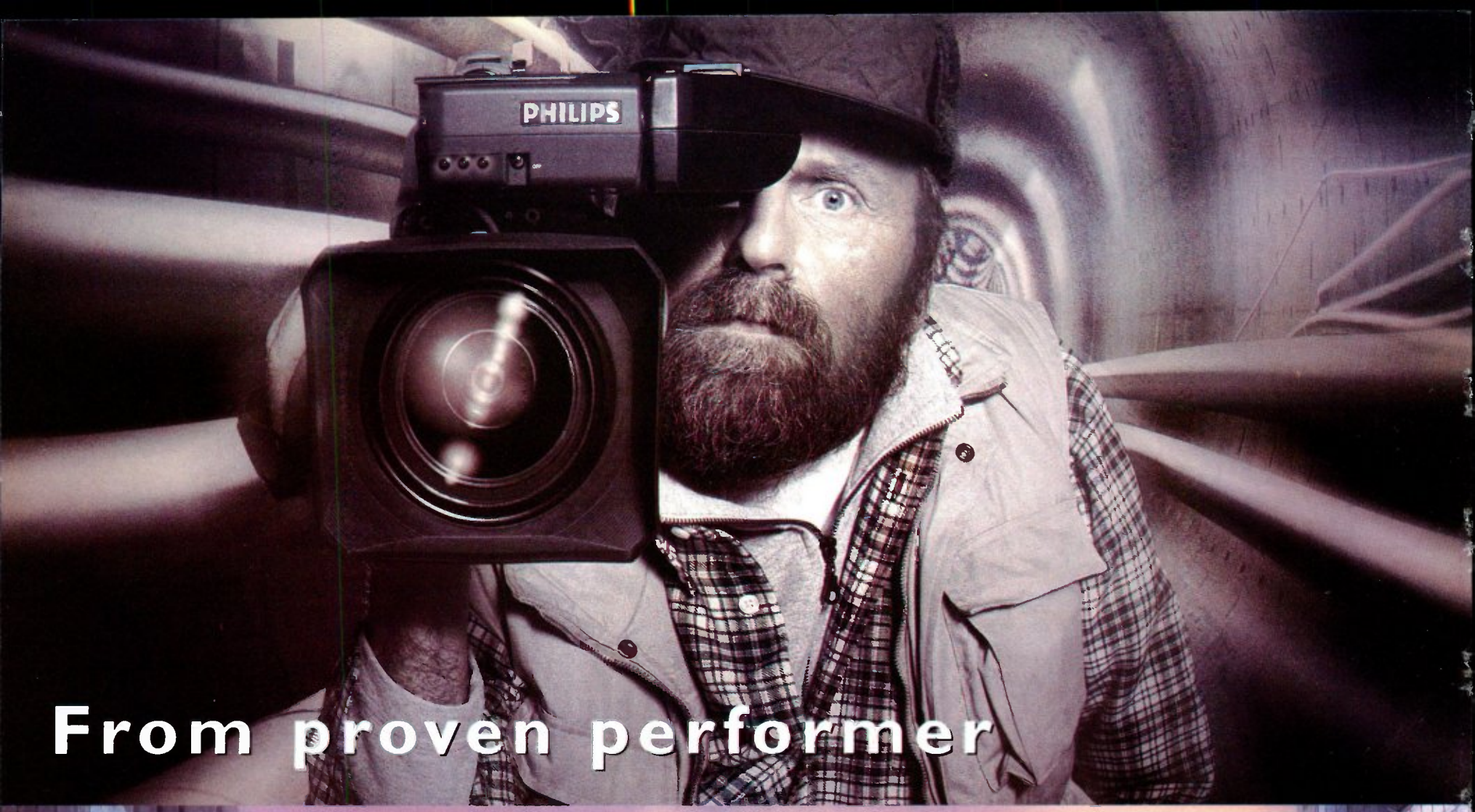

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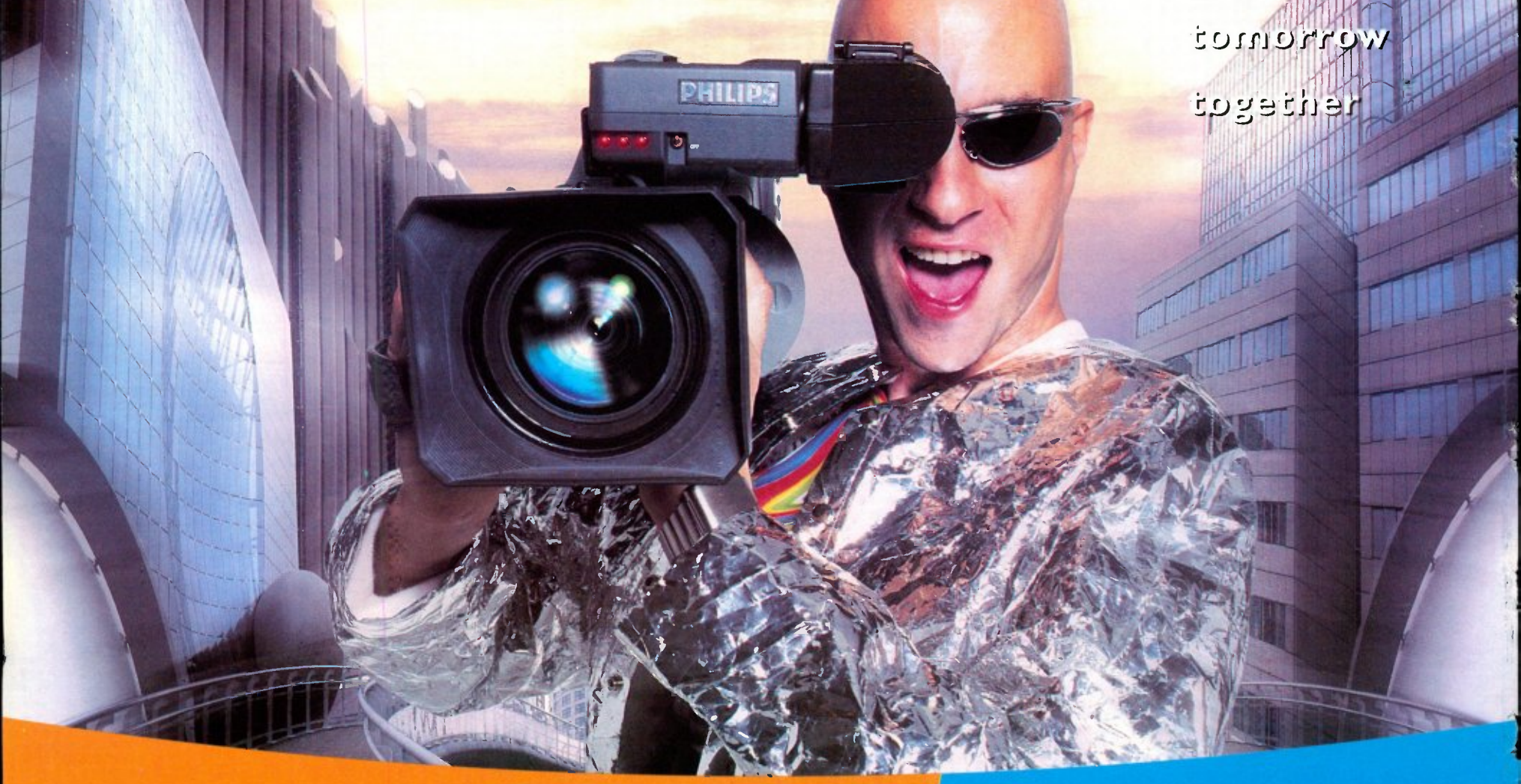

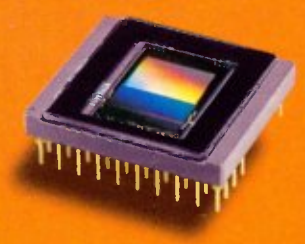

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