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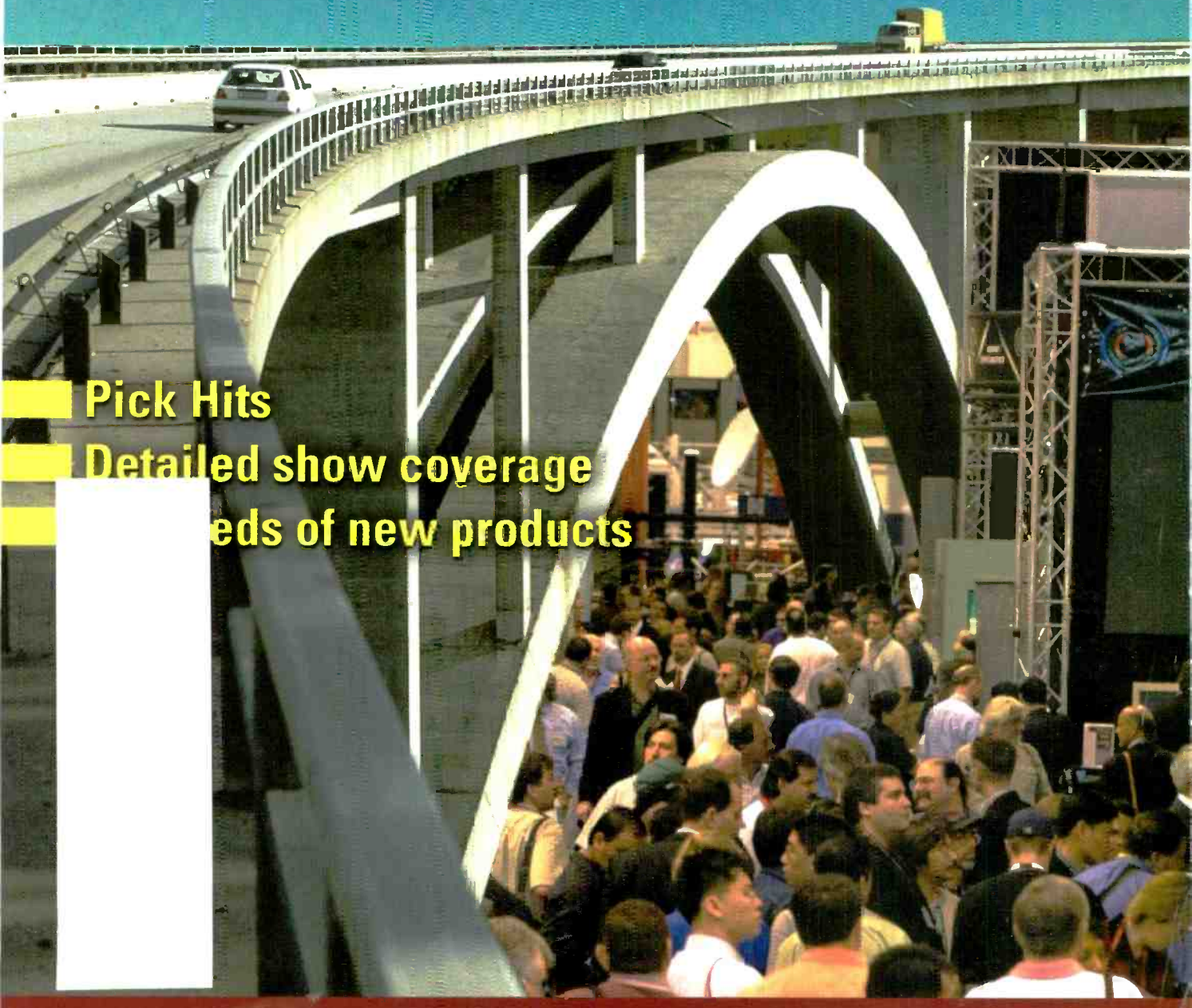

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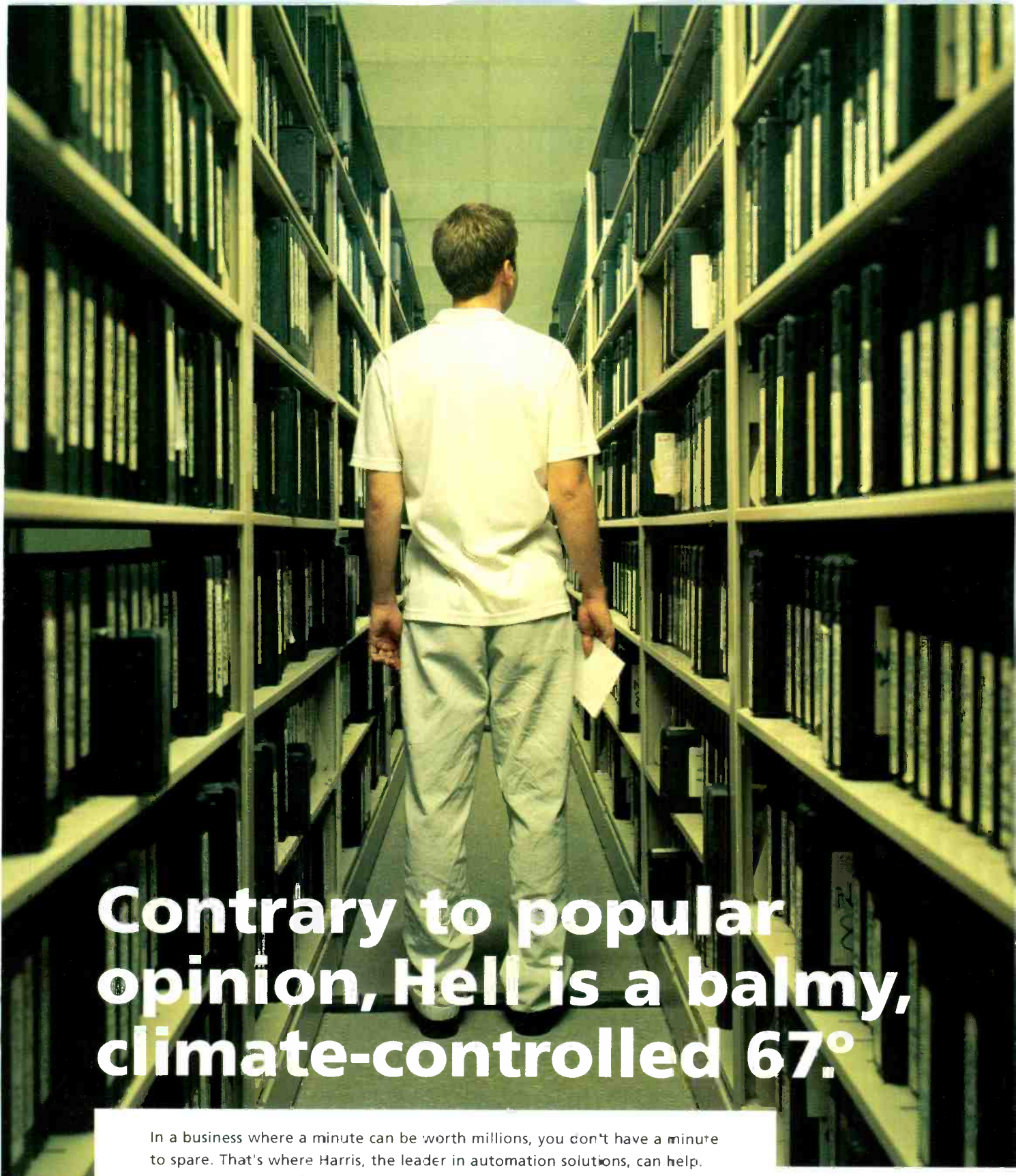

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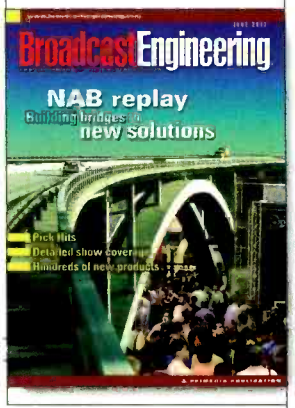
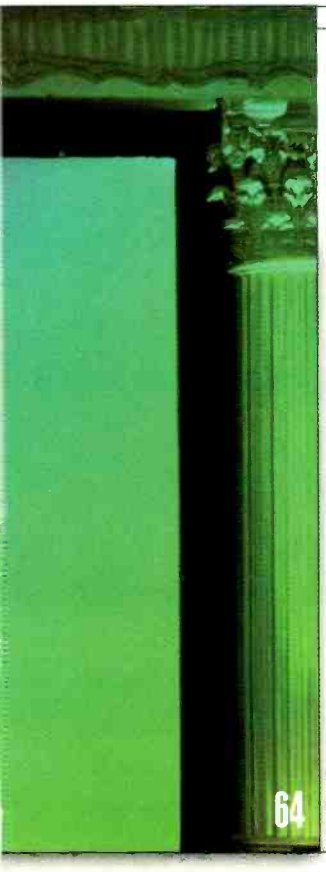



**ON THE COVER:** Broadcasters may find that products presented at NAB2002 will offer new solutions to the issues facing them. Graphic design by Robin Morsbach.




## BEYOND THE HEADLINES



## DIGITAL HANDBOOK



(continued on page 6)

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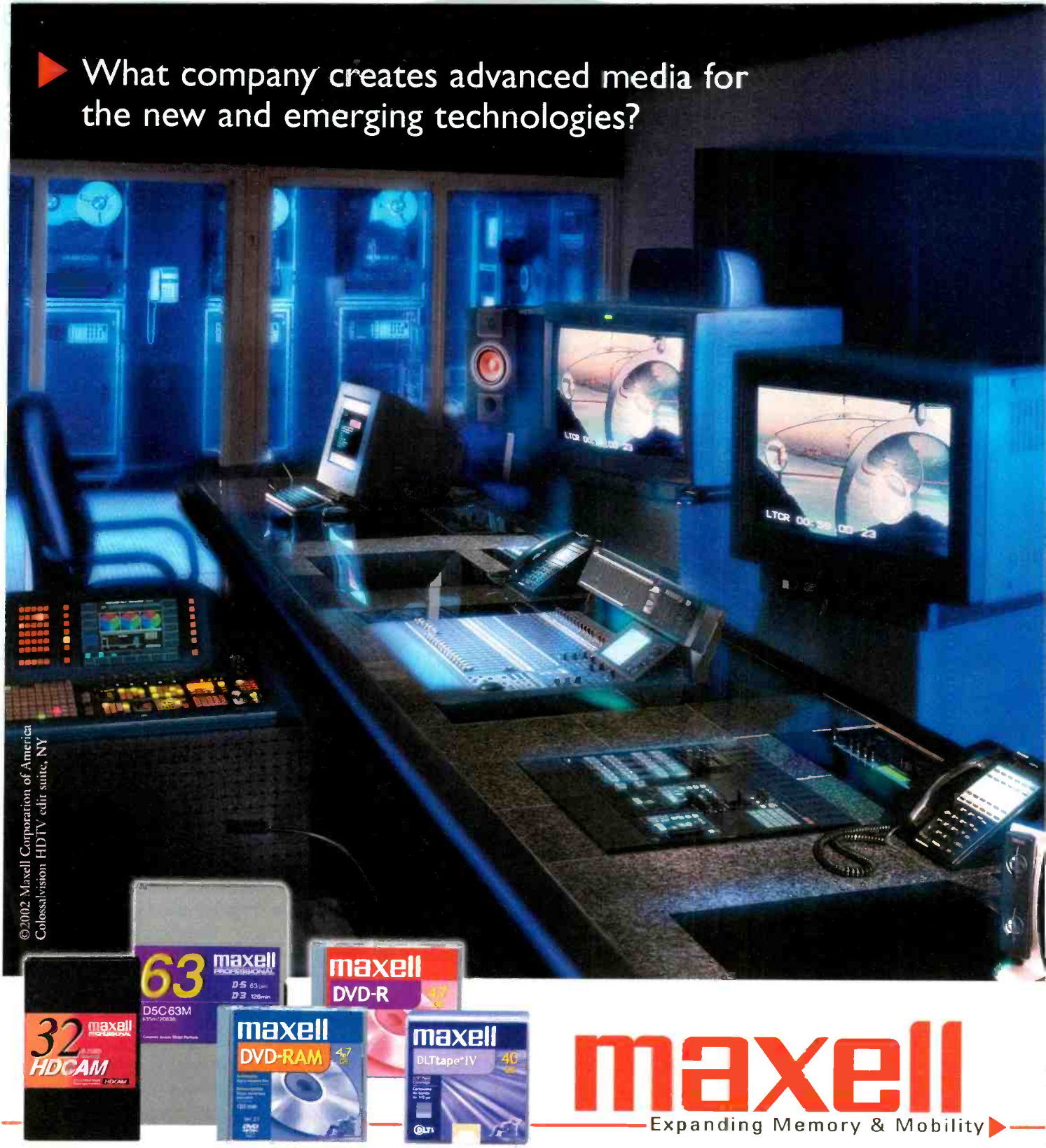
# What company creates advanced media for the new and emerging technologies?







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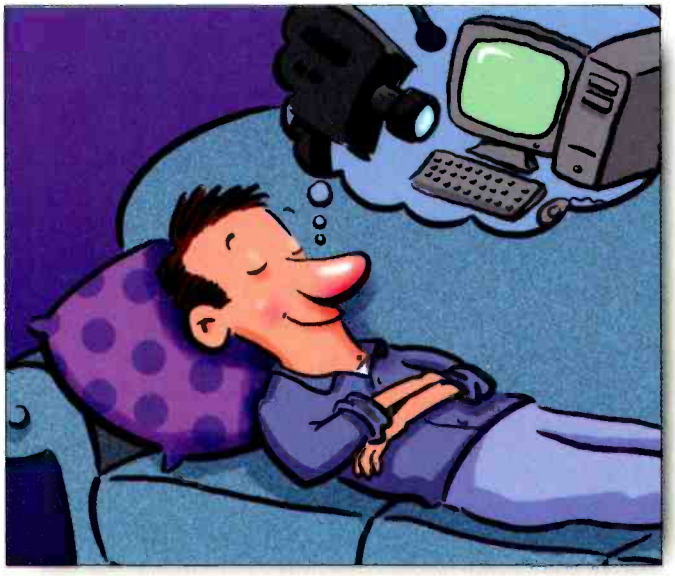
# Dream
## or nightmare?

For some strange reason, I was dreaming about the NAB convention. Maybe it was closer to a nightmare.

Anyway, I'm seeing all these new products at the show, but they aren't related. There's a new saddle for horses, and the latest from Vegamatic and Gingsu. All of this is alongside transmitters and editing systems. It must have been something I ate.



This year's NAB was certainly something all right, but exactly what I'm not so sure. Touring the Sands was schizophrenic. First, I was in the Discreet booth viewing an NLE application, then seemingly in the next booth was a satellite dish, and next to it was a tiny software company. Then, only a few steps away, was a company offering everything from cable encoders to satellite and cable STBs. Whew! It helps to have multiple personalities when touring this show.

To help bring some organization to the convoluted and often disjointed event, *Broadcast Engineering* brought together some of the industry's best engineers and writers to help paint a clearer picture of the event and the industry. These experts will help all of us better assimilate what was really new and innovative. Ten writers were assigned to cover just the convention floor technology. They'll provide a first-person report on both events and technology. You'll learn what was new and, just as important, what may be coming.

Three things struck me as standouts at this show. First, was the positive atmosphere, as I discussed last month. This shouldn't be underemphasized. I believe we'll be seeing the result of this upbeat mood in both purchases and advertising in the months ahead.

Second was the mixed messages in the halls. The Sands sticks out as the least "NAB-like." While there were the traditional production and broadcast vendors, there were plenty of less-related exhibits too. There were many new exhibitors that could have been (and are) seen at other non-broadcast shows. I found this much like CES, where you can go from car stereos to home automation in the blink of an eye. It works for them, and NAB is betting the new eclectic mix will work for us.

Finally, this year's new products were real. Yes, I know you've heard that 100 times from vendors, but the majority of what I saw could be bought right off the floor and immediately used. This is a direct result of manufacturers finally realizing that vaporware hurts their image, and customers don't want to unknowingly be used as guinea pigs or be baited along for months (sometimes years), waiting for something new.

So, clarity with all this confusion is just ahead. Dozens of articles, hundreds of new products, thousands of words, tens of thousands of characters – whoa, I'm getting way too excited here.

Just read on. And let me know your thoughts about this year's NAB. I'll be putting some of your letters in upcoming Reader Feedback columns, so hit the SEND button now to bdick@primediabusiness.com.

Brad Dick

**editorial director**

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## The loss in lossless

Dear Mr. Robin:

I work for Jordan Radio and Television and have a question about digital compression from one of your earlier articles in *Broadcast Engineering*. Is DCT process considered a lossless technique?

Also, I have a subscription for *Broadcast Engineering* and I read your articles, but unfortunately, I missed some of them. Could you please help me get back copies?

ENG SALEH ZUBI
JORDAN RADIO AND TELEVISION

*Michael Robin responds:*

The DCT is essentially a lossless mathematical process. The zigzag readout of the 8x8 block is also a lossless process. The requantizer (REQ), following the zigzag scanning of the 8x8 block, is the lossy process. Essentially the high frequency coefficients are more coarsely coded than the low frequency coefficients. They are divided by a value "n">1, and the result is rounded to the nearest integer. "n" varies according to the position of the coefficients in the block with higher frequencies attracting larger values. The result is that low frequencies generated by large uniform areas of the picture, where the eye is most sensitive, are finely quantized. Higher frequencies generated by fine picture details, where the eye is less sensitive, are more coarsely quantized since distortions and accompanying quantizing noise are less visible.

The requantizer is followed by the variable length coder (VLC), which assigns more bits to rarely occurring values and fewer bits to frequently occurring values. The VLC is followed by the run length coder (RLC), which sends a unique code in place of a long string of zeros and thus helps reduce the bit rate. All these processes result in a variable bit rate (VBR) and a subjectively constant picture quality (CPQ).

Digital distribution networks require constant bit rates (CBR). A buffer helps obtain CBR but results in a variable picture quality (VPQ). Depending on its overflow or underflow status, the buffer sends a message to the REQ controlling the number of bits per sample. The situation is further complicated when several compressed digital television signals are time division multiplexed and share a common carrier. Here a further bit-rate control, called statistical multiplexing, is used to individually control each REQ.

It is this long chain of events that introduces losses. As long as these losses are imperceptible to the eye everything seems to work well. However, the original signal cannot be exactly reconstructed.

REGARDS,
MICHAEL ROBIN

*Editor's note: Copies of most articles from* Broadcast Engineering *are available on our Web site, www.broadcastengineering.com. A two-year archive of past articles is also accessible there.*

## If we build it, they will come

Dear Paul McGoldrick:

I believe you have a clear understanding of what it will take to accelerate the adoption of HDTV. I would take issue with you on the matter of denial of services to legacy viewers, however. DVDs, as you have correctly pointed out, offer additional venues for entertainment, above that which is available from VHS. Wouldn't it make sense for program providers to take a hint from this?

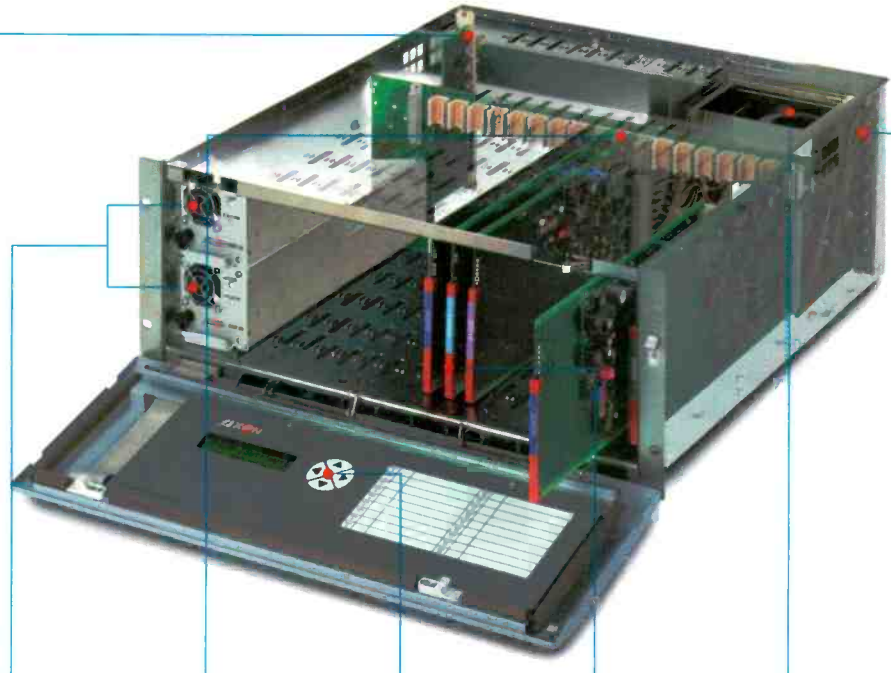
Suppose that background material were available on athletes during the Olympics via a PIP delivered in spare bandwidth? Suppose local merchants who sold sponsored products could be highlighted via the same means? Perhaps some of this information would have to be downloaded to a hard drive in the consumer's television or set-top box to achieve full enhancement, and it may be that a back channel would be needed for certain applications. But many, many intriguing items could be delivered as simple one-way program enhancements, many of them offering added value to advertisers, without a back channel, and without local storage. None of this could be delivered via NTSC.

This is truly a case where, if we build it, they will come. We just have to build something people will spend money on to have in their lives.

TOM NORMAN, CPBE
SYSTEMS ENGINEER
HARRIS BROADCAST SYSTEMS DIVISION

SEND Send questions and comments to: bdick@primediabusiness.com


# THE FUTURE



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# Planes, trains and automobiles

BY CRAIG BIRKMAIER

The 1987 movie classic "Planes, Trains and Automobiles," began in New York City, two days before Thanksgiving. Neal Page (Steve Martin) is eager to get home so he can enjoy the holiday, but bad weather intervenes. His flight from LaGuardia to O'Hare is diverted to Wichita, KS, after a snowstorm hits Chicago. What makes the trip even longer is that Neal is stuck next to one of those good-natured, annoying talkers who won't shut up — Del Griffith (John Candy), who is a shower curtain ring salesman armed with an endless supply of dumb jokes and pointless anecdotes.

Here's a *pointless* anecdote for broadcasters, many of whom still think that DTV is some kind of dumb joke. According to statistics from the Cellular Telecommunications and Internet Association (CTIA), in 1987 there were 883,778 subscribers to wireless telephone services. Apparently, Neal and Del were not among them, having to resort to a communications device that is slowly vanishing from the domestic landscape — the pay phone.

In 1987, broadcasters had just begun the process of developing an advanced television standard; they were not even thinking about digital TV. What broadcasters were thinking about was the potential for interference from two-way radio services, which were seeking the ability to share spectrum reserved for television broadcasting.

In 1986, the FCC was poised to grant land mobile the use of unused TV channels in the nations ten largest markets.

In 1987, broadcasters asked the FCC to delay making the land mobile decision; they asked the FCC to begin a proceeding to determine the spectrum requirements for an advanced television service so that they could deliver the wonders of HDTV.

Another *pointless* anecdote: According to the CTIA, as of June 2001, there were 118,397,734 subscribers to wireless telephone services. In little more than a decade, Americans have cut the wires and grown accustomed to mobile telecommunications. We now expect to be able to communicate with anyone, anytime, from virtually everywhere. We take it for granted that entertainment and information services (including two-way data) will be available in planes, trains and automobiles, not to mention buses and taxi cabs.

**We take it for granted that entertainment and information services will be available in planes, trains and automobiles, not to mention buses and taxi cabs.**

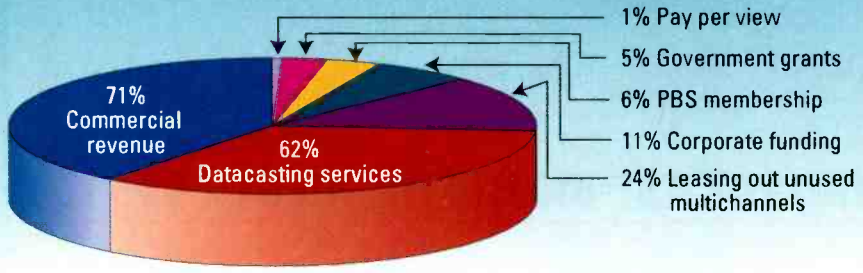
Many upscale vehicles are now equipped with two-way satellite data services. This year two digital satellite radio services were launched. And car theater systems now are being offered as an option on another American icon, the minivan. Recently, the FCC authorized Boeing to move forward with plans to offer two-way data services for commercial air carriers. And WiFi wireless data networks are popping up everywhere, in schools, businesses, homes, airports and even Starbucks.

Another important and highly profitable component of today's mobile communications infrastructure is a terrestrial broadcasting service — *radio*. It is ubiquitous, but most important, it is wireless.

An AM/FM radio is now standard in virtually every vehicle; portable radios are found in virtually every home, at the office, at the ballpark, at the beach,

**FRAME GRAB** A look at the issues driving today's technology

**Funding DTV**
**How will stations pay for it?**

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etc. Sony defined the term *walkabout portability* with its Walkman personal audio entertainment systems. It also has sold millions of personal NTSC television receivers in the form of the Watchman.

But receiving picture through the air has always been problematic, plagued by ghosts and other goblins. As was the case with radio, consumers accepted TV for what it was, until something better came along.

In remote areas, Community Antenna (CATV) systems took picture out of the air, redistributing them by wires. And in big cities — plagued by multi-path — Master Antenna (MATV) systems were used to deliver TV by wire to residents of large apartment buildings.

Cable TV was totally reliant upon broadcast content until a new wireless transmission infrastructure changed the rules again. Satellite communications has transformed the communications and distribution landscape — many broadcasters still affectionately call them the *Death Stars*.

**The Nokia Mediascreen is a portable/mobile DVB television and data receiver.**

While American consumers have grown accustomed to communications without wires, they have largely given up on the idea of un-tethered television receivers. Cable and DBS provide better picture quality, but of far greater importance, they provide greater programming choices than terrestrial broadcasting.

Another *pointless* anecdote: According to the FCC's eighth annual report on competition in the market for the delivery of video programming, the number of subscribers to both cable and non-cable multichannel video program distributors (MVPDs) increased to 88.3 million households as of June 2001, up 4.6 percent over the 84.4 million households subscribing to MPVDs in June 2000. The FCC report did not mention that more than 30 million of these homes now subscribe to a digital television service, while only a few hundred thousand are able to receive ATSC digital broadcasts.

While American consumers have grown accustomed to communications without wires, they have largely given up on the idea of un-tethered television receivers.

Less than 20% of U.S. homes now rely exclusively upon NTSC television broadcasts. Broadcast lobbyists will quickly point out that nearly half of U.S. homes still have, and may occasionally use, a portable TV. In reality, no one is quite sure how many sets are connected to cable or DBS versus an antenna.

Whatever the current reality, the trend is clearly NOT toward the kind of ubiquity enjoyed by radio as a wireless service. The well-documented problems with reception of 8VSB transmissions bring into question whether DTV will be able to support portable reception, much less mobile reception. The ATSC is currently evaluating modifications to the standard with an eye toward support for walkabout portability, but receiver cost and complexity suggest that it will be many years before the DTV Watchman will become a reality.

Meanwhile, none of the spectrum assigned to television broadcasting in 1987 has been vacated for land mobile, cellular, PCS or wireless data services. This is despite the fact that the 1996 Telecommunications Act called upon the FCC to auction channels 52-59 and 60-69 by September of 2001. Channels 60-69 would be made available

## Web Links

White paper on mobile DVB-T reception 5/99:
www.dvb.org/resources/pdf/dvbtpaper.pdf

Motivate project and pictures of European mobile TV demos:
www.bbc.co.uk/rd/projects/motivate/

FCC affirms MVDDS authorization and adopts service rules for the 12.2-12.7 GHz band:
www.fcc.gov/Bureaus/Wireless/News_Releases/2002/nrwl0207.html

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immediately upon relocation of incumbents, while channels 52-59 would become available at the end of the DTV transition when all TV broadcasters would be relocated in to the core DTV spectrum (channels 2–51).

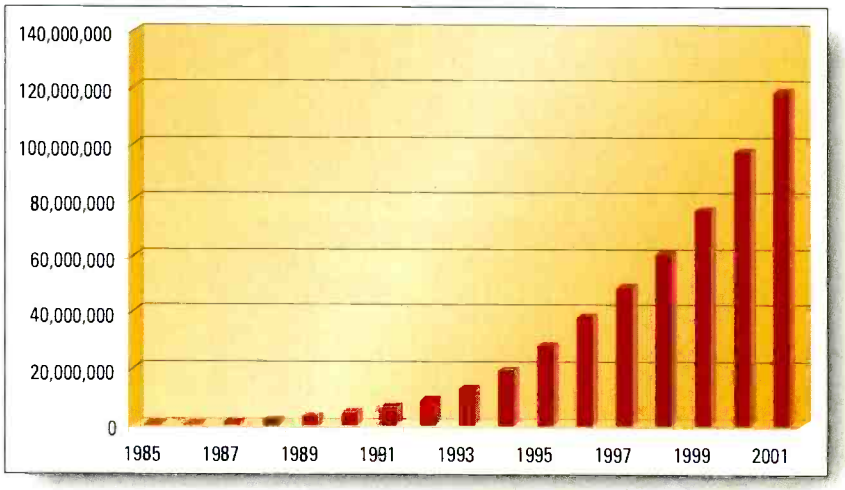
The Balanced Budget Act of 1997 attempted to accelerate the auctions to September of 2000, but the same legislation also imposed market tests on the DTV transition, turning the scheduled January 1, 2006, return of NTSC channels and the DTV transition into a joke.

After repeated delays, the auctions are now scheduled to take place on June 19, 2002, but legislation has already passed in the House to postpone them again. Nearly everyone — except for the stations currently occupying the 700 MHz spectrum — would like for the auctions to be delayed indefinitely.

The FCC has established rules that would allow successful bidders to pay the stations currently using the 700 MHz spectrum to vacate it immediately, and it has authorized these broadcasters to use their assigned DTV channels to relocate their NTSC service until January 1, 2006, or whenever the DTV market tests are met. Thus, these stations stand to make billions in windfall profits from relocation payments, AND they will not be required to operate DTV facilities until the end of the transition period, if that day ever comes.

The Association for Maximum Service Television (MSTV) is asking the FCC to delay the scheduled June 19 auction because of potential interference with existing NTSC broadcasts. "These digital-channel allotments were not designed to be used by analog facilities," MSTV told the commission in a May 15 letter.

Even the CTIA is now seeking to delay the 700 MHz auctions. Earlier this year, it filed with the FCC for a delay, which was denied in early April. An April 10 CTIA press release condemns the FCC action: "Going forward with a June auction severely limits the ability to develop a rational spectrum management policy," said Tom Wheeler, president and CEO of CTIA. "The public lost, public safety lost, and the broadcasters




**This table from the CTIA shows the growth of mobile telecommunications since 1985.**

— who will hold the real auction following the FCC's — must be laughing all the way to the bank," he said. "It looks like the broadcasters will get their billion-dollar ransom for the spectrum Congress gave them for free in 1996."

## Wireless competition

Meanwhile, on April 23, the FCC authorized a new *spectrum sharing* plan, which could enable a third terrestrial multichannel TV competitor.

Outside of the U.S. attempts to revitalize terrestrial television broadcasting, others have not been faring well, either. In Great Britain and Spain, early attempts to create premium multichannel digital terrestrial television services have failed. In Australia, the only other country outside the United States to launch digital HDTV services, consumer interest has been equally dismal. Multichannel standard-definition programming and data broadcasting are now being discussed as potential options.

Recent reports suggest that Brazil is leaning toward the Japanese ISDB terrestrial broadcast standard because it offers the best performance in mobile applications. And in Europe, interest is growing in the use of DVB service parameters that are optimized for portable and mobile reception of DTV services.

Television broadcasters face a world of uncertainty and growing competition. While interest is growing in HDTV and other enhanced television services, it is now clear that multichannel competitors have the upper hand in delivering HDTV content to this niche market, and it appears that no existing television distribution service is in a rush to push enhanced services like interactive TV and data broadcasting.

In the 15 years since 1987, little has changed in the world of television broadcasting. Everything has changed outside of that world. Consumers are moving on to digital TV and the Internet. Advertisers are following the consumers and learning how to use digital technologies to target their messages.

And broadcasters seem content to let competitors deliver their content rather than trying to redefine themselves to do the only thing that their competitors cannot — delivering bits to things that move.

## FCC authorizes MVDDS

For most of the past decade, Broadwave USA (a.k.a. Northpoint) has been lobbying the FCC to allow it to share the frequencies used by Direct Broadcast Satellite (DBS) operators to deliver digital television and data services via a terrestrial broadcast system. Since DBS services utilize a highly directional dish oriented to the south, Broadwave USA and other

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companies advocating the sharing of the DBS frequencies have demonstrated that it is feasible to use the same frequencies to deliver signals using terrestrial transmitters located to the north of the directional receivers that would be used for the multichannel video distribution and data service (MVDDS).

The DBS industry has opposed this form of spectrum sharing, contending that it may interfere with reception in some locations. Clearly, the DBS systems were also concerned about the competitive impact of a third terrestrial multichannel service. The new FCC rules may, however, have turned the tables, providing an incentive for existing cable and DBS operators to bid for the use of this spectrum, which will be licensed in a yet-to-be-determined number of geographic component economic areas (CEAs), analogous to existing television markets.

Here are some of the specifics of FCC action. (The URL for the full news release is included in Web links with this story.)

- Dismissing without prejudice the pending applications of Broadwave USA, PDC Broadband Corporation and Satellite Receivers for terrestrial use of the 12 GHz band.
- Adopting a licensing system for MVDDS based on CEAs, with one spectrum block of 500 MHz available per CEA, and, deciding to use the general competitive bidding rules set forth in Part 1, Subpart Q, of the Commission's rules to resolve any mutually exclusive applications for initial MVDDS licenses.
- Requiring MVDDS operators to ensure that the adopted EPFD limits are not exceeded at any existing DBS customer location. If the EPFD limits are exceeded, the MVDDS operator will be required to discontinue service until such time that the limits can be met.
- Adopting a "safety valve" that allows individual DBS licensees or distributors to present evidence that the appropriate EPFD for a given service area should be different from the EPFD applicable in that zone.
- Permitting fixed one-way operations, but excluding mobile and aeronautical operations.
- Declining to permit dominant cable operators from acquiring an attributable interest in an MVDDS license for a service area where significant overlap is present, but not restricting DBS providers' eligibility to acquire MVDDS licenses.

Broadwave USA had been seeking to use the spectrum nationwide without paying for the licenses because of their pioneering work in this area. But other companies have implemented similar systems, and the FCC ruled that existing laws require that they offer the spectrum via the competitive bidding process. Broadwave is challenging the decision.

The rules will allow the owners of cable systems to bid for licenses in areas they do not currently serve. DBS operators will be allowed to compete for the licenses in all markets. By using the same frequencies for the national satellite service and a local MVDDS service, a DBS company could deliver local broadcast signals and two-way data services using the terrestrial component in each market. BE

*Craig Birkmaier is a technology consultant at Pcube Labs, and hosts and moderates the OpenDTV Forum.*

# Webcasting: Profit or pit?

BY STEVEN M. BLUMENFELD

OK, so it's mid-2002, and you are wondering how Webcasting is doing. Is now the right time to jump in? The topic of whether it is a profitable business or a pit can be summed up in four letters — CARP. No, not the fish — the Copyright Arbitration Royalty Panel.

On Feb. 20, 2002, CARP delivered a report with recommendations on "Rate Setting for Digital Performance Right in Sound Recording and Ephemeral Recordings." While this article is about Webcasting music over the network, don't be fooled. The precedence set today in the music streaming market will be applied in the next generation of large-scale streaming applications — video. Already, MPEG-4 is in danger of never becoming a ubiquitous standard due to the current licensing philosophies.

CARP's proposed rates are onerous and will effectively force most small independent Webcasters out of business, including almost all educational and community stations. The fact that these rates would be enforced retroactively going back to 1998 will compound the issue as small broadcasters find themselves with huge unexpected bills.

The Digital Millennium Copyright Act (DMCA), passed by Congress in October 1998, gave record companies the ability to receive royalties retroactively as determined by the U.S. Copyright Office. The copyrighted works are subject to royalty payments whenever they are played via a digital broadcast media. The good news, however, was that the DMCA guaranteed that Webcasters could receive an automatic license to those copyrighted works without having to negotiate with each record company.

The CARP's ruling on Feb. 20, 2002, recommended a royalty rate of 14 cents per song, per listener, for Internet-only Webcasters; seven cents per song for commercial radio station simulcasts; and two cents per song for non-commercial radio simulcasts. These royalties, as per the DMCA, are due retroactively to October 1998 and payable within 45 days of acceptance.

From my previous articles, you may know I am a big believer in creating and storing metadata for all kinds of

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content. CARP has proposed that each Webcasting station generate and report the following information for every streamed program: transmission date, time and time zone; location of the transmission within the program; transmission duration (to nearest second); transmission genre or format; service name; program channel or station ID; program type (archived/looped/live); album and song title; recording artist; music label; catalog number; recording ISRC code; UPC code; copyright notice date(s) and copyright owner information; unique user identifier; users' time zone and country; and times and dates of login and logout.

Webcasters, generally small operations, are now faced with a tremendous burden that involves collecting information that sometimes is just not available. Currently, there is no automated way to input IRSC, UPC or release date of the album. That means that someone has to sit down at a computer with the music disk and enter the information manually. If you have ever seen a radio station CD collection, then you know that half of them have holes drilled through the UPC Code or have property stickers all over the disc, making it extremely hard to get at the data. Additionally, believe it or not, there are still many Web broadcasters that use vinyl and would have to import all this data by hand, not even able to use a CDDB type service. The RIAA states that the information is easily obtainable; however, while it may be obtainable, there is a big difference between obtaining the information and logging and reporting it!

The Internet radio industry is still very young, and very few Webcasters have much, if any, revenue. The proposed royalty rates seem high when compared to over-the-air radio broadcasters, but royalties do need to be paid. Artists, record companies and promoters all should be able to make a living. Whether the RIAA, BMI, ASCAP or the government, for that matter, is the right group to collect the money, I honestly don't know. Whether the rates set under the CARP document are too high or too low, again, I can't say.

I find the issue of reporting extremely troubling, however. The accounting and reporting functions will require added expenses that not even the mainstream broadcasters are required to fund. Even worse is the invasion of privacy. By law, Blockbuster has no right to collect and use my movie-buying habits. Why should the RIAA or any other entity have this right when it comes to my musical tastes? Could you imagine what my friends might do if they found out that last night I listened to the Sex Pistols, Dead Kennedys, Misfits, Bad Religion, Lars Frederiksen and the Bastards, and Miranda Sex Garden?

Fortunately, the Librarian of Congress rejected the recommendations of the arbitration panel. This is good news for this nascent industry, and let's hope that the copyright holders and the Internet broadcasters can work something out that has a positive impact for both sides and acts as a precedent for future cooperation between copyright holders, technologists and new forms of distribution.

If you want to be heard on this issue, visit www.saveinternetradio.org. BE

Steven M. Blumenfeld is vice president of technology, AOL Time Warner CTO's office.

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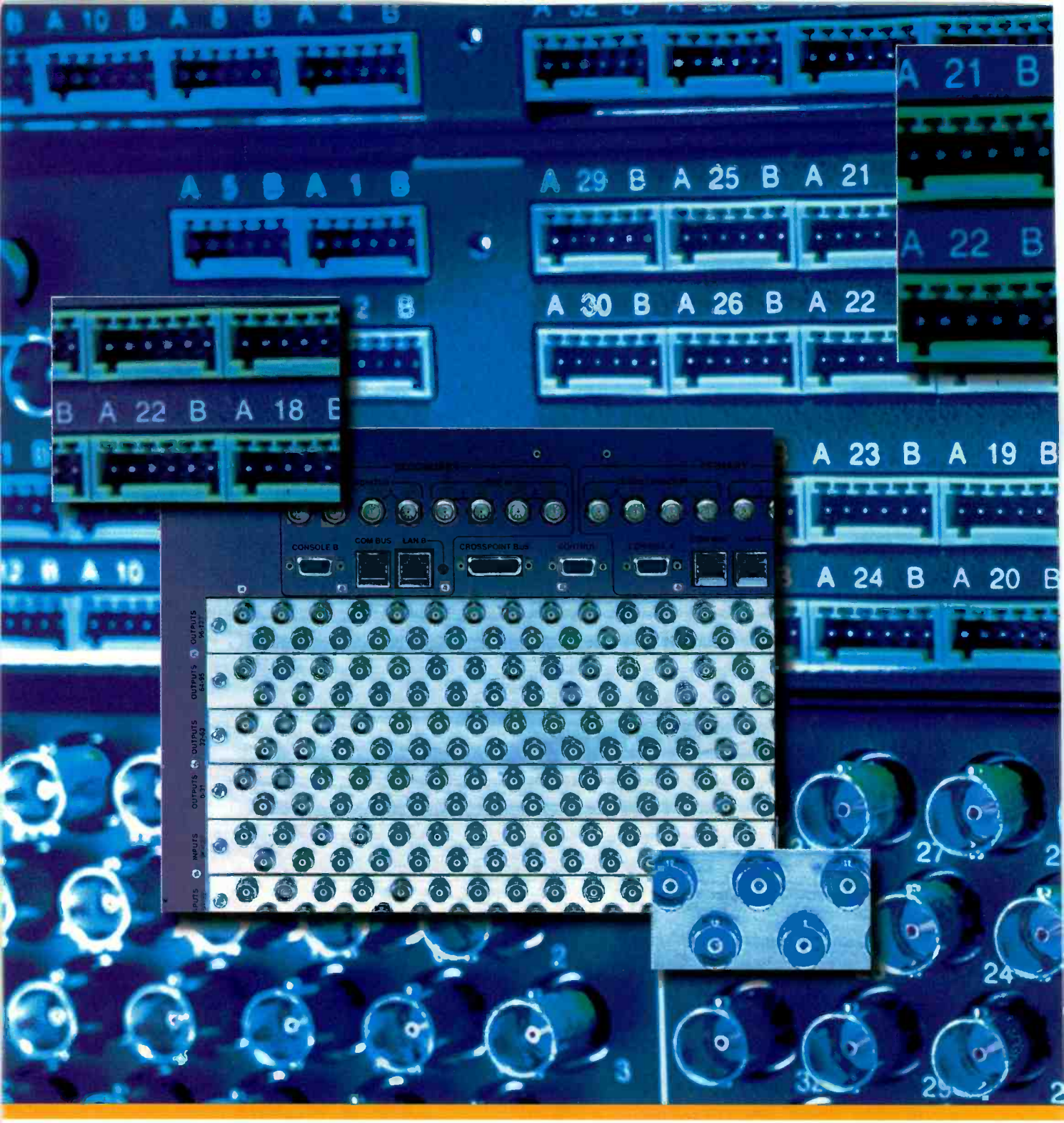


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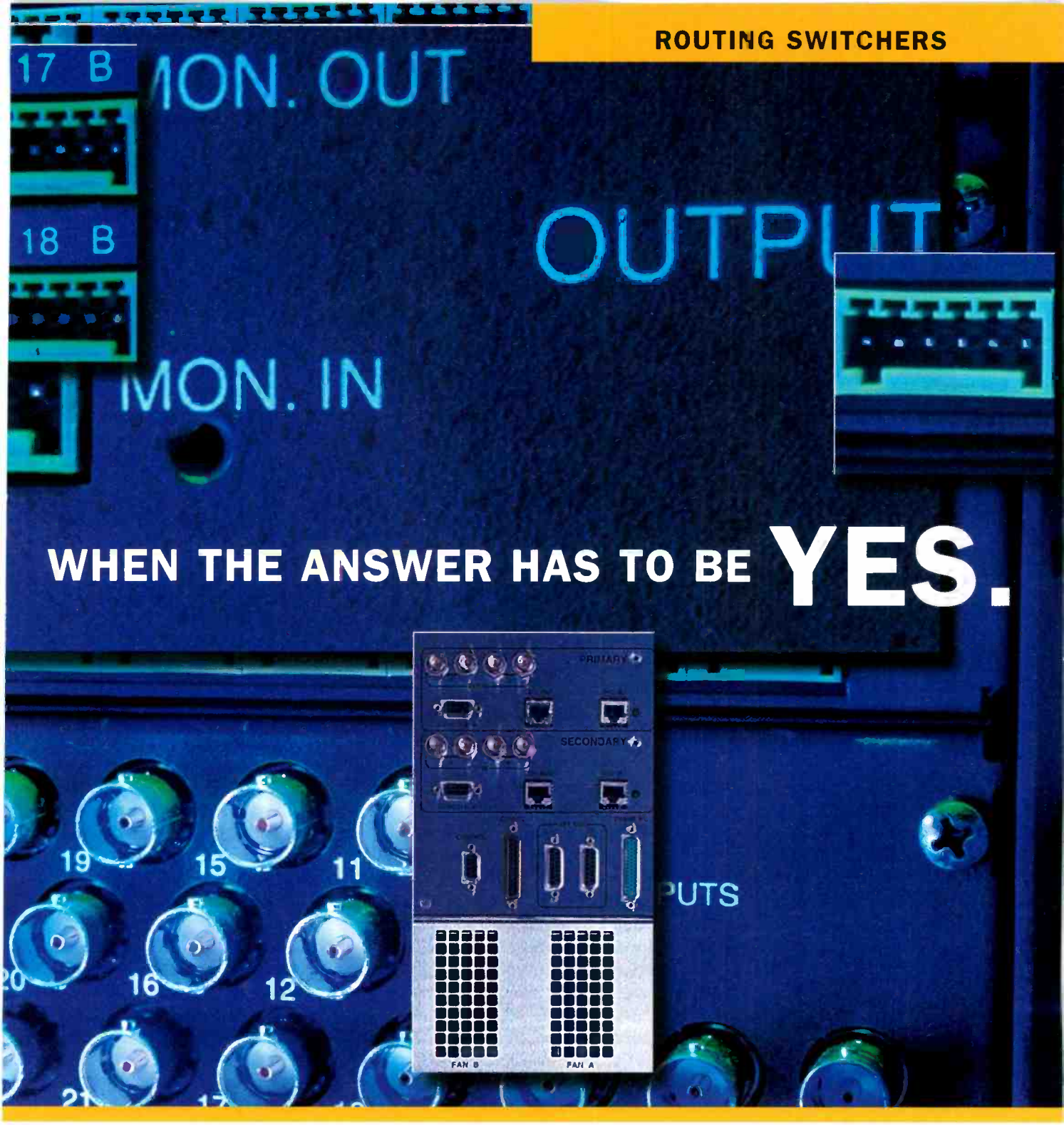


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BEYOND THE HEADLINES

# Powell offers
## plan to spur DTV transition

BY HARRY C. MARTIN

FCC Chairman Michael Powell has sent to Congressional leaders a plan to spur the national DTV transition. Powell acknowledged that his plan is not intended to be entirely comprehensive. For instance, it does not address thorny issues such as copyright protection or equipment compatibility. Rather, the plan is designed to emphasize actions that can be taken now, without regulatory intervention.

Powell calls for the top four broadcast networks, as well as HBO and Showtime, to provide high-definition or other "value-added DTV programming" during at least 50 percent of their prime-time schedules, beginning in the 2002-03 season. The idea is to give "consumers something significantly different than what they currently receive in analog." Powell's plan also asks DTV affiliates of the top four networks located in the top 100 markets to pass through on a non-degraded basis their network DTV signals by Jan. 1, 2003, or as soon thereafter as they begin DTV broadcasting.

Powell asks broadcasters to add to the attractiveness of DTV programming by promoting it on their analog channels. The idea is to give consumers an incentive to acquire DTV receivers. It is not clear, however, how the plan to offer different "value-added" programming on the DTV channel will square with the DTV simulcasting requirement beginning next year. As the Commission's rules now stand, beginning April 1, 2003, DTV licensees would be required to simulcast 50 percent of their analog station's programming on their DTV channels.

Powell's letter asks that cable systems and DBS service providers carry signals of up to five digital programming services which air digital programming during at least 50 percent of their prime-time hours by Jan. 1, 2003.

**Beginning April 1, 2003, DTV licensees would be required to simulcast 50 percent of their analog station's programming on their DTV channels.**

Finally, Powell asks equipment manufacturers and retailers to commit themselves to meeting consumer demand for cable set-top boxes to enable the display of high-definition programming, and to marketing broadcast, cable and satellite DTV options in retail outlets. Manufacturers are asked to begin including over-the-air DTV tuners in new broadcast TV receivers. The plan calls for a phased-in inclusion of such tuners, beginning with larger sets and culminating with all sets over 13 inches including such tuners by 2006. By 2004, Powell wants all new HD-capable TV receivers and display devices to include digital inputs.

A number of broadcasters see Powell's initiative as a step in the right direction. However, all segments of the television industry, including cable and equipment manufacturers, expressed some reservations and a desire to hear more.

### Captioning of emergency information now required

Effective April 1, 2002, all television stations, multichannel video programming distributors and other direct distributors of video programming to the home must make emergency information accessible to persons with visual disabilities by presenting the audio portion of such emergency information with closed captioning or another method of visual presentation conforming to the requirements of the closed-captioning rules.

Emergency information that is provided in the video portion of a regularly scheduled newscast, or newscasts that interrupt regular programming, also must be made available to persons with visual disabilities. Emergency information that is provided in the video portion of programming that is not a regularly scheduled newscast, or a newscast that interrupts regular programming, must be accompanied by an aural tone.

Unlike the new video description rules, which limit their applicability to the top 25 markets, the emergency information rules, like the closed captioning rules, apply to all providers of television programming who are subject to the jurisdiction of the Commission.

These emergency information rules, as well as the video description rules, are under review by the D.C. Circuit Court of Appeals. The challengers filed for a stay of their April 1, 2002, implementation date pending judicial review, but the Commission and the Court denied those requests. BE

### Dateline

July 10 – Deadline for electronic filing of quarterly Forms 398 (children's programming report) and for placing quarterly issues/programs in the public file.

*Harry C. Martin is an attorney with Fletcher, Heald & Hildreth PLC, Arlington, VA.*

SEND Send questions and comments to: harry_martin@primediabusiness.com

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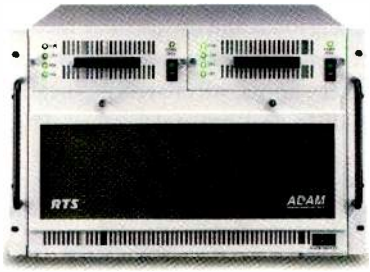


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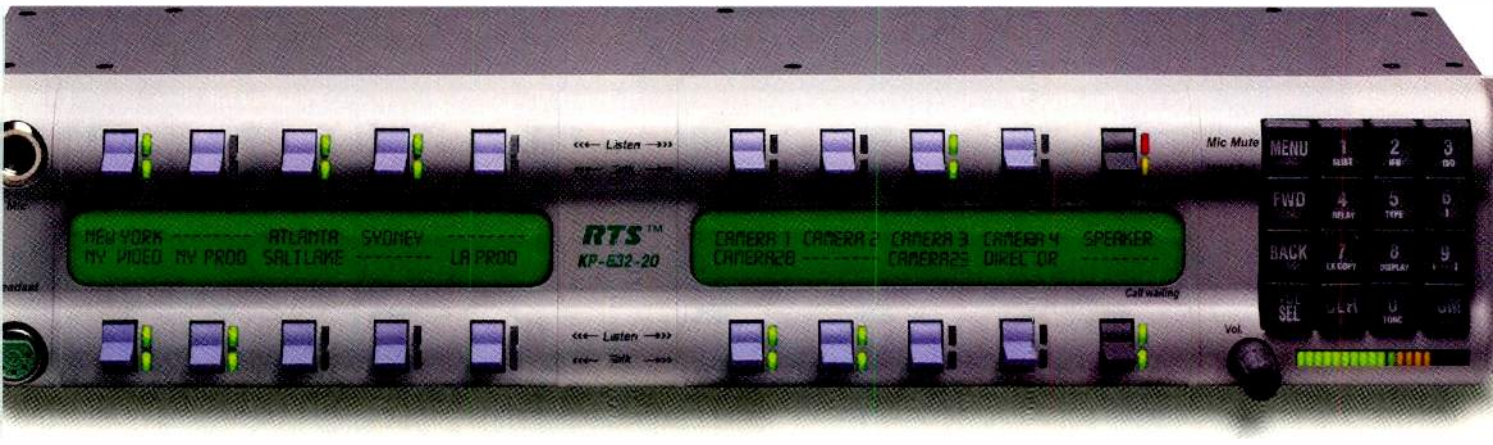


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# The cost of digital - Part 2

BY GLENN ESTERSOHN

*Editor's Note: Last month's Business Models article discussed some of the advantages associated with shooting digital and offered cost comparisons between corresponding film formats. This month's article continues that discussion.*

## Camera rental

In addition to eliminating the cost of stock, processing and dailies, using digital formats in some cases reduce the cost of camera rental. For instance, the cost of DVCAM camera rentals runs roughly 60 percent to 80 percent less than 16mm rentals. Digital Betacam camera rentals are less expensive than Super 16mm by a narrower margin – about 26 percent.

The HDCAM 24p, however, runs neck and neck with 35mm film. On average, 35mm film cameras cost nine percent less to rent. (See Table 1.)

## Letting it roll

One of the most important advantages of shooting digital may also be one of the most mundane. Tape cassettes hold more than three times as many minutes as film canisters. (See Table 2.) For example, an $80 HDCAM small cassette can roll uninterrupted for 50 minutes (24p mode). Compare this with 11 minutes for a 1000-foot reel of 35mm film.

Long loads and inexpensive media offer a special cost advantage for underwater shoots, ultra-remote locations, wildlife and natural history. Digital media also transforms the economics of extracting minutes of images from countless hours of necessary capture.

**Shooting with digital cinematography doesn't reinvent the cost structure of filmed entertainment.**

## Post production

The cost advantages, if any, of digital post production depend largely on what you need to do. For example, if the production includes heavy effects sequences, if you're performing a digital online edit or considering digital release formats, then the savings tilt toward digital.

Digital can also mean lower color correction time and costs – especially if different film stocks would have been required in the same shoot. Many productions shoot slow and fast stocks for daylight and nighttime, for example, which then need to be matched in post production. Some high-end digital cameras have built-in high-speed and slow-speed capabilities. For example, the Sony HDW-F900 digital 24p camcorder can range from 150 ASA to 1200 ASA with low "grain" (electronic noise).

If a digital production is intended for digital release or digital broadcasting, the savings can be substantial. However, producers may need to balance potential digital savings against the need to blow up digital productions for theatrical release on film – a process that alone can cost $500 per minute (Arri laser recorder; silent, timed print). According to Ellen Kuras, who shot *Bamboozled*, using DV required added care and expense in the digital-to-film process.

| Stock | 16mm Aaton XTRProd, Arriflex 16SR-3 or Panaflex 16 | DVCAM handheld Sony DSR-PD150 or DCR-VX1000E | DVCAM high-end Sony DSR-500WS | Super 16mm Aaton XTRProd, Arriflex 16SR-3 or Panaflex 16 | Digital Betacam Sony DVW-700WS | 35mm Aaton 35-3, Arriflex 535B or Golden Panaflex GII | HDCAM 24P Sony HDW-F900 |
|---|---|---|---|---|---|---|---|
| Rate Card daily rental, including batteries, charger, AC power, lenses, tripod, fluid head and (for film cameras) color video assist. | $1310 | $305 | $533 | $1310 | $967 | $1858 | $2154 |
| Savings | | 77% | 59% | | 26% | 9% | |

**Table 1. The savings in camera rentals between 16mm and DVCAM are almost as dramatic as the savings in stock costs. Between Super 16mm and Digital Betacam, the prices are closer, but there's still a 26 percent cost advantage to renting Digital Betacam. When comparing the rental price of the 24p camera to that of 35mm film cameras, depending on the package chosen, film usually has a nine percent price advantage. Sources: Abel CineTech and LVR, Fletcher Chicago and Clairmont Cameras, Panavision, and Plus 8 Video.**




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## Digital production

Digital enables you to reduce shooting ratios, or digital means higher ratios. Digital lets you shoot faster, or digital is just the same. It all depends on the creative demands of the director and cinematographer. Digital enables a pervasive rethinking of life on the set, but only if that's what you want. For example, seeing the instant playback obviates the need to wait 24 hours to see dailies, enabling you to strike sets faster. But ultimately the speed you achieve in digital production depends on you.

For independent filmmakers, perhaps the biggest economic advantage to digital is not how much productions cost, but rather when those costs are incurred. By nearly eliminating a big up-front cost, digital helps producers manage their cash flow. They can shoot and edit in digital, and project the edited digital master when they shop the feature around to potential distributors. Only after they secure a distributor do they need to spend the money for transfer to 35mm film.

| Formats | Film load | Tape load (small cassette) | Digital advantage |
|---|---|---|---|
| 16mm and DVCAM | 11.11 min. at 400' | 40 min. | 3.6 to 1 |
| Super 16 mm and Digital Betacam | 11.11 min. at 400' | 40 min. | 3.6 to 1 |
| 35mm and HDCAM 24p | 11.11 min. at 1000' | 50 min. | 4.5 to 1 |

**Table 2. Digital media offers producers the benefits of inexpensive media and long loads, which can transform the economics of extracting images from countless hours of necessary capture.**

## The bottom line

Shooting with digital cinematography doesn't reinvent the cost structure of filmed entertainment. You still need actors, sets, lighting and crew. You still must house and feed them on location. However, digital does eliminate 97 percent (or more) of the cost of film stock, developing and dailies. And digital can lower camera rental costs. Many producers are using these savings to lower the overall cost of production; to get more coverage, as in the multi-camera techniques that Spike Lee and Ellen Kuras used to create *Bamboozled*; or to achieve a new intimacy with the talent (permitted by smaller, more mobile cameras and longer recording times). BE

*Glenn Estersohn is a writer who follows digital cinema, digital television and digital audio from his home in Scarsdale, NY.*

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# Understanding multiplexing

BY MICHAEL ROBIN

Since the beginning of telecommunications in the early 20th century, telcom carriers and broadcasters have striven to transmit as much information as possible while conserving the limited bandwidth of the media they use — that is, to maximize throughput. They have succeeded in this effort by developing various techniques that can be grouped under the term "multiplexing."

## The analog world: frequency-division multiplexing

Analog multiplexing has been with us since the 1930s, when the rapid increase in telephone traffic required the development of techniques allowing for the simultaneous transmission of multiple channels on a single telecommunications medium. The method used was frequency division multiplexing (FDM). One of the most successful applications of FDM is the frequency interleaving of the chrominance and luminance information resulting in the composite NTSC video signal. This process allows the simultaneous transmission of luminance and chrominance values in a shared 4.2 MHz bandwidth. The system takes into account the discrete spectrum clusters of the luminance signal with a spacing of Fh (horizontal scanning frequency) and inserts equally discrete but Fh/2 displaced spectrum clusters of a suppressed carrier quadrature modulated signal conveying the color-difference B-Y and R-Y information. The chrominance spectrum displacement by Fh/2 is achieved by using a chrominance subcarrier whose frequency is a multiple of Fh/2. The chosen subcarrier frequency is Fsc = 455 Fh/2 ≈ 3.58 MHz. The result is an interleaved spectrum with chrominance and luminance clusters spaced Fh/2 as shown in Figure 1 on page 32.

**While frequency-division multiplexing is a relatively easy task, demultiplexing the signal is relatively difficult to achieve.**

While frequency division multiplexing is a relatively easy task, the demultiplexing is relatively difficult to achieve. A perfect decoder requires complex filtering and separation of the luminance and chrominance spectral components. Unavoidable design compromises result in chrominance-to-luminance and luminance-to-chrominance crosstalk. In addition, less than ideal transmission channel characteristics result in high frequency delays, resulting in chrominance versus luminance delays, and nonlinear distortions, resulting in differential phase and differential gain, which affect the accuracy of the color rendition.

## The digital world: time-division multiplexing

Digital multiplexing uses the concept of time-division multiplexing (TDM). Here, several signals (related or unrelated) are sampled at a rate high enough to ensure that no information is lost. The samples are shortened as required and are time-division multiplexed for sequential transmission through a common medium. The digital multiplexer interleaves a

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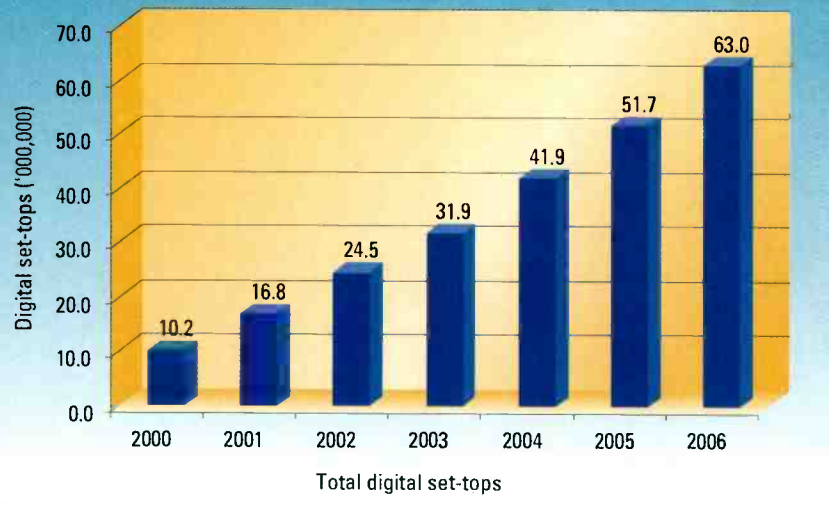


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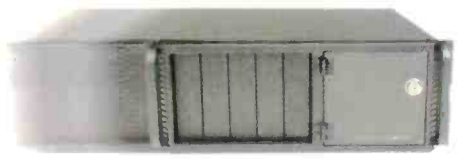

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number of lower-speed signals to form a higher-speed signal.

The advent of digital signal processing in professional video and audio equipment has led to time-division multiplexing of various data in the studio environment. Figure 2 shows how the TDM technique is applied in CCIR 601 4:2:2 digital video. The first step in this process is the sampling and quantizing of gamma-corrected analog luminance ($E'_Y$) and scaled color-difference ($E'_{CB}$ and $E'_{CR}$) signals. (The latter are sometimes referred to as $P_B$ and $P_R$.)

• The $E'_Y$ analog luminance signal is low-pass filtered at 5.75 MHz. Then it is sampled at 13.5 MHz, with a precision of 10 bits per sample. This results in a bit-parallel digital luminance signal (Y) with a data rate of 13.5 MWords/s. The words have a duration of 1/13.5 MHz = 74 ns. There are 858 Y samples per total scanning line, numbered Y0 to Y857.

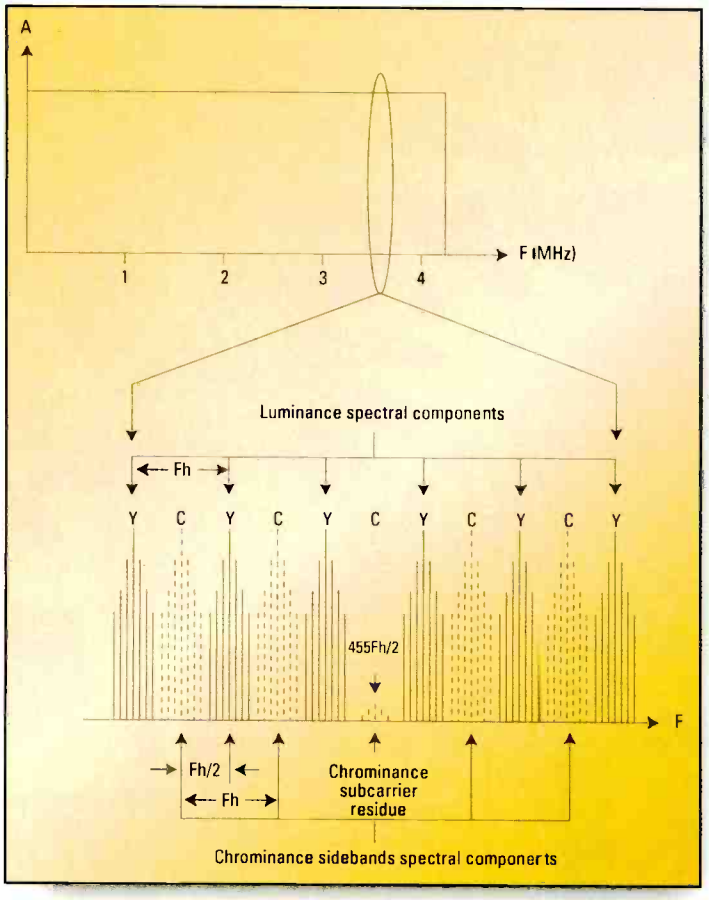


**Figure 1. Details of NTSC FDM spectrum around the chrominance subcarrier**

• The $E'_{CB}$ analog blue color-difference signal is low-pass filtered at 2.75 MHz. Then it is sampled at 6.75 MHz, with a precision of 10 bits per sample. This results in a bit-parallel digital blue color-difference signal ($C_B$), with a data rate of 6.75 MWords/s. The words have a duration of 1/6.75 MHz, or 148 ns. There are 429 $C_B$ samples per total scanning line, numbered $C_B0$ to $C_B428$. The $C_B$ samples are colocated with odd Y samples (Y0, Y2, Y4 ...).

• The $E'_{CR}$ analog red color-difference signal is low-pass filtered at 2.75 MHz. Then it is sampled at 6.75 MHz, with a precision of 10 bits per sample. This results in a bit-parallel digital blue color-difference signal ($C_R$), with a data rate of 6.75 MWords/s. The words have a duration of 1/6.75 MHz, or 148 ns. There are 429 $C_R$ samples per total scanning line, numbered $C_R0$ to $C_R428$. The $C_R$ samples are colocated with odd Y samples (Y0, Y2, Y4 ...).

Now, here's where the multiplexing takes place. The three 10-bit bit-parallel data words are sequentially clocked out, starting with $C_B0$. The sequence is $C_B0$, Y0, $C_R0$, Y1, $C_B1$, Y2, $C_R1$, etc. The last sample of the line is Y857. The result of this time-division multiplexing of the data is that the outgoing data rate is the sum of the incoming data rates. This requires only one multi-pair cable for signal distribution. The time-division multiplexed bit parallel data rate is 27 MWords/s, and the duration of each sample is 1/27 MHz, or 37 ns. But distributing 4:2:2 multiplexed digital data using a multi-pair cable is costly and cumbersome, especially when using a routing switcher. To facilitate signal distribution, the bits can be read out sequentially and fed to a single coaxial cable, resulting in a bi-serial digital signal with a data rate of 270 Mbits/s. This simplifies signal distribution at the expense of increasing the bandwidth.

There are 1716 samples per total line (858Y, 429$C_B$ and 429$C_R$) and 1440

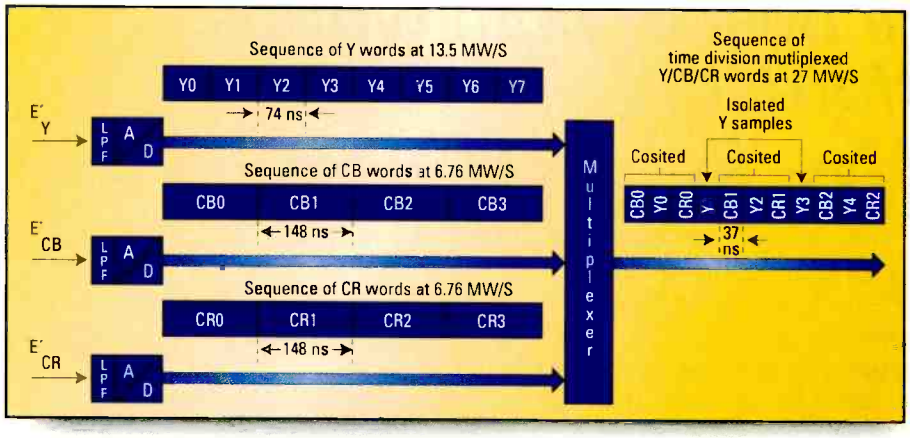


**Figure 2. Time division multiplexing of digital 4:2:2 data**

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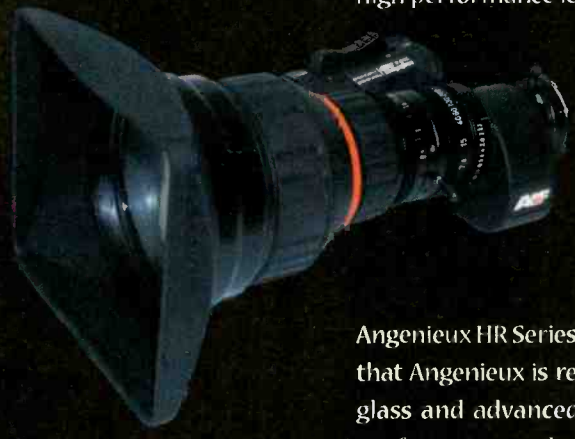

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samples per active line (720Y, 360$C_B$ and 360$C_R$). The horizontal blanking duration is equal to 1716 - 1440, or 276 samples. The horizontal sync is not sampled. Instead, two 4-word timing-reference signals (TRSs) are sent: one identifying the end of active video (EAV) and the other identifying the start of active video (SAV). This leaves an overhead of 268 horizontal-blanking-interval samples available for transporting other types of information called horizontal ancillary data (HANC).

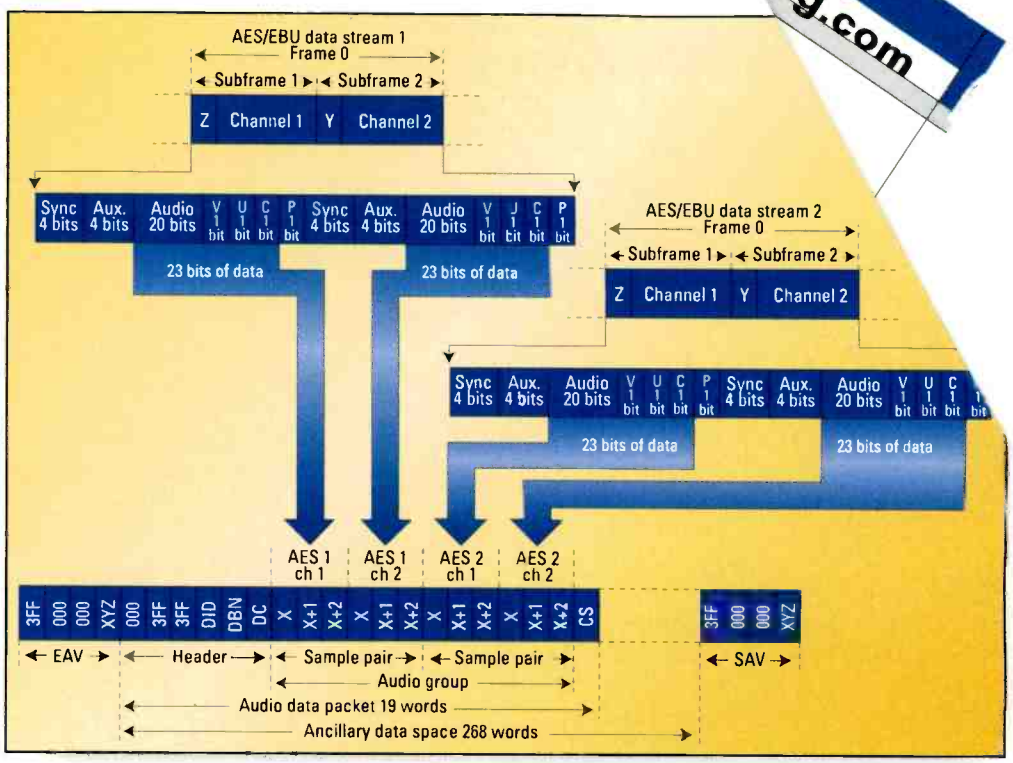


**Figure 3. Time division multiplexing of two AES/EBU audio data streams mapped as a sequence of three words — X, X+1 and X+2 — into the horizontal ancillary data space of a 4:2:2 data stream**

## HANC

HANC data are formatted in packets consisting of a header, followed by the ancillary data and ending with a checksum (CS). In the absence of a header, it is assumed that no ancillary data are carried. The header consists of six words. The first three — 000, 3FF, 3FF — are values that cannot be assumed by other data, and they signal the presence of ancillary data. The last three header words are data identification (DID), data block number (DBN) and data count (DC). After the header, a maximum of 255 ancillary data words are permitted. Figure 3 shows details of the digital 4:2:2 horizontal blanking interval and the manner in which two AES/EBU digital audio data streams (four individual audio channels) can be formatted to fit into one ancillary data packet.

SMPTE Standard 272M defines ways to multiplex (embed) up to eight AES/EBU data streams (16 individual audio channels) in the HANC data space.

This is achieved by grouping the eight AES/EBU data streams into four audio groups. The HANC capacity of the 4:2:2 digital format is on the order of 42 Mbits/s. This figure is obtained as follows:

268 Words/line x 525 lines/frame x 29.97 frames/s x 10 bits/word ≈ 42.16 Mbits/s.

Certain exclusions, such as lines 10 and 11, reduce this value by 10 percent to 20 percent. Given an AES/EBU data rate of 3.072 Mbits/s (before BPM encoding), eight AES/EBU data streams would require 8 x 3.072 Mbits/s = 24.576 Mbits/s, so there is ample HANC space for other ancillary data.

Ancillary data also can be embedded into the vertical blanking interval (VANC). Among the VANC data are error detection and handling (EDH), as well as vertical-interval time code (VITC). Audio is usually embedded only as HANC. BE

**Two AES/EBU digital audio data streams (four individual audio channels) can be formatted to fit into one ancillary data packet.**

*Michael Robin, former engineer with the Canadian Broadcasting Corp.'s engineering headquarters, is an independent broadcast consultant located in Montreal, Canada. He is co-author of* Digital Television Fundamentals, *published by McGraw-Hill.*

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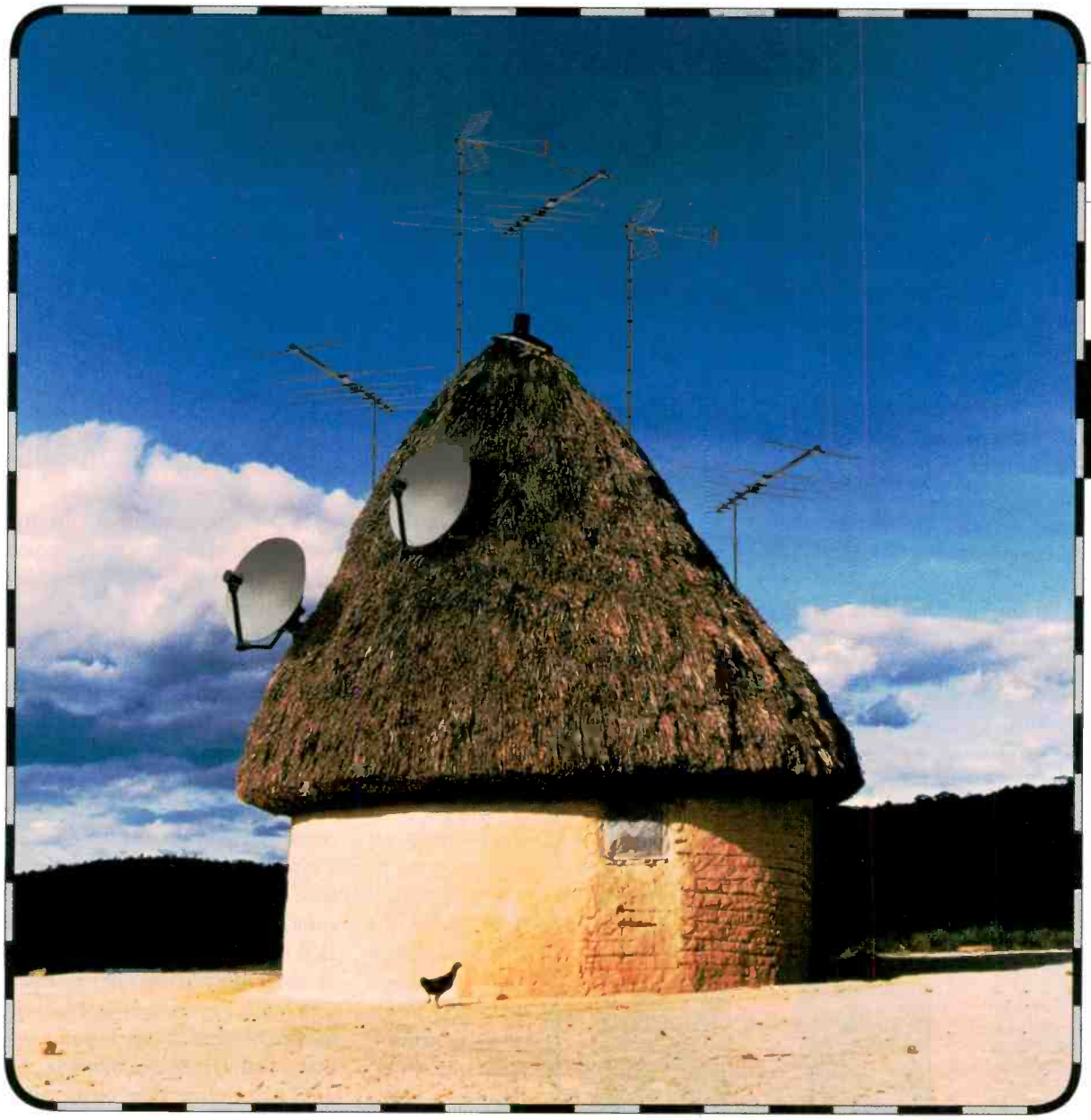


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# Networking
## for post production

BY BRAD GILMER

Most post-production facilities have been moving pictures over networks for years. Why did post get an early start? Because in post it was possible to use conventional networks to move single images or graphics backgrounds from one place to another. As the speed of networks and computers has increased, network designs in post production have expanded to take advantage of these capabilities.

This month's column explores Ethernet network switching components. Understanding how these components work together will help you build the high-performance networks you need to support your post-production department.

In the earliest networking days, simple Ethernet hubs were used to connect a small number of devices together on a network. The hub provided the physical connections and voltages necessary to allow devices to communicate. They were completely dumb, meaning that they had absolutely no awareness of the packets being exchanged between nodes. They worked well for very small workgroups in office environments. Hubs could be daisy-chained together to increase the total number of computers on a network but, as many of us found out the hard way, adding computers to the network increased congestion and quickly caused the network to fail.

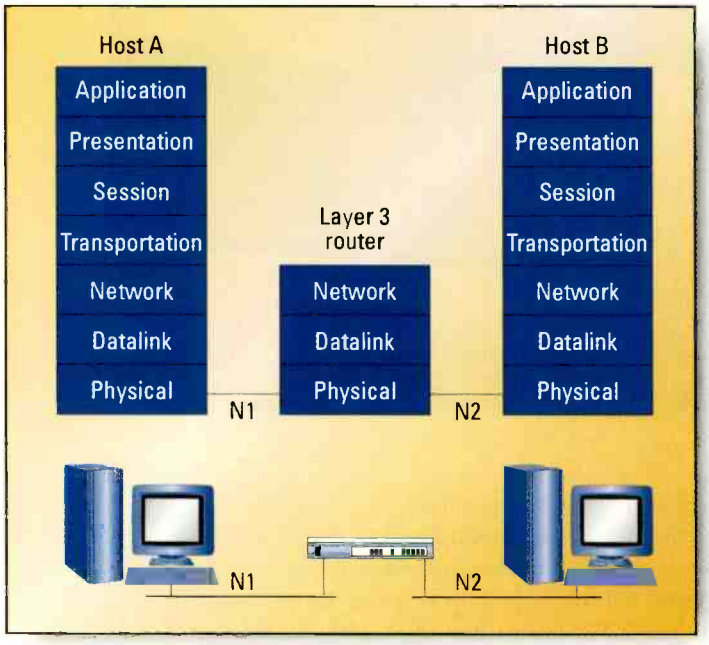


**Figure 1. Layer-3 routing takes place at the Network layer in the seven-layer OSI model.**

Bridges were developed to connect disparate local-area networks (LANs), and were the first devices used to connect a local network to the Internet. They also allowed network engineers to control access to a part of a network on a case-by-case basis. In the early days, bridges had limited processing power. But these days, they have evolved into complicated devices.

Routers are similar to bridges, but they allow computers on one network to talk to computers on another network. Sometimes routers are referred to as gateways. The router takes packets on one network and forwards them to another. Routers are intelligent devices; they learn where a computer is. From then on, they send packets along the appropriate route without having to rediscover where the receiving computer is located. A cable modem or DSL box is a router – it connects your computer, running on a local network, to the Internet.

**Routers are similar to bridges, but they allow computers on one network to talk to computers on another network.**

Switches are similar to hubs in that they are used to connect a number of computers together. But in a switch, when a computer on Port A wishes to talk to a computer on Port C, Port A is effectively connected to Port C for the duration of the packet transfer. And, if at the same time, a computer on Port B wants to communicate with a computer on Port D, it may do so without having to wait for the transfer between Port A and Port C to finish. Put another way, the big difference between a switch and a hub is that a switch provides multiple, simultaneous bi-directional connections at full wire speed, just as if you had hooked the computers back-to-back. Before switches, all connected devices shared the available bandwidth in the hub. Installing Ethernet switches can increase speed by a factor of 10 to 20, compared to conventional hubs.

Switches can be much more than hub replacements. Routing switches combine the functions of both a router and a switch, connecting different networks together at very high speed and low latency.

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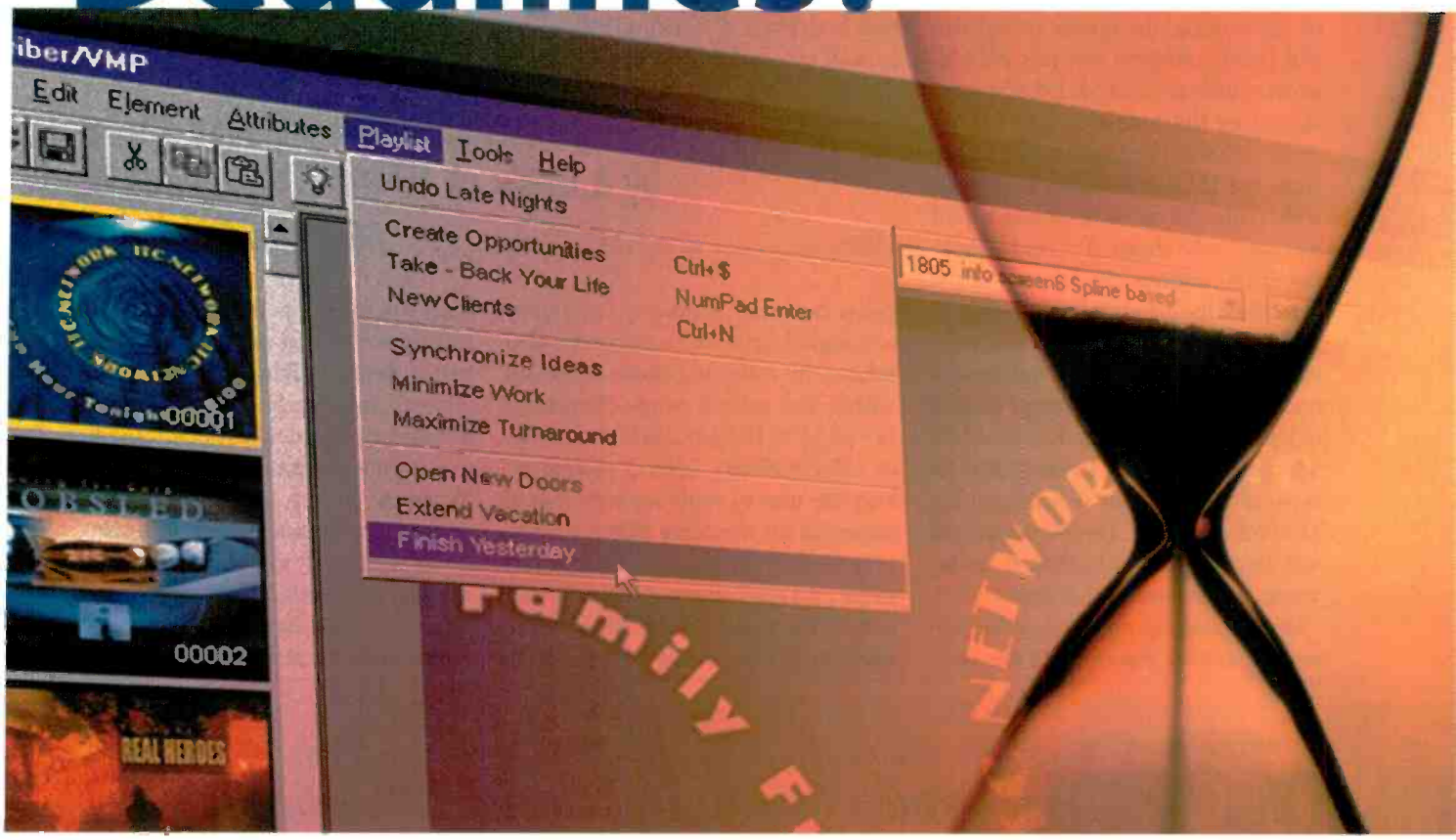


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### Switching, routing and layers

When a router receives a packet, it looks at the header to determine where the packet should go. In the early days of networking, the media access control (MAC) address was key. A MAC address such as 00:03:53:d3:bc:56 is assigned by the manufacturer from a range of addresses they have obtained from the IEEE. This address is hard-coded into the network-interface card and cannot be changed. A bridge looking at this address checks its tables to determine the disposition of the packet. If it does not know where the device is, it sends a broadcast packet to all nodes on the network in an attempt to find it. Bridges and switches that use MAC addresses are called Layer-2 devices because they do their switching at the Datalink or Layer 2. Layer-2 devices are very fast, they can be built with low latency, and they are not expensive.

Layer-3 routing operates at the network layer. (See Figure 1.) In this layer, machines are identified by network address, which can be set by the user. TCP/IP is the most commonly used networking protocol today. IP addresses are written in "dot" notation, with four numbers between 0 and 255, separated by periods (Example: 127.0.23.41). An engineer can assign a group of computers to a logical network, sometimes called subnet, by assigning them addresses within the subnet range (Example: 127.0.23.0 to 127.0.23.254 with a subnet of 255.255.255.0). Layer-3 routing allows the user to route separate logical networks on the same physical wire. Why would this be important, especially to the post community? The answer lies in how Ethernet handles collisions (see sidebar). When two nodes talk at the same time on the same network, a collision occurs. If you build a facility with a routing switch, connecting each node to its own port on a switch will avoid having two devices collide at the physical level. However, if these devices are all part of the same logical network, collisions will still occur. By using a Level-3 routing switch, you can limit the number of devices talking on each logical network, and thereby limit the number of collisions. The devices can still all talk to each other because the router part of the router switch will route packets across the various networks. This solution is particularly important to the post community, where users are moving large files in and out of server farms.

**Installing Ethernet switches can increase speed by a factor of 10 to 20, compared to conventional hubs.**

Layer-3 router switches are more ex-

pensive than Layer-2 router switches. The Layer-2 device is sufficient for most applications. The Layer-3 device gives you the flexibility of assigning devices connected to the same physical network to different logical networks.

Let's look at an example to see how a simple hardware upgrade can improve network performance. Suppose that a post facility has a server farm with 10 servers, all on the same network, capable of pumping 8 Mbit/sec. per server. You decide that you will hook these all together using a 10-port, 100Base-T Ethernet switch. So far, so good (you think). You have a maximum of 80 Mbit/sec. (10 servers at 8 Mbit/sec. each) from the servers running through a 100Base-T switch.

There are at least two problems with this scenario. The first problem is throughput. If each of the servers actually delivers 8Mbit/sec., then theoretically the network will be 80 percent saturated. However, Ethernet has a fairly high overhead, somewhere in the neighborhood of 20 percent to 25 percent. If you load this network beyond about 75 Mbits/s, it will fall over. Most network design engineers like to see networks running at 70 percent capacity or below. The second problem is with collisions. Since all servers are aggregated on one logical network, when one server starts talking, all the others have to wait until it is finished. With a large number of users, this could cause network lockup.

Fortunately, with the advent of routing switches, these problems are eas-

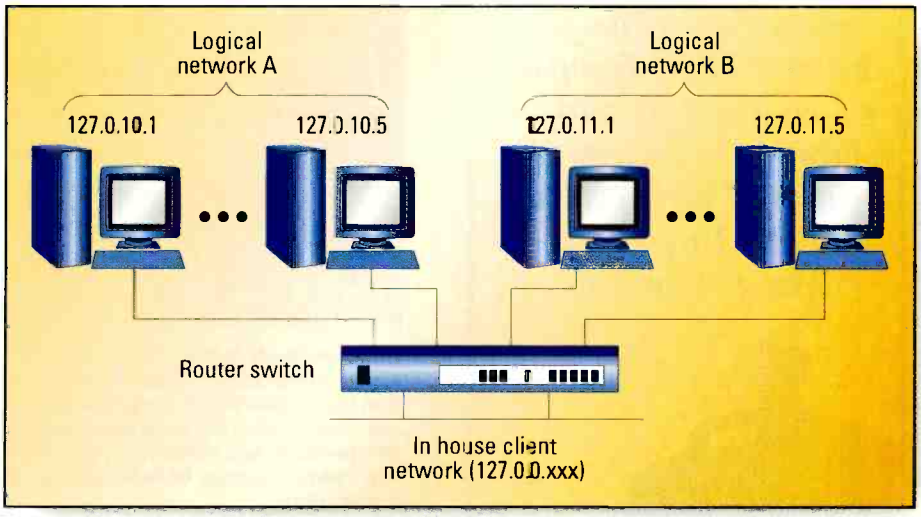


**Figure 2. Separating 10 servers into two logical networks of five servers each reduces collisions and increases network performance.**

**Facilities such as this all-digital duplication center at Crawford Post Production make use of high-speed networking technology for tape duplication, compression and electronic spot delivery. Photo courtesy of Crawford Communications.**

ily resolved. One possible solution is to replace the 100Base-T switch with a 100Base-T routing switch. Then split the servers into two separate logical networks and configure the router to connect the networks together. This is shown in Figure 2. Finally, add two more connections from the router switch output to the client network. What do you get from this reconfiguration? First, by replacing the switch with a routing switch, you provide a 100Mbits/s pipe from each server to the backbone. With two direct-duplex, full-bandwidth connections to the client network, you will never run short of bandwidth between the servers and the clients. Second, by grouping the servers into two separate logical networks, the collision domain is cut in half. In other words, the number of computers competing for a chance to talk is cut in half. This reduces the likelihood of a collision and increases network efficiency.

Understanding how network devices work can help you to design better, more efficient networks.

As a closing comment, consider the example shown in Figure 2. If you expand your server farm, you can add two more links from the router switch to the in-house network. But is that the best way to go? Consider the alternative of purchasing a 100/1000 router switch. This would allow you to run a single Gig-E connection from the output of the router switch to the in-house network instead of four 100 Mbit connections (assuming a Gig-E backbone). The single Gig-E is less expensive than the four 100 Mbit connections, and offers about 20 percent greater throughput because the overhead of the multiple 100 Mbit connections is four times higher. BE

*Brad Gilmer is president of Gilmer & Associates, executive director of the AAF Association, and executive director of the Video Services Forum.*

SEND Send questions and comments to: brad_gilmer@primediabusiness.com

## Collision avoidance

Carrier-sense, multiple access/collision detect (CSMA/CD) is the protocol for carrier-transmission access in Ethernet networks. On Ethernet, any device can try to send a frame at any time. Each device senses whether or not the line is idle and available. If it is, the device begins to transmit its first frame. If another device tries to send at the same time, a collision occurs and the frames are discarded. Each device then waits a random amount of time before attempting to send the frame again. While Ethernet networks may have up to 255 computers on a single segment, most networks become heavily loaded before that many computers are connected. As loading on the network increases, collisions become more frequent. Once the network nears saturation, adding just a few more nodes can cause the network to fail completely. Most Ethernet cards have a collision LED to indicate that a collision has occurred. If this light is constantly illuminated, it may indicate that the network is overloaded. It is important to note that collisions are inevitable even in very lightly loaded networks. Collisions are not a problem per se. But when there are large numbers of collisions happening all the time, the network ceases to function.

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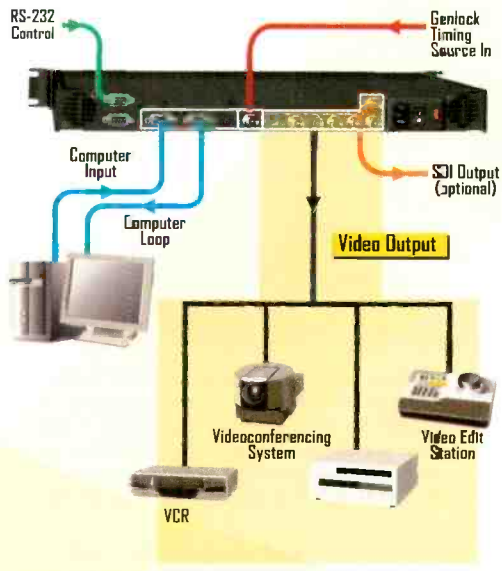


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# Overcranking
## HDCAM 24p

BY CONRAD DENKE

On my monitor, I see bullets flying, glass shattering and cars exploding. It's an action sequence in the trademark style of director Robert Rodriguez. My company, Victory Studios in Los Angeles, has just posted a trailer for his forthcoming Miramax release, *Once Upon a Time in Mexico*. This is the third movie in the Mariachi series, and the trailer may well be the world's first to incorporate slow motion by means of "overcranking" the HDCAM 24p system.

Overcranking, as film professionals know, is the technology behind cinema slow motion. Overcranking occurs when movie film is shot at a high frame rate and displayed at a lower frame rate. The difference in picture rates creates the slow motion effect. While it has been easy to vary the picture rate in analog film production, the technique hasn't been duplicated in digital cinema until recently.

**Digital cameras enable directors of photography to take advantage of a range of effects not available with film cameras, creating effects such as the slow-motion shot of a pistol being fired. Image courtesy of Sony.**

Introduced just one year ago, Sony's HDCAM 24 fps progressive (24p) system has quickly become a favorite of producers, directors and cinematographers. The system combines a full 1080 scanning lines with the 24 fps capture rate of film to deliver many of the technical and psychophysical benefits of the "film look." It also offers fast, cost-effective production in all the ways that digital, electronic media can outperform analog, chemical-based media.

**Overcranking, as film professionals know, is the technology behind cinema slow motion.**

I got into high definition four years ago because I believed it would finally bring electronic production to the level needed for theatrical releases. I have not been disappointed. HD has become like a religion, and I want to convert the world. It's great to see the HDCAM 24p system selected for many television episodics, theatrical releases, commercials and music videos that would previously have been shot on 35mm film. And that's all the more reason to pursue overcranking in HDCAM 24p.

### The idea

Digital overcranking is made possible by the availability of a range of image capture rates on the Sony HDW-F900 HDCAM 24p camcorder. The available rates include 23.98, 24, 25, 29.97 and 30 fps progressive, and 50, 59.94 and 60 fields/s interlace. Overcranking involves some ingenuity in post production. For example, you can shoot at the rate of 60 fields/s interlaced (60i). Then in post production you can convert the footage from 60i to 60p. When you play back the result at 24p, you get motion rendered at 40 percent of the original speed.

Of course, 60i is just one of the eight image capture rates available with the Sony HDW-F900. Other rates, especially 50i and 30p, give the cinematographer additional tools and possibilities. (See Table 1.)

HDCAM 24p overcranking at 60i or 50i requires interlace-to-progressive (I/P) conversion, a process that's well proven, if not necessarily transparent. I/P conversion is already used when NTSC and PAL productions are "blown up" to film. The conversion can be performed by many nonlinear editing systems, digital disk recorders and software packages, including products from Avid, Adobe and Discreet. In a pinch you can even trick Sony videotape recorders into conversion using Sony's Dynamic Motion Control.

It was at NAB last April that Roland House, the Arlington, VA, post production firm, demonstrated overcranking HDCAM 24p. Here at Victory Studios we did further tests using our Sony HDCAM 24p equipment and various software programs. Chief engineer Scott Thomas supervised work in our Seattle facility, while Victory Studios' senior HD editor Walt McGinn conducted tests in our Los Angeles location. After many trials, we hit upon a combination that minimized motion artifacts, maintaining superb image quality.

### Putting theory into practice

When director Robert Rodriguez chose HDCAM 24p to shoot *Once Upon a Time in Mexico* and chose Victory Studios to post the trailer,

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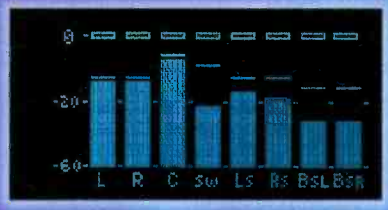


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| Image capture rate | Shutter speed for the equivalent of 180° | Post production playback rate | Resulting speed |
|---|---|---|---|
| 60i | 1/125 | 24p | 40% |
| 50i | 1/100 | 24p | 48% |
| 30p | 1/60 | 24p | 80% |

**Table 1. 60i, 50i and 30p are just three of the eight image capture rates available. Other rates give the cinematographer additional tools and possibilities.**

the concept of 24p overcranking faced a practical test. Rodriguez burst upon the Hollywood scene with *El Mariachi*, a violent epic shot in 16mm for a reported $7000. A self-described "rebel without a crew," Rodriguez aims to shoot movies quicker, cheaper and with less crew than typical Hollywood productions. He completes 50 or more setups a day in an industry where 20 to 25 setups are the norm. One favorite Rodriguez trick involves using a wheelchair as a camera dolly. Just as Rodriguez is impatient with conventional film shooting schedules, he gets frustrated with the conventional film post production process. This makes him an ideal candidate for shooting on HDCAM 24p.

Rodriguez's movies are also technically demanding. In productions ranging from *Desperado* and *From Dusk Till Dawn* all the way to *Spy Kids*, Rodriguez has featured highly choreographed fight sequences. A Rodriguez movie is full of gunfire, explosions, fireballs, crashes and stunts with bodies jumping, flying and falling. In fact, the demanding action sequences for *Once Upon a Time in Mexico* would really give our approach to 24p overcranking a thorough workout.

Because the HDCAM 24p overcranking process involves interlace-to-progressive (I/P) conversion, there are some restrictions and limitations. These were anticipated by B. Sean Fairburn, SOC, an HD engineer and camera operator on the *Mexico* shoot. "You need to be careful with motion," said Fairburn. "The cinematographer has to be sensitive to the speed and axis of motion, speed and motion of the camera, and the shutter speed."

Fairburn explained that slower motion is always easier to handle. Motion toward or away from the camera is easier than a vertical or horizontal axis of motion. Subjects that move with the camera, as in car-mounted shoots, are also easier to accommodate. And longer shutter speeds generate motion blur that, when desired, can also obscure I/P conversion artifacts. Fairburn noted that these factors can enable cinematographers to get away with more, but in any case, the results have to be tested.

## The results

As we posted the *Once Upon a Time in Mexico* trailer, we had the opportunity to examine many of the overcranking effects. While it is always possible to blow up an individual frame and search for artifacts, in actual viewing the results are seamless. We've screened 24p scenes intercut with the converted overcranked 60i scenes and you'd be hard-pressed to tell the difference.

In fact, we quickly put together 20 scenes for an un-color-corrected rough edit of the trailer and screened it for senior Miramax management. They thought it was ready to go.

As the months go by, I predict that this reaction will be typical. Others will share in the enthusiasm as more producers utilize HDCAM 24p overcranking. Even though you won't find this capability in Sony's operating instructions, I'm here to tell you there's no need to wait to take advantage of the potential of HD overcranking. It's a technology whose time has come. BE

*Conrad Denke is CEO and founder of American Production Services and Victory Studios.*

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SYSTEMS DESIGN SHOWCASE

# GlobeCast's international broadcast and origination facilities

BY ELIZABETH WAKEMAN

GlobeCast's video control center supports both digital and analog signals, and all major encryption systems. Photos by Ruben Romeu, Globecast.

As the broadcast services subsidiary of telecommunications giant France Telecom, GlobeCast is an operator of satellite transmission and production services for professional broadcast, enterprise and Internet content delivery. The company supports every aspect of program content delivery via satellite, including direct-to-home distribution, cable headend delivery, contribution, terrestrial TV and radio delivery, business television, satellite newsgathering, sports backhaul, audio distribution, Internet backbone, satellite VPN overlay, satellite-to-desktop streaming, and Webcasting.

While satellite platforms are Globecast's hallmark, the company also offers signature services such as studio production, language conversion and program origination on the ground. In a strategic move to expand its value-added offerings in North America, in 1998 GlobeCast acquired South Florida satellite and production services company Hero Productions, giving it an instant satellite gateway to Latin America and a full-service studio production company with extensive program origination capabilities.

SYSTEMS DESIGN SHOWCASE

With the integration of Hero Productions' studio and master control capabilities within its worldwide operations, in 1999 GlobeCast announced a five-year, multimillion dollar investment to expand its program origination facilities and to upgrade its broadcast infrastructure across North America.

In Miami, $18 million was invested to expand the South Florida broadcast complex from 85,000 square feet to 200,000 square feet, encompassing 8.5 acres of land with expanded master control facilities and the new GlobeCast Studios, a television and film production center with 28,800 square feet of soundstages, currently housing original television productions for Univision. In Los Angeles, the company's West Coast teleport and central booking center – acquired through a 1994 acquisition of Keystone Communications by France Telecom – was given a much-needed $7.5 million upgrade, including a new 6000-square-foot all-digital program origination and transmission center.

To meet the ever-increasing launch of new channels – particularly to Latin America – GlobeCast's digital broadcast centers in Miami and Los Angeles were tailored to offer global satellite transmission and extensive program origination capabilities, including fully automated insertion and playout, tape library, 24-hour monitoring, live-to-air program insertion, and in-house studios for original live programming.


**In the case of Telefutura, which originates a separate feed to three U.S. time zones, GlobeCast incorporated four Sony Flexicarts, pictured above, for automated operation of the East Coast feed.**

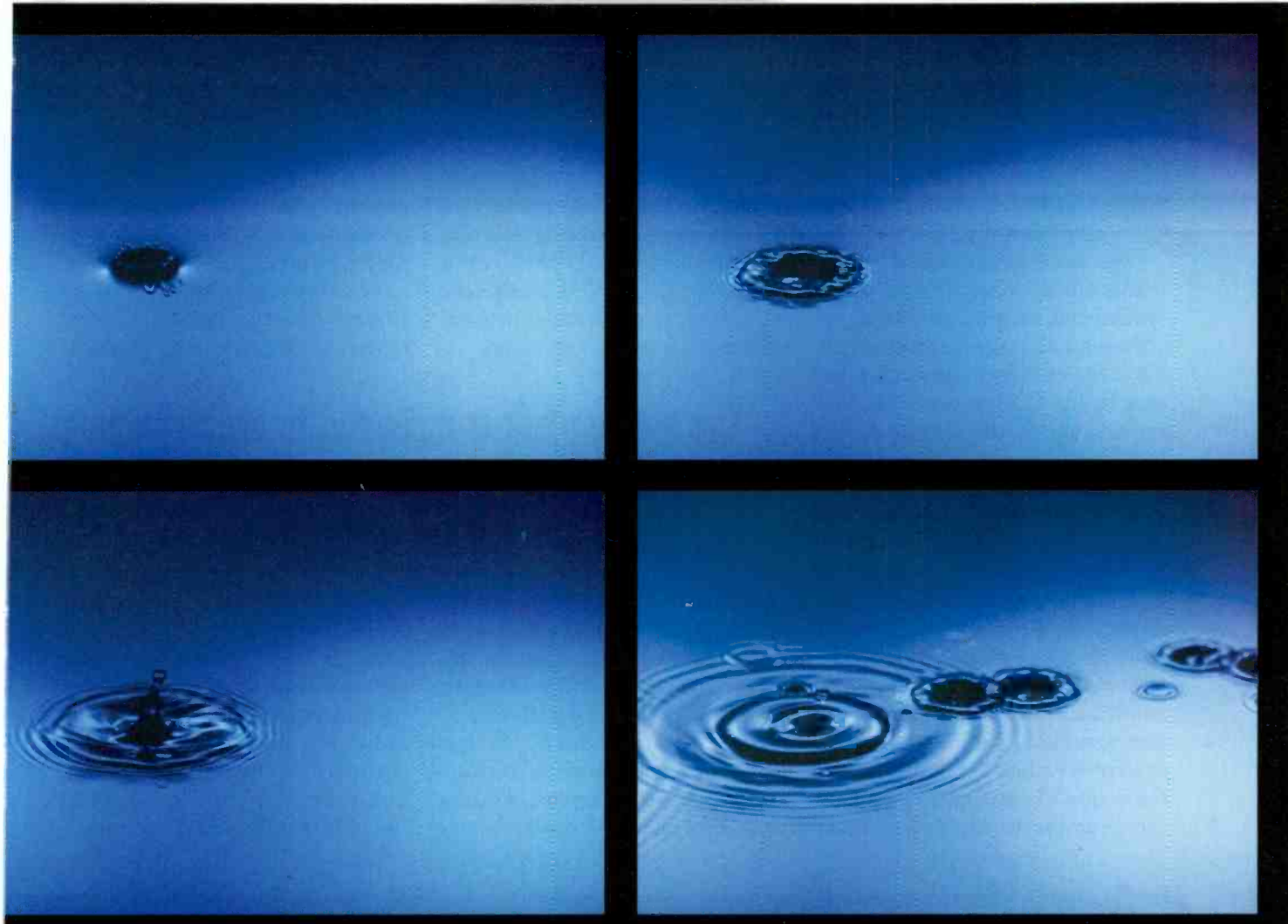
Key to GlobeCast's success is its build-to-measure approach. With more than 10 years of experience, GlobeCast's engineering and operations professionals provide complete system design and integration in-house allowing for quick turn up of services and eliminating the role of costly external consultants. GlobeCast's Miami and Los Angeles broadcast centers can support multiple master control operations and can be custom configured to accommodate office space and studio facilities according to customer demand. Services can be launched quickly in as little as four weeks depending on customer requirements.

**Key to GlobeCast's success is its build-to-measure approach.**

**GlobeCast operates three master control rooms for various networks covering more than 5000 square feet of space and housing all the necessary equipment to maintain channels on-air 24 hours a day.**

A tour of the East Coast digital origination center in Miami reveals a broadcast operations center, configured with multichannel master control capabilities, over 38,000 square feet of soundstages, four digital studio control rooms, multiple Avid edit suites and graphic stations, as well as a tape library and expandable office space, which GlobeCast will build to accommodate network personnel of over 100 people. For instance, MGM Latin America has their operations base in GlobeCast with over 1000 square feet of office space to accommodate over 20 staff members.

GlobeCast's facilities are fully redundant and designed for ease of operation and reliability, while keeping



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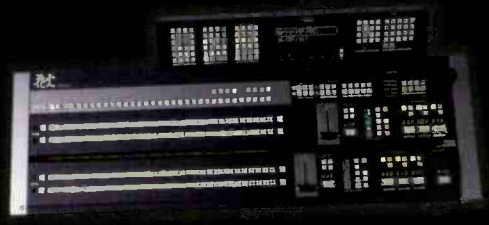

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network interface and traffic systems in mind. GlobeCast also provides IT design and support to establish internal office connectivity, telephone systems and network operability.

The central equipment room (CER), a 20 x 20 foot space immediately adjacent to one of three master control centers, houses the routing equipment, master control switching equipment, audio and video distribution amplifiers, all of the production switcher frames, digital video effects generators and the video servers. The CER features a Philips Venus 2201 modular universal router consisting of two frames (one frame being a 64x64 SDI video router and the other a 64x64 two-channel AES audio router). The router enables GlobeCast to distribute content to various points throughout the facility. The 400-square-foot CER serves as the backbone for signal routing. Having the central equipment room close to the master control centers is key to keeping cable runs to a minimum, which can still easily surpass 25 miles of 1505A coaxial cable for a four- to six-channel network originating from the ground up.

**The entire plant is designed to accommodate the master control rooms – the heart of on-air playback.**

Also in the CER are the servers for production equipment used throughout the various control rooms and studios, including a Grass Valley Kalypso, a Grass Valley Gveous digital video effects generator, three Quantel PictureBox 2 still stores, a Pinnacle DVExtreme effects generator, one Grass Valley 3000 digital video switcher, one Sony DME-7000 digital multi-effects generator and two Chyron Max! character generators, all interconnected via the router network.

The entire plant is designed to accommodate the master control rooms – the heart of on-air playback.

GlobeCast operates three master control rooms for various networks covering more than 5000 square feet and housing all the necessary equipment to maintain virtually an unlimited number of operating channels on-air 24 hours a day. Equipment includes Ikegami TM20-20R color video monitors,


**The central equipment room (CER) houses the routing equipment, master control switching equipment, audio and video distribution amplifiers, all of the production switcher frames, digital video effects generators, and the video servers.**

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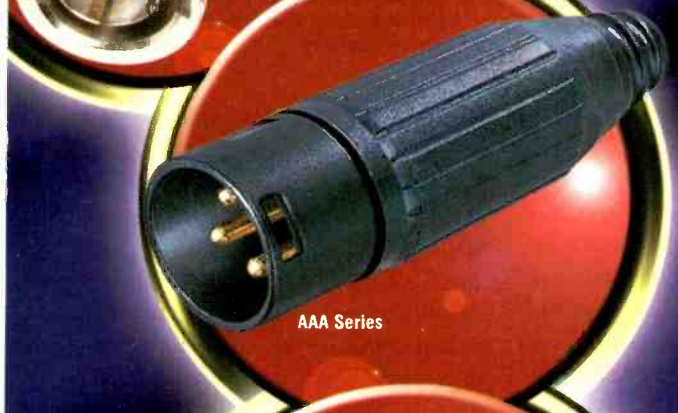

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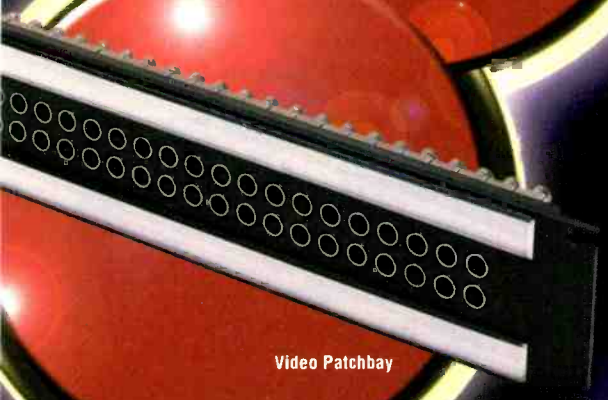

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Ikegami TM10-17RA color video monitors, Tektronix 764 digital audio monitors, 360 Systems DigiCart II digital audio recorders, an assortment of digital and analog tape machines, RTS panels for ADAM Systems, Leitch MGI-1302 logo generators and inserters as well as Louth/Harris Automation Air Clients to run on air logs. Four Philips Saturn master control switcher panels merge all of the production elements for live-to-air integration. While a major portion of program playout is able to originate from the various servers, DigiBeta players are also available in the master control areas for redundancy. In the case of Telefutura, which originates a separate feed to three U.S. time zones, GlobeCast incorporated four Sony Flexicarts for automated operation of the East Coast feed. The East Coast feed is stored in GVG Profile XP video delay servers for delayed distribution to the central United States and the West Coast.

Because many of the networks originating in Miami are targeting both North and Latin America, the master control facilities are designed to handle multiple program feeds in multiple languages. Broadcasters targeting Latin America will often distribute feeds in Portuguese for Brazil, and Spanish for the rest of the continent. The Spanish feeds are often further divided into regional feeds to accommodate specific countries by national dialect or time delay – for example, to Argentina, Mexico and the United States – plus a generic Spanish feed to cover the rest of the countries.

Because GlobeCast's facilities are also large international teleports, their master control centers offer customers complete satellite delivery for both distribution and content contribution. Customers can receive incoming feeds of news, sports and events from anywhere in the Americas, Europe, Asia and the Middle East. GlobeCast's video control center (VCC) supports both digital and analog signals, and all major encryption systems, as well as NTSC, PAL and SECAM conversion.

The VCC connects to the CER through a six-lane highway supported by six Leitch DFS-3005 transcoders. Each transcoder synchronizes the video to house reference and converts analog video to SDI while embedding up to four channels of analog audio. A Snell & Wilcox Alchemist motion-compensated standards converter is employed to accommodate fast motion digital content. Grass Valley Group PVS1000 video servers and Tektronix PDR200 video servers provide content storage and playout of incoming feeds.

For original programming such as cooking shows, talk shows, news and sports magazines, advertising, and other feature content, GlobeCast offers the added benefit of in-house studio production. In Miami, GlobeCast has more than 38,800 square feet of studios, including 28,800 square feet of combinable soundstages in the GlobeCast Studios production center and an additional two studios in the digital broadcast center, totaling 10,000 square feet adjacent to the master control rooms. All of GlobeCast's studios are routed through the router network to facilitate the sharing of media with the MCC.

A combination of Sony, Panasonic and Hitachi cameras are available for production in the various studios. The video shading area is home to all of the camera control units and robotics remote control. Full monitoring and RTS communications facilitate operation with GlobeCast's four studio control rooms. Each studio is wired

**Each studio control room has its own audio control room. This enables the studios to operate alone, but they are also interconnected via the network and can share the resources and tools of the entire facility.**

**The master control facilities are designed to handle multiple program feeds in multiple languages.**

## Design team

Charles C. Trice Jr., senior vice president of engineering
Fernando Linares, director, engineering, Southeast Region
Alex Novoa, director, broadcast operations, Southeast Region

Before

after.

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FLORICAL SYSTEMS

to its own individual all-digital control room. The control rooms house a Grass Valley Kalypso 2M/E control panel with video production center, a Chyron Max! character generator for titling, a Quantel PictureBox 2 for still stores and a Grass Valley Gveous effects generator. A video wall composed of Sony PVM-8045Q color video monitors and Sony PVM-97 black-and-white video monitors facilitates monitoring of studio cameras.

Each studio control room is provisioned with its own audio control room with RTS TIF951 telephone interfaces to connect the producers in the control room with others on location, as well as a 360 Systems Shortcut personal audio editor, a Panasonic SV-4100 DAT recorder and an RTS advanced digital audio matrix. The studios are designed for stand-alone operations, but are interconnected via the network to share the resources and tools of the entire facility.

The 200-square-foot graphics and post-production area also share in the communications between all components. The graphics area includes a tape routing system to import and export digital material. Two tie lines between the graphics 16x16 Leitch Xplus digital router and the main Philips Venus 64x64 digital router in the CER allow material to be easily exchanged throughout the facility. Six individual suites are equipped with Avid nonlinear editing systems, and a seventh larger suite is powered by a Quantel Paintbox for high-end graphics work. These rooms share over one terabyte of storage capacity via a unity server and are stocked basically in the same manner containing one Leitch 16 x 16 router control panel, one Tektronix WFM-601A for waveform and vector monitoring, and an Ikegami TM20-20R color video monitor.

A separate room houses videotape machines, video shading and two slo-mo suites. The tape area features multiple Sony DVW-A500 DigiBeta recorders, with machines dedicated to each studio control room. All machines are interconnected across the network for access from any location via the router.

**Six individual suites are equipped with Avid nonlinear editing systems, and a seventh larger suite, shown above, is powered by a Quantel Paintbox for high-end graphics work.**

Media companies can quickly turn up a new channel – in as little as four weeks – by outsourcing the technical operations to an experienced program origination partner such as GlobeCast. Outsourcing enables new channels to concentrate on programming and marketing, while engineers take care of hardware and daily operations. BE

## Equipment list

Philips Venus 2201 router
Grass Valley Kalypso
Grass Valley Gveous DVE generator
Quantel PictureBox 2 still stores
Pinnacle DVExtreme effects generator
Grass Valley 3000 digital video switchers
Sony DME-7000 digital multi effects generator
Chyron Max! character generators
Ikegami TM20-20R color video monitors
Ikegami TM10-17RA color video monitors
Tektronix 764 digital audio monitors
360 Systems DigiCart II digital audio recorders
Leitch MGI-1302 logo generators and inserters
Louth/Harris Automation Air Clients
Philips Saturn MC switchers
Sony Flexicarts
Grass Valley Group Profile XP video delay servers
Leitch DFS-3005 transcoders
Snell & Wilcox Alchemist motion-compensated standards converter
Grass Valley Group PVS1000 video servers
Tektronix PDR200 video servers
Sony, Panasonic and Hitachi cameras
Grass Valley Kalypso 2M/E control panel
Sony PVM-8045Q color video monitors
Sony PVM-97 black-and-white monitors
360 Systems Shortcut audio editors
Panasonic SV-4100 DAT recorders
RTS digital audio matrix
Leitch Xplus digital routers
Avid nonlinear editing systems
Quantel Paintbox
Philips Venus digital router
Leitch router control panels
Sony DVW-A500 DigiBeta recorders

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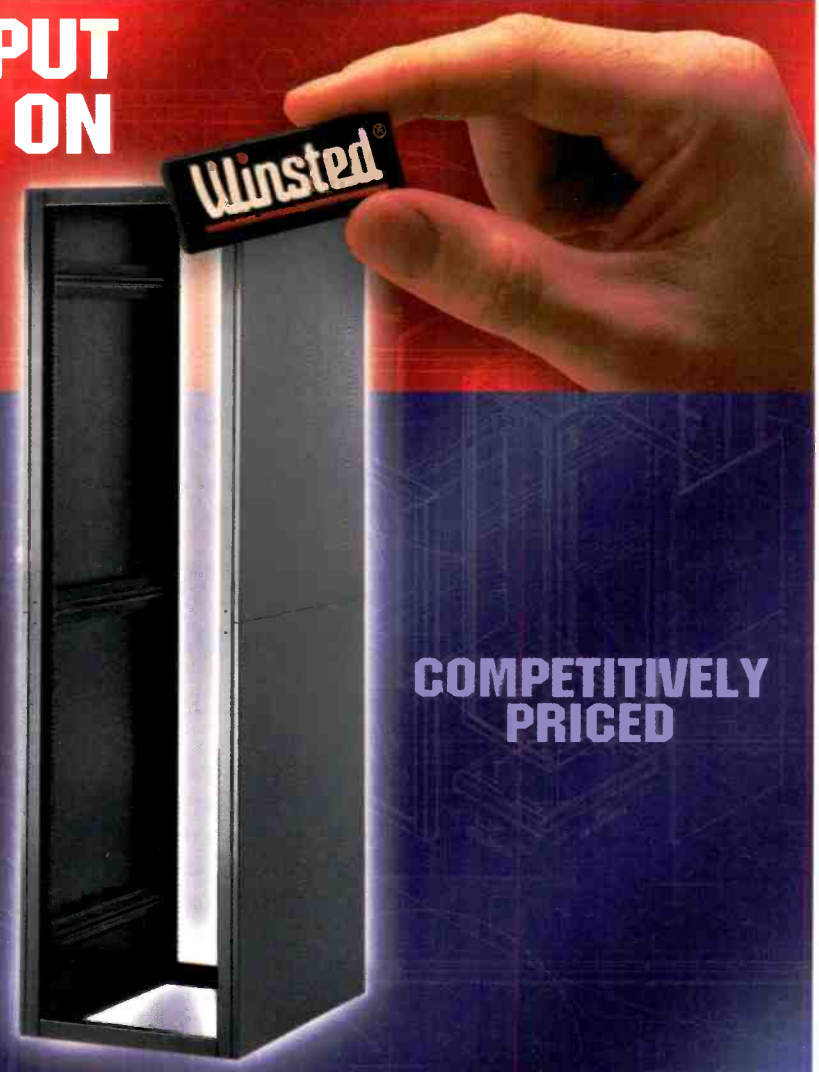


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# Monitoring RF systems

BY DON MARKLEY

Transmitters keep getting more and more reliable. At least, that is what the manufacturers would all have us believe. In reality, they are becoming more complex, which is not necessarily the same thing as reliable.

The issue of good preventative maintenance has been discussed in this column in lengthy and boring detail. But such maintenance has become even more important as transmitters have become more complex, and more difficult as the functions accomplished by the transmitter have become more numerous.

If you take care of good equipment, it will serve you dependably. That is the case now as it has been for many years.

With transmitter plants becoming almost universally unmanned, good monitoring systems have become even more necessary. Transmitter remote control systems have developed to the point where they monitor everything from primary line voltage to individual tower lights. But the transmission line and antenna are still sometimes overlooked.

It simply isn't sufficient to meter VSWR or reflected power using a very basic metering system. Equipment is available to measure forward and reverse power accurately and provide those readings to an on-site computer that can be accessed either by the Internet or a direct dial-in modem. As an example, one system currently in operation uses a computer to monitor three antennas fed by a total of eight transmission lines. The basic power metering devices are the new Bird Electronics power meters installed in the six-inch transmission lines.

The outputs of the Bird meters are routed to a computer that uses a proprietary program to display the forward and reverse power on all lines. If a fault is sensed on any of the lines, or if the power is inadvertently increased above the rating of the lines, the system shuts down the associated transmitters before further damage occurs. This also prevents the horrible habit practiced by some transmitter operators of pushing the "Power On" button over and over in an attempt to get the station back on the air. Operators should know that if the transmitter doesn't come up with the first attempt, any further attempts are probably just doing more damage – to very big and expensive components.

**With transmitter plants becoming almost universally unmanned, good monitoring systems have become even more necessary.**

On some antenna systems the repeated button-pushing repair method has destroyed the entire vertical run of six-inch coaxial line. In one case, the repeated efforts of the station staff to get the transmitter back on line burned up about 75 feet of line, destroying most of the center conductor and burning huge holes in the outer conductor. The lesson here is very simple. When the transmitter goes off, check first to see if there is an overload condition. If there has been a VSWR trip, common sense would say to try bringing the transmitter back up once, although it probably would be a good idea to reduce the power before making that attempt. If the transmitter fails to come back to normal operation, it's time to go to the standby antenna if one exists. In any case, it is definitely time to find out what is wrong before hitting the high power button again.

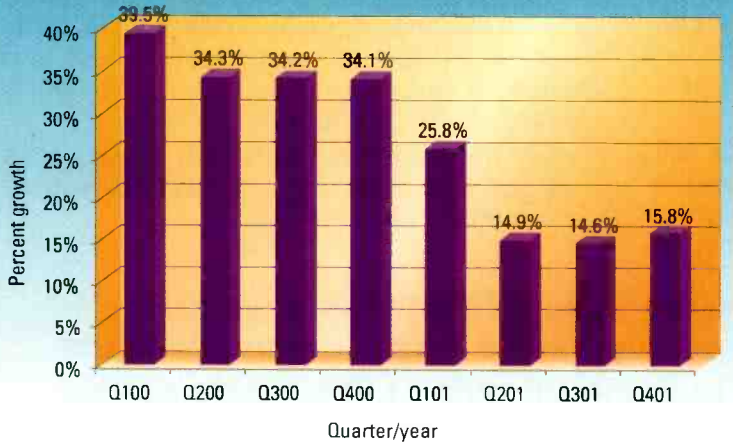
Many transmission lines out there still use the familiar "watch-band"

## FRAME GRAB

A look at the consumer side of DTV

**Broadband continues to increase**

**Usage is up, but growth rate slows**

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## SONY PROFESSIONAL MEDIA

**BECAUSE EVERY STORY COUNTS.**

connections. As the years pass, the combination of continued wear and heat cause that spring-type assembly to lose its tension become loose and lie down in their groove. When the connection starts to go bad, heating increases and further loosens the spring. At the very least, those watchband springs should be replaced every 10 to 12 years. That repair job is not highly expensive and is certainly much, much cheaper than the repair job that will be necessary if a burnout occurs – probably at midday – during sweeps.

The next area of concern is simple mechanical maintenance. Those pieces of equipment that normally work properly for many years tend to be totally overlooked when maintenance is done. Such is the case for transmission line or waveguide hangers. Spring hangers are meant to allow the transmission line to expand at a different rate than the tower during temperature changes.

The hardware associated with those hangers – the necessary bolts, springs, hose clamps around the line, and other bits and pieces – do occasionally fail. The result can vary from mechanical damage to the line to a change in the tuning of a waveguide system as the waveguide is distorted by improper support. Again, the solution is simple. When the tower receives its annual inspection, be sure that the riggers check each hanger carefully for proper hardware and for correct spring tension.

**It is a good idea to schedule a complete antenna and transmission line sweep at least every three years.**

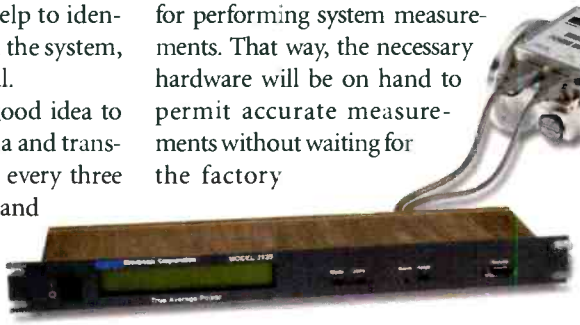
The hangers come from the factory with a spring tension chart. That chart tells how long the spring should be for a given temperature. It is a simple matter to check the temperature and the chart when doing tower maintenance and then to measure the springs to ensure that they are at the proper tension. One final check should be performed during any tower modifications. The riggers need to check any tower additions such as new antennas or transmission lines to be sure that they do not interfere in any way with the normal expansion of the transmission line. If the line is not allowed to move freely, severe mechanical damage can result. The line is going to expand as it heats up – if it can't expand freely, something is going to be crushed in the process.

Finally, it is possible with today's equipment to find problems with the

transmission line and antenna before they cause significant deterioration of the antenna performance or a burnout. A device such as the Dielectric VSWRvision system can help to identify changes taking place in the system, whether abrupt or gradual.

In addition, it is a very good idea to schedule a complete antenna and transmission line sweep at least every three years. This action is simple and can be done with no more than ten minutes of down time if no other actions are needed. The system performance can be compared with the measurements that were taken when the initial tuning was performed or at the time of the last sweep. The combination of frequency domain and time domain measurements can often spot developing troubles that, in turn, can be repaired at your convenience rather than leading to a system failure.

To that end, it is advisable to purchase an adapter, tuned to your channel(s) for performing system measurements. That way, the necessary hardware will be on hand to permit accurate measurements without waiting for the factory to tune and ship a connector. To answer the question before you ask, NO, a simple type N to whatever is not acceptable. Adapters should be tuned or optimized on your channels so that the measurement process becomes one of looking at the line and antenna rather than trying to determine how much the connector is screwing up the readings. If that seems implausible, it is recommended that a visit be made to the Agilent Web pages. The connectors to a piece of transmission line are absolutely critical if any kind of reasonable accuracy is desired. Just buy one and put it on the shelf. It will be a wise move in the long run, especially in the case of a system failure. BE

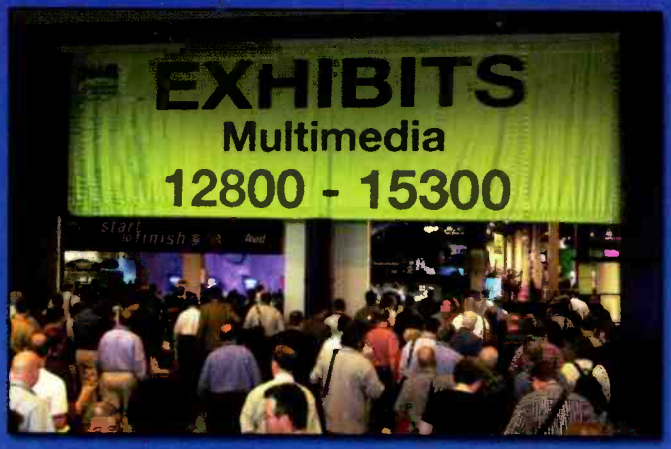


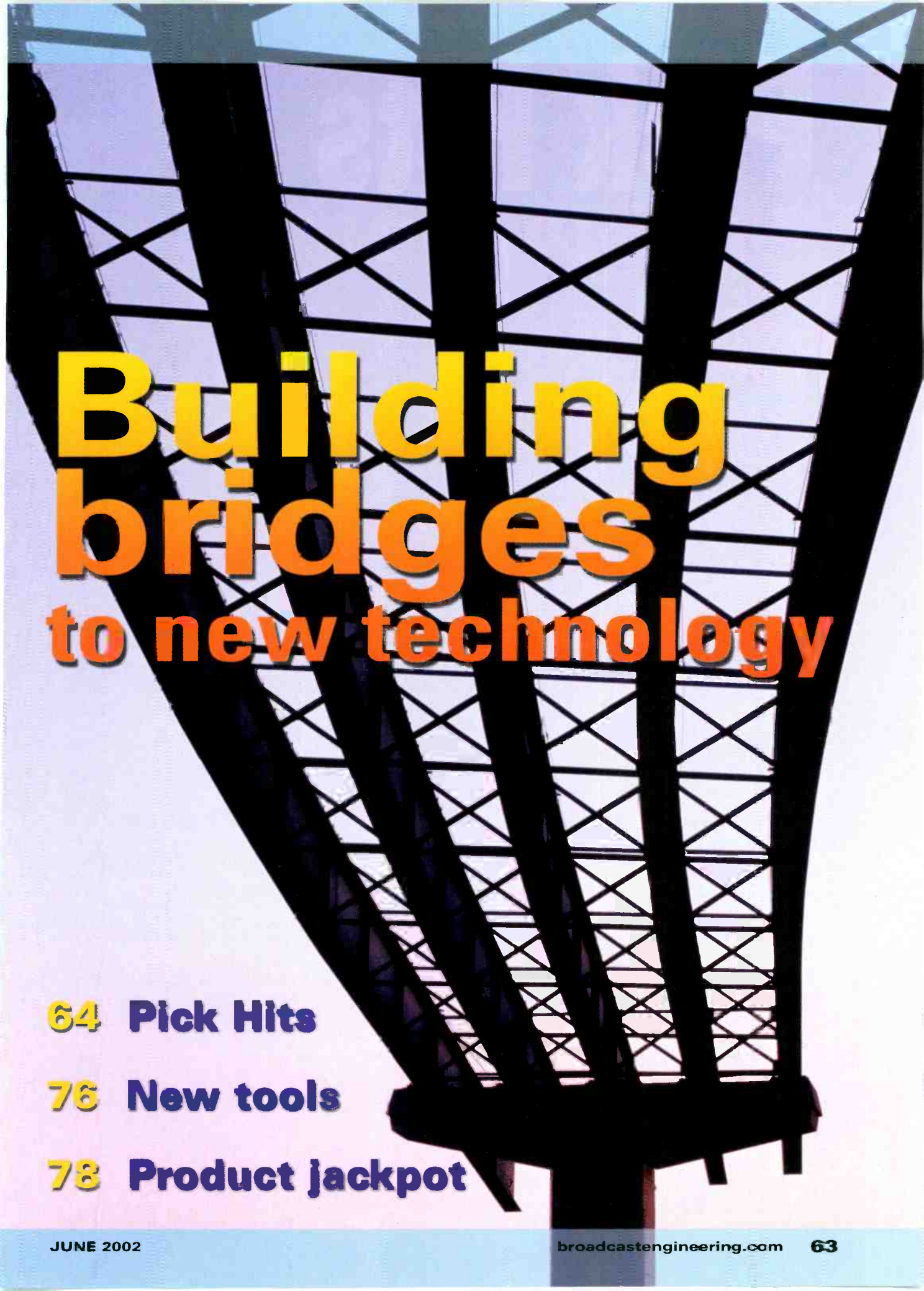
**One system currently in operation uses the new Bird Electronics power meters, which are installed in the six-inch transmission lines. The outputs of the Bird meters are routed to the computer that uses a proprietary program to display the forward and reverse power on all lines.**

*Don Markley is president of D.L. Markley and Associates, Peoria, IL.*

SEND Send questions and comments to: don_markley@primediabusiness.com

# NAB replay

# Building bridges to new technology

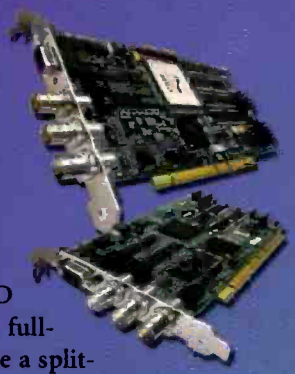
# Pick Hits

## NAB2002


By Donald Keller

### AJA Video Systems KONA-SD and -HD

#### Capture cards



These QuickTime cards capture 10-bit, uncompressed video and six-channel AES audio, and are designed specifically to be used with Apple's Mac OS X operating system. They can be used with Apple's Power Mac G4, RAID storage, computer display, video monitor and Final Cut Pro 3 to create a full-featured nonlinear editing system. Computer and video monitors provide a split-screen function that allows Photoshop, After Effects and real-time effects without rendering before output to video. The KONA-SD has 128 MBytes of on-board RAM and supports 525/59.94 and 625/50 video formats. KONA-SD system requirements include a Power Mac G4 with dual 800 MHz processors, 512 MBytes of RAM and hard disk sustained throughput of 40 MBytes/s (80MBytes/s for RT). The KONA HD has 256 MBytes of on-board RAM and supports 1080i 50/59.94/60, 2080p/psf 23.976/24/25/29.97/30, and 720p 23.976/24/25/29.97/30/50/59.94/60 video formats. KONA HD system requirements include a Power Mac G4 with dual 1 GHz processors, 1 GByte RAM and hard-disk sustained throughput of 200 MBytes/s.

800-251-4224; www.aja.com


### Asint Video Chameleon Model 201

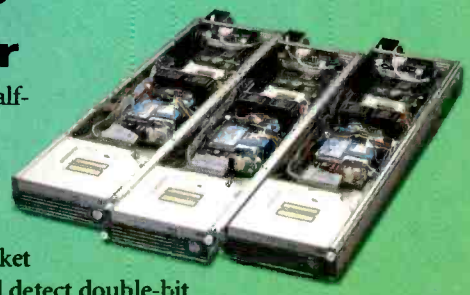
#### MPEG player

The Video Chameleon 201 plays MPEG-1 and MPEG-2 video/audio files and still images from a CompactFlash or Microdrive memory card. The player is available for either NTSC (720x480) or PAL (720x576) playback. Video output plays through RCA composite or S-video connectors. Audio output plays through stereo RCA connectors. Memory-card port accepts solid-state and Microdrive cards. Other ports include an RS-232 serial port, an Ethernet port and a user-interface port, which can be used for interaction with touchscreens, switches and sensors. Available as a stand-alone unit or as a circuit board for OEMs, the player can be used for applications such as point-of-purchase, training, trade shows and information kiosks. It requires the use of an authoring tool to prepare and program the MPEG data. The device operates from 7 to 25 VDC and consumes 3.6 W. Options include 120 VAC or 240 VAC wall transformer and S-video cable.

877-767-8862; www.asintgroup.com

# Axiom AX6113

## Data network server



This rack-mount, 19 in. server is 1U high and fits three half-size cards to run three independent systems simultaneously. Applications include high-density clustered systems, server farms and Web site hosting. Each 1/3U system has a half-size CPU card with an Intel 370-pin Pentium III FC-PGA (FSB 133 MHz) CPU that supports a 168-pin DIMM socket (with ECC memory support to correct single-bit errors and detect double-bit errors) for up to 512 MBytes of SDRAM. The onboard C&T 69000 AGP VGA supports CRT/LCD with integrated 2 MByte SDRAM. The half-size CPU cards also feature a Realtek 8139 Ethernet controller with Wake On LAN support. I/O features include two USB connectors, two serial ports, one parallel port, PS2 keyboard and mouse connectors, and one IrDA pin-header for wireless communication. Each unit includes one slim-line CD-ROM drive, one 3.5 in. IDE HDD, a 100 W open-frame power supply and two 4 cm cooling fans.

626-581-3232; www.axiomtek.com

# Chyron NewsCrawl Lite

## News crawl software


This application for Duet LEX, Duet LE, Duet PCI, DigiBox CODI and Digital pcCODI-based units allows users to insert a lower-third automated news crawl into any program video. The program acquires and displays data provided from sources such as automated feed services for news, sports and financial information; networked file servers; serial port; Web pages; keyboard entry; and built-in dababases. The user can control multiple configuration variables independently and can create a crawl with a distinctive appearance unique to station, channel or organization. Configuration variables include a user-defined background graphic. This graphic can include fixed text and/or station logo, background and font colors, TrueType fonts and characteristics such as size, italics, bold and drop shadows, and crawl rate. Any standard graphic file can be used for the logo, and the optional GPI/O trigger can turn the logo/crawl on and off.

631-845-2000; www.chyron.com

# Pick Hits

## NAB2002

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## Chyron Sirius Router


This 7-RU router can be configured in blocks of 8x8 up to 128x128. It supports AES analog and digital audio signals, and analog and digital video signals – including high definition, simultaneously in a single chassis. The different signal formats are configurable in any combination of eight-channel input or output blocks. The router provides analog-to-digital and digital-to-analog conversion, and can route NTSC/PAL inputs to SDI outputs (and vice versa) with no external conversion equipment. The unit monitors input (before the primary crosspoints) and output. Monitor cards provide simultaneous digital and analog outputs of the monitored signal. Control is available through an optional internal control card or ProBel's expandable, Windows-based Aurora control system. The internal control card option provides control panels and UMDs direct from the router. Other options include SNMP via Ethernet. The router has dual hot-pluggable autosensing PSUs. It requires 90 to 264 VAC 50/60 Hz and consumes 500 W.

631-845-2000; www.chyron.com

## Devlin Design Group/Darim Vision SoftSet-VS2000 solution

### Virtual set system


Darim Vision and the Devlin Design Group share a Pick Hits award for a combination of hardware and software that allows broadcasters to create real-time 3-D virtual sets. The VS2000 system from Darim Vision provides 3-D environments and interactive control of virtual sets without the need for sophisticated camera-motion-tracking technology. Instead, it uses a range of virtual cameras that can be moved within the 3-D graphics environment or zoomed in and out while the physical camera remains still. It supports multiple video sources (live or recorded) and movement of virtual set objects and virtual cameras by predefined animation sequences or in free-hand mode. It can be operated by a single person using on-screen controls and one or more joysticks. The PC-compatible VS2000 hardware uses off-the-shelf 3-D software from Devlin Design Group for the design of 3-D environments that render in real time for news, educational or entertainment programming.

Darim Vision: 925-251-0178; www.darim.com
Devlin Design Group: 858-535-9800; www.ddgtv.com

# Director's Friend df-ciniHD and df-ciniFS

## Capture/ control desk

This portable digital-video capture and processing system captures video and audio directly from camera to hard disk for immediate viewing, managing and processing. The unit has input and output HD-SDI connectors for Y Cr Cb (4:2:2) eight- or 10-bit video. The df-cineFS version can also handle uncompressed RGB (4:4:4) video. Both versions can accommodate eight digital audio channels (4x AES/BSU) with XLR connectors or as embedded audio. The system supports 720p,1035i and 1080i at 59.94/60 Hz, and 1080p/1080sF at 23.98/24/29.97/30 Hz. Video output is selectable as loop through or HD-SDI output. Features include an analog RGB or YUV HD output, LTC I/O, RS-232 remote I/O, analog reference input, built-in video mixer for DVE, 3:2 pulldown, and slow-motion and time-lapse preview. The system has two 14 in., 1024x768 pixel TFT LCD screens, one of which is switchable between HD video and computer desktop. Options include a 17 in., 16:9 HDTV LCD screen, a 6.3 in. LCD waveform monitor and a multichannel audio analyzer.

818-241-8680; www.directorsfriend.com

# JVC BC-D2300U

## HD upconverter

This device converts material originally shot in the 480i standard-definition video format to 1080i/60i or 720p/60p high-definition formats. It has three aspect ratio conversion modes: 4:3, letterbox and squeeze. In the 4:3 mode, an edge-crop function enables side-edge masking, and the position of the side panels can be moved. In the letterbox mode, it is possible to adjust the vertical position of the top and bottom panels. The unit has one component SDI input and three HD-SDI outputs. The 1RU chassis accommodates additional circuit boards and software for installation in any production environment. An optional BC-D231U plug-in board provides D2 and analog inputs. Optional BC-D323U image-control software enables color correction and variable frequency enhancement.

800-582-5825; www.jvc.com/prof

# Pick Hits

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### JVC GY-DV300E/ DV301E StreamCorder Camcorder

This MiniDV camcorder has an attachment that encodes the camcorder's incoming or playback video and audio in the MPEG-4 format, and creates ASF files for streaming news and other events over the Internet. The KA-DV300U network pack attaches to the base of the camcorder and, through a PCMCIA card, to a personal computer. The network pack can also accept a CF solid-state memory card to record ASF files. Streamproducer software, bundled with the pack, installs on the PC to control, stream and display the ASF files. The software also allows up to four GY-DV301E/DV300Es to be connected to a single PC and switch them as required before streaming. The GY-DV301E has DV input and output, while the GY-DV300E has DV output only. Thus, the GY-DV301E can record images and sound onto a CF memory card only, or onto MiniDV tape and a CF memory card simultaneously, whereas the GY-DV300E cannot.

800-582-5825; www.jvc.com/prof

### Leader LV5700 Multi-SDI monitor

This multiformat SD and HD SDI monitor conforms to more than 20 standards and accommodates two SDI inputs. Formats include 1080, 720p, 525 , 625 and 1035. XGA panel displays waveform, vector, audio, picture and data-monitoring functions individually or in several screen combinations. Error detection and logging facilities include gamut detection and settable error limits. Digital analysis screens include data dump and equivalent cable-length readings. A full 10-bit decoder converts source to Y Cb Cr or RGB. Connectors include 15-pin XGA/VGA output for external monitors, Ethernet and USB ports for remote reporting and control and local control, remote connector for remote control of preset selections, four two-channel pairs of AES/EBU outputs for eight channels of disembedded audio, and SDI I/O.

800-645-5104; www.leaderUSA.com

# Miranda iControl

## Web site creator

This new version of Miranda's Web site creation utility provides browser-based monitoring and control of audio/video equipment and signals over standard IP networks. It allows users to create custom representations of broadcast installations and facilities. It simplifies the use of Miranda products within a multichannel operation and offers local and remote monitoring of Miranda audio and video equipment, as well as an array of third-party products, through a unified view of all the devices in the system. With it, users can create a customized Web site that provides system status and permits the use of a low-bitrate, low-latency streaming video encoder to monitor signals in remote facilities. It also enables broadcast facilities to monitor and make changes to the configuration and operational parameters of remote equipment.

514-333-1772; www.miranda.com

# Miranda Kaleido-K2

## Multi-image display system

This device allows a computer monitor to display as many as 32 images simultaneously. It can accept SDI, HD-SDI, VGA, composite- , Y/C- and component-video signals. Each image can be independently sized and positioned, or displayed full screen at up to 1600x1200 pixels. The windows can be configured for 4:3 or 16:9 aspect ratios. Each input is equipped with a frame synchronizer to monitor asynchronous sources, and a de-interlacing and scaling engine to maintain image quality and minimize artifacts. Multiple tally displays, source IDs, status indicators, clocks and audio level meters can be added to create a customized layout. The unit can accept up to eight display-input modules. Each video input module has four input connectors, and each VGA module has two input connectors. The unit also accepts up to three audio-input modules for monitoring analog, AES or embedded audio signals. Each analog or AES module allows monitoring of 16 stereo channels.

514-333-1772; www.miranda.com

# Pick Hits NAB2002

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## The judges

### NAB2002 panel judges are:

| | |
|---|---|
| Jim Baird | WEWS |
| Mike Betts | Broadcast Training Partners |
| Steven Blumenfeld | AOL |
| Jim Boston | Industry consultant |
| Greg Doyle | Doyle Technology Consultants |
| Bill Emery | WEWS |
| Aram Freidman | American Museum of Natural History |
| David Lingenfelter | The Evers Group |
| Tom Patrick McAuliffe | Industry consultant |
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# The only easier way to record to DVD is to let someone else push the button.


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Business Solutions Division

For more information, contact **1-800-527-3766**
or visit us at **www.pioneerelectronics.com/BE-9000**

BE 0602

# New tools


# Bridging the gap:

## *Broadcast Engineering's* experts provide answers

# Product jackpot

**Leitch NEWSFlash-II**
Newsroom editing system is integrated with Leitch's new VRMediaNet media manager; incorporates NEWSFlash-II craft editor, BrowseCutter-II and InstantOnline-II.
800-387-0233; www.leitch.com

**Encoda Systems DAL A-6500**
Channel manager provides frame-accurate automation; scalable within a standard playout environment; provides multichannel functionality.
303-237-4000
www.encodasystems.com

roof – much to the chagrin of the local transportation industry.

What's the number one challenge for today's broadcaster regarding audio? According to Hannah of HHB, television and radio are becoming more critical of the quality of prerecorded and transmitted audio. He said that the challenge will be to consistently provide high-quality audio content that meets this new consumer demand. As he says, equipment manufacturers will have to create mainstream and professional products that can satisfy the desire for higher fidelity at a reasonable cost. Will 7.1 surround sound, DVD audio, Dolby E and other technologies continue to be adopted? Only time will tell. But, according to the Consumer Electronics Association, DVD is the fastest growing media format ever, and "good audio quality" is the number two feature requested by consumers. Considering these facts, it's probably a good bet that such technologies have enough of a foothold to survive and thrive.

**Gone are the days when audio is an afterthought or a non-budgeted item.**

The other strong impression one walks away with is that the annual NAB convention is not just for broadcasters anymore. This year's tag, "Convergence is Tomorrow's Change Agent," is apropos. It's easy to see the frustration American broadcasters are experiencing as they travel the rocky road towards the digital broadcasting deadline. As broadcasters look to stem the tide of falling ad revenues due to cable, the importance of streaming, datacasting and using computers for tasks once handled by expensive black boxes is becoming clear. But there's no rush, because broadband net access (at a cost of around $50 or more per month), and DTV receivers are still beyond the reach of most of the American public.

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# Product jackpot

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UHF transmitter is capable of power levels up to 120 kW; average 8-VSB and DVB-T; relies on IOT technology; 470 MHz to 810 MHz; up to 30 kW average per HPA.

888-881-4447; www.acrodyne.com

### Solid State Logic XL 9000K mixer

Provides full 5.1 surround architecture and increased bandwidth and resolution for DVD audio; signal path optimized for DVD-A and SACD; six-channel monitor insert.

212-315-1111
www.solid-state-logic.com

### Solid State Logic MT Version 6

Digital console features selectable moving/non-moving fader control surface; allows mixer to set a balance on a group of faders, assign those faders to a master and then close that master.

212-315-1111
www.solid-state-logic.com

### Forecast Consoles MasteRail DDMS

Furniture system is available in a modular component consoles style and an ImageMaster workstation; all devices mount universally anywhere along the rail and are independent.

800-735-2070
www.forecast-consoles.com

### Thales Paragon multi-stage depressed collector IOT digital transmitter

Offers an increase in transmission efficiency of up to 2x vs. a conventional IOT, and 4x that of a solid-state transmitter.

413-569-0116; www.thales-bm.com

The hesitation towards digital television results from both the costs involved and the continual squabbling over newly established formats, protocols and standards. And the audio part of the industry – radio, audio for video production and, to a lesser extent, the audio part of television – seems to be the furthest ahead in the all-digital race. There are those in the broadcasting community, both in radio and television, who feel that American viewers (not to mention the broadcasters themselves) are not ready for digital television or high-definition broadcasting.

Perhaps NAB attendee Bruce August, owner of AugustStar Enterprises, a video and audio production and training company outside Chicago, best summed up the growing importance of audio in video: "Gone are the days when audio is an afterthought or a non-budgeted item." He added that high-quality audio, from DVD audio to regular TV broadcasts in 5:1 surround sound, is easily within reach of every video producer or broadcaster and is more in demand from today's viewer. Stay tuned! BE

*A former U.S. Navy photojournalist, Tom Patrick McAuliffe also writes about video, entertainment and politics. He's a contributing editor to* Broadcast Engineering*'s sister publication* Video Systems.

# Automation

BY JIM BOSTON

Automation at this year's NAB once again has lived up to the old adage of "different things to different folks." To a lot of folks, automation this year appears to be controlling multiple stations from one location, or "centralcasting." Like many systems in play in the television industry today, the delineation between automation and other technologies is blurring, mainly due to centralcasting. Servers, both video and multimedia, are central to all centralcasting topologies. A number of server companies cut their teeth on controlling the content of servers, such as Crispin and Odetics, before morphing into full automation packages. Today, many video server vendors have applications that come close to being full automation solutions. Among them are Sony, Pinnacle, SGI and the Grass Valley Group component of Thomson.

A central part of centralcasting is media management. This is an application, or suite of applications, that come with full-fledged automation packages. But there are many companies that specialize in building and maintaining large databases, with ample metadata as part of each asset's record. Media management is crucial when one location is controlling others via either the centralized playout or distributed control approaches to centralcasting. In the centralized playout approach, a central location acquires, stores and delivers a complete program stream to the local stations that the central site serves. The local stations might switch away for local programming, such as newscasts, or in a few cases the locally produced programming is actually fed back to the central site for integration with commercial breaks. The distributed control model for centralcasting has a central point that controls the assemblage of program stream(s) via remote control of the local automation package.

Both of these approaches rely on another technology, telephony. Telephony provides the connectivity, wideband in the case of centralized playout, that allows either a central automation package to build the necessary program stream for the dependent stations, or a WAN-based automation system with components spread out geographically, either regionally or nationally, to be controlled remotely.

So to look at automation at this year's NAB we must think geographically, as in centralcasting, and locally, as in the case of the stand-alone, single-station system. Putting aside the large, third-party asset managers and WANs, we still have various solutions to machine control via suites of software applications. Some vendors offer specific applications that comprise a larger system, and some vendors that offer com-

plete solutions are evolving these systems into specialized areas. The bottom line in any automation system is the building, care and feeding of one or more databases that are parsed out to "device servers" as needed. These device servers issue the proper machine control commands to the appropriate sources, switchers and routers at the proper time. With all this in mind, let's take a look at some of what was offered this year.

Aveco is a new player in the U.S. market that has installations throughout Europe and Asia. Aveco perceives the future merging of automation and servers; therefore, their systems are able to control some of the MPEG encoding/decoding and display cards used to build many video servers. Aveco's architecture is compact and the whole system, which can control up to 56 devices directly (additional device servers can be added through common network connectivity with other device servers), fits into a single automation server. Client applications that need to be physically dispersed run on diskless PCs that boot up from the central automation server. Another interesting Aveco product is a 1RU barcode reader that can be installed above a rack-mounted VTR. This allows stand-alone VTRs to be used in conjunction with a centralized barcode system.

Blueline has developed a derivative of their automation system that a couple of PBS stations are using to deliver content to local schools, called Blueline Video on Demand. Schools can order programming from the PBS station via the Internet, and the station transfers the various programs requested by terrestrial DTV transmission between 10 p.m. and 7 a.m. to MPEG servers located at the requesting school. An interesting thing about Blueline's traditional automation package is that it is comprised of Java applets and an SQL database. This means that Blueline's automation can run over a number of operating systems, including Linux, OS X and Windows.

Blue Order and Dremedia announced a partnership that combines Blue Order's media asset management platform, media archive, with Dremedia's media analysis engine. The engine can be used when media is ingested or imported into Blue Order's media asset management system. The system uses speech recognition to automatically generate metadata transcripts, which can be used to retrieve archive content using natural language- or concept-based searches.

Crispin continues to enhance their RapidPlayX 2000, which is the front end of their growing suite of automation applications. RapidPlayX 2000 now has the ability to provide distributive control of multiple locations via WAN. Their AssetBase 2000 has a Web browsable facility that allows anyone with the proper permissions to manage the database over the Web.

DNF Controls customized its ST420 Shotbox for ParkerVision's Digital CameraMan system. The control panel provides one-button recall of camera presets. The system can control up to 16 Cameraman systems, working in conjunction with ParkerVision's Digital Shot Director. It utilizes virtual alphanumeric keyboards to assign preset labels.

Encoda introduced a new automation solution based upon their D-Series technology. It supports the device interfaces of the high-end D-Series products developed by Drake Automation, which Encoda acquired in 1999. Encoda also demonstrated the A-7900 satellite recording and receiver system designed to support scheduled satellite recording functions within the TV station. Encoda is currently rolling out the Link Product Family, which includes an Oracle database designed as a "broadcast database" to support data import and export and roll up reporting for a variety of activities including basic exchange between traffic and automation. It can also be used for metadata import from a variety of sources like spot delivery systems and syndicated programming delivery systems.

**Automation this year appears to be controlling multiple stations from one location, or "centralcasting."**

Webware announced that Scripps Networks has selected Webware's MAMBO software to create a unified, secure archive for its library of digital assets. The MAMBO asset management system allows companies to integrate their digital assets to create unified brands.

Florical demonstrated Sharecasting, which already has a number of instal-

# Product jackpot

### Miranda Master Control Glass Cockpit

Master control system for managing multichannel broadcast applications; combines elements of branding, on-air presentations switching and monitoring.

514-333-1772; www.miranda.com

### Miranda iControl Web site creator

Users create custom representations of broadcast installations and facilities; can also create a customized Web site that permits use of low-bit-rate, low-latency streaming video to monitor signals.

514-333-1772; www.miranda.com

### Miranda Oxtel Imagestore HDTV

HD logo insertion system and still store; modular, automated mixing and channel-branding system; expands from logo inserter and branding processor to a multichannel MC switcher; A/B video mixing; EAS support.

514-333-1772; www.miranda.com

### IBM Digital Media Factory

Broadcast/production system provides a set of scalable, flexible products to handle broadcast and production tasks; Digital Content Creation provides 2-D/3-D rendering animation and NLE tool based on Linux.

914-642-4880

www.ibm.com/industries/digitalmedia

### Pixel Instruments VS5200

Universal synchronizer with TBC features a 10-bit frame synchronizer; built-in TBC offers auto mode select; transcodes from any selected input to all outputs simultaneously; has a wide range output timing and digital proc amp.

408-871-1975

www.pixelinstruments.com

# Product jackpot

**Triveni Digital GuideBuilder**
System allows broadcaster to collect, translate, manage and generate PSIP data compliant signals; provides remote departmental user interfaces; fault tolerant multiplexer-based table playout.
609-716-3500; www.3veni.com

**Audio Specialties Group/ Systems Wireless HME System 800**
Wireless intercom provides for full-duplex communications at distances up to half a mile; interfaces to any two-, three- or four-wire intercom systems; optional two-channel upgrade.
800-542-3332; www.swl.com

lations. This approach to centralcasting allows either a central hub or a local station, or spoke, to control device servers throughout the system. Thus, a local station can assume control of its own operations, or even the operations of other stations if the hub needs to go off-line. This is accomplished by Florical's DCOM technology, which in essence lets the various device servers be controlled by clients anywhere in the entire multiple station enterprise. As with many centralcasting systems, Sharecasting keeps track of the various propagation delays that video and audio incur between the hub and the spokes.

Harris is heavily involved with wide area automation. To allow their customers to implement centralcasting, they have added new applications to their suite of software. They have a new protocol based on XML for controlling a wide variety of devices such as servers and character generators over WANs. They also point out that this new protocol already supports Pinnacle's Dekocast. Harris sees a merging of automation and telco connectivity. As such, they have products that are making it easier to tie broadcast infrastructure to WANs. Harris is also addressing areas that have been outside of the automation sphere up to now, but which will have to be addressed in the centralcasting world. With their own SNMP software applications, Harris can also control and monitor the whole facility, ATSC encoding/multiplexing, transmitter, fire and other alarms. Basically, anything that has a SNMP Management Information Base. Even their ADC device servers are now SNMP-enabled.

**Today, many video server vendors have applications that come close to being full automation solutions.**

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FAX: (615) 872 7080
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# Product jackpot

### Thomson Broadcast cameras

New cameras include two versions of the LDK 6000 Mk II HD/digital cinematography camera and the LDK 5000 SD camera; the LDK 6000 Mk II family uses three 9.2 million-pixel HD-DPM+ CCD sensors.

818-729-7700

www.thomsonbroadcast.com

### Thomson Broadcast Trinix 512

Routing switcher able to route both SD and HD signals in the same frame; supports 3 Mbits/s to 1.486 Gbits/s signals; uses advanced alarm monitoring software.

818-729-7700

www.thomsonbroadcast.com

### Shotoku Crescent fluid head

Adjustable for large cameras; provides balance with a counterbalance module that is continually adjustable without changing camera height; 60 degrees of range.

661-775-7736; www.shotoku-usa.com

### Tektronix WFM90D/91D

Handheld battery-powered, composite analog and SD-SDI component digital waveform monitor; variety of display modes including picture and vectorscope.

800-426-2200; www.tektronix.com

### Avid DS and DS HD v 6.0

Media composers offer enhanced conform capabilities; further integrate HD finishing into the Avid platform; full-featured effects, compositing and HD finishing capabilities.

800-949-2843; www.avid.com

### Avid Xdeck

Ingest device automatically records material directly into the Avid Unity for News, Unity MediaNet and Unity LANshare shared media networks.

800-949-2843; www.avid.com

Odetics introduced a new simplified GUI for their AIRO automation package. They have also developed an enhanced database architecture for AIRO with many new attributes that position it for the future. Odetics points out that the television station is slowly evolving from the current push model to a viewer-pull model. When viewers are able to request video (or material) on demand from a broadcast station, the automation will need to perform new tricks and keep track of new types of transaction. They stress that the databases being built by automation, and as we have already mentioned, by numerous vendors outside traditional automation, must be robust enough to evolve as your operation does.


**NAB attendees looking for automation for centralcasting operations found many solutions by companies not traditionally inthe automation field.**

Omnibus introduced their HyBrow desktop browse technology based on their global asset and media management applications (GAMMA) technology. This is part of what they call "knowledge management," and it is based on an SQL gateway or Informix Blade technology. It allows a customer's existing database to be interfaced with the Omnibus system. The browse technology also allows online material to be mirrored on browse servers to show that many people can view material simultaneously.

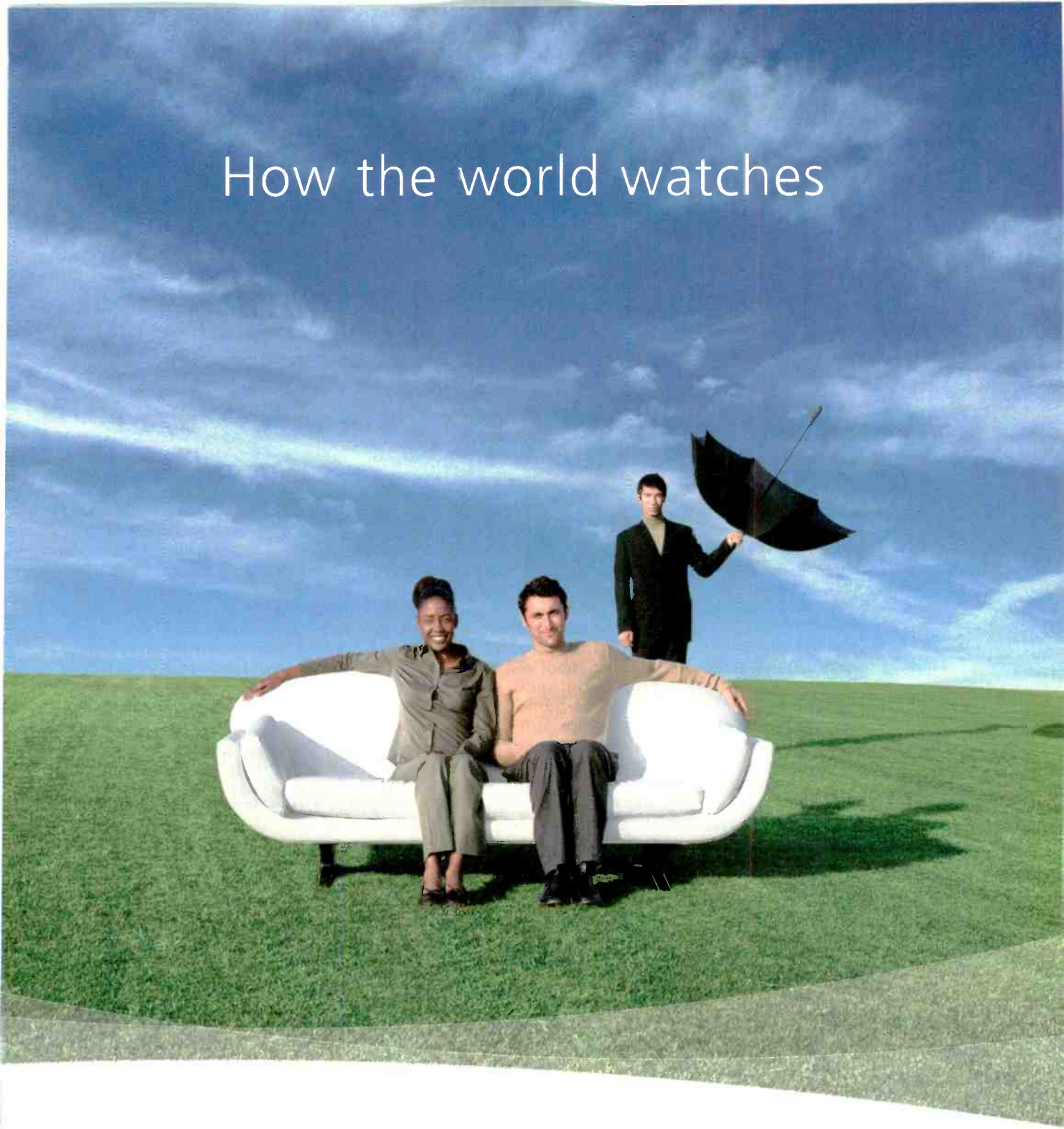
Sundance added the Titan large-scale automation system to their automation lineup. FastBreak is still their mainline product for customers requiring 10 to 20 channels under control. The Titan architecture is such that it can be scaled to control thousands of channels if desired. This is done via Listprocessor servers at each controlled location, which directly control the local devices. The Titan air controller client application that controls each Listprocessor can have multiple instances, which means control can be from many locations, either centrally, locally or remotely from another station in the group. The central database replicated the records necessary for each local Listprocessor to run independently if required from the central database.

For those still concerned about controlling playout of multiple VTRs, Tiltrac's V-100 video library manager is a basic automation system for controlling VTRs, either as stand-alone machines or in Tiltrac's robotic server and archive units.

Thomson has folded Philips automation into its ever-widening offering of broadcast solutions. Their systematic approach uses the geometric shape of a tetrahedron as an analogy. A tetrahedron is a four-sided pyramid with all sides being equal. These four sides represent scheduling or traffic, storage, the catalog or media management, and the actual automation system. Thomson stresses that these four sides should work tightly together to ensure efficiency and reliability. To facilitate the tightly required coupling, Thomson embraces using open protocols between the four sides: RNP between automation and traffic, AMP between automation and the media manager, and AQP between automation and storage.

**Many centralcasting systems keep track of the various propagation delays that video and audio incur between the hub and the spokes.**

In looking at the exhibits guide when planning this year's coverage, various automation vendors listed themselves in broadband technologies, computer products, data broadcasting, digital/high-definition television, systems integration, Internet and Webcasting categories. Conversely, over 60 companies were listed in the TV/radio automation category. Many of those companies wouldn't have considered themselves part of the television automation uni-

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# Product jackpot

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866-861-5390 www.omneon.com

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Integrity Express control panel can be combined with the FRM-304 Integrity system frame to provide access to multiple signal conversion and synchronization products.
770-806-0234; www.forteldtv.com

verse a few years ago. Convergence is not just happening between separate industries, as the often-mentioned television-telephony-computer example notes. It is also happening inside those industries. We are seeing separate groups of technologies applied to television as single discipline. BE

*Jim Boston is a West Coast consultant.*

# Cameras

BY DAN STARK

The video camera has come a long way in the past two years. It is now becoming acceptable to shoot video in venues that would have never accepted video images. For example, the quality improvements added by HDTV have provided the technical ability to shoot and record images in progressive, specifically 24-frame progressive and 16:9 image format.

At NAB this year, many cameras were introduced with 24-frame progressive capabilities in HD, as well as SD. Many DV resolution cameras were shown in 24 or 25-frame modes to emulate film's 24 frames.

Most new SD cameras were offered in switchable image format, 4:3/16:9. In the broadcast and production community, 16:9 images are certainly more acceptable, and it is easy to see that manufacturers have responded by the products they were showing.

Cameras at NAB break down into three basic categories, HDTV, SD and DV. Many manufacturers displayed new or improved models of products in all three categories. Camera technology has reached the point where many cameras can make spectacular pictures. The difference is in how the operator can control the camera to achieve the results they want.

**It is now becoming acceptable to shoot video in venues that would have never accepted video images in the past.**


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# Product jackpot

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201-633-5600; www.fujinon.com

### Fujinon HD ENG lenses
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### Chyron DigiBox CODI
Stand-alone graphics and animation system houses one or two cards in a self-contained 1RU frame; can read and replay iNFiNiT! messages as well as most graphics files.

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### Chyron Duet LEX
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### Optibase VideoPump HD 811
High-definition interface platform that offers support for both embedded audio conforming to SMPTE 272M as well as AES/EBU audio, which can be acquired, de-multiplexed from the input serial digital signal and stored on the host computer, as well as played back synchronized with the video stream.

650-903-4900; www.optibase.com

### Panasonic AJ-SDC915
2/3-inch IT 3-CCD camcorder provides 25 Mbits/s 4:1:1 DVCPRO and EFP quality 50 Mbits/s 4:2:2 DVCPRO50 modes in either the 16:9 widescreen or 4:3 aspect ratio.

800-528-8601; www.panasonic.com

Metadata also made some showings this year, with some cameras able to record data items such as GPS location of the camera, lens position, and scene and take numbers. Certainly metadata will be showing up in more products as the tools become more available to program producers. The idea of pertinent data recorded alongside or with the audio and video content is growing within the industry.

**In the broadcast and production community, 16:9 images are certainly more acceptable.**

Although not necessarily new technology, an interesting vintage camera display was provided by Chuck Pharis. It featured numerous historic cameras you can view at www.pharis-video.com. Pharis has a sizeable collection of old cameras and equipment, and those who visited the display were treated to some wonderful television memorabilia.

Sony introduced the MSW-900 IMX camcorder. Recording in the IMX format, the camcorder completes an end-to-end MPEG 50 system, from acquisition to production and distribution. The camcorder features MPEG I-frame compression and recording at 50 Mbits/s. Sony's latest sensor, the Power HAD EX, provides a high signal-to-noise ratio of 65 dB and -140 dB smear. A Memory Stick port allows users to store and retrieve settings via the removable memory module.

Sony also showed optional video cache boards for several camera models. The module allows seven seconds of video to be constantly recording to RAM. When the onboard recorder is activated, the images in RAM are recorded to tape, while the RAM continues to record the live images of the camera. This allows for fewer missed shots when the recorder is not recording. This feature was shown for several camera models in both standard- and high-definition camcorders.

Also introduced were the HDW-730 camcorder and HDC-930 HD camera systems. Both cameras use a 2/3-inch IT CCD with 1920x1080 pixels, featuring high sensitivity and low smear of -125 dB. Other features include selectable gamma curves, knee saturation and adaptive highlight control. A Memory Stick port allows users to store camera setups on removable media for future recall or transfer to other cameras. The HDC-930 studio camera features an optical fiber link from the CCU to the camera, providing a 1.5 Gbits/s HD-SDI signal.

The HDW-730 and MSW-900 IMX camcorders can integrate with Sony's wireless microphone products, with the receiver fitting into a slot in the camera. This feature was offered on several other Sony cameras.

Sony introduced metadata recording capabilities in several cameras, giving them the ability to record metadata and have the data continue through the production to the finished master. Metadata such as camera position (through GPS), camera data, lens data and good shot markers can be recorded. The system uses an adapter that attaches to the camera with a removable hard disk drive. JPEG proxy images can be stored on the drive and then transmitted back to the station for post production through wireless Ethernet links. Use of the low-resolution proxies will allow production to begin before the crew arrives with the actual recorded tapes. This feature is available in several formats via common camera interfaces in certain models in MPEG IMX, Betacam SX and Digital Betacam camcorders. New in camera adapters and CCUs are the CA-D50 camera adapter for the DXC-D30/D35 camera series, and the CCU-D50 CCU for the DSR-370 and 570 models. When both units are used, uncompressed SDI signals are transmitted over 75m 26-pin multicore camera cable from the camera adapter to the CCU. Longer distances of 200 m are possible by using multicore cable and an additional coax cable.

Panasonic unveiled numerous cameras with variable frame rates this year, specifically 24-frame progressive. Building upon the success of its first HD camera with 24p, the AJ-HDC27, they now offer 24p in DV, DVCPRO25, DVCPRO50 and improvements in the HD products.

Panasonic also offers the AG-DVX100, the first DV camera to offer true 24-frame progressive images. New 1/3-inch 410,000 pixels in the progressive scan CCDs allow 60-field interlace and 24-frame progressive. Weighing only 4.4 pounds, the camera includes two channels of audio with XLR inputs and phantom power available. IEEE 1394 link is standard, allowing images to be up- and down-

loaded to PC-based NLE systems. The lens includes manual focus and iris controls, and zoom ratios from f3.25 to 325mm. A new line of cameras featuring switchable DVCPRO 50/25 recording was introduced with the AJ-SDX900 series of cameras. The AJ-SDX900 supports 4:3/16:9 with 2/3-inch 520,000-pixel CCD imagers. It offers 24p images with sensitivity of F13/2000 lux, 10-bit A/D and signal-to-noise specifications of 63 dB. The AJ-SDC915 is a 2/3-inch IT 3-CCD camcorder, which allows users to switch between and classic 25 Mbits/s 4:1:1 DVCPRO and EFP quality 50 Mbits/s 4:2:2 DVCPRO50 modes in either the 16:9 widescreen or 4:3 aspect ratio. Both offer an optional digital Triax system, with control of both the camera and onboard VTR.

Panasonic soon will be delivering some upgrades to its AJ-HDC27 Varicam HD camera, including using cine-style gamma curves to more closely approximate the image characteristics and dynamic range of film. Also, increased variable rates now range from 4 fps to 60 fps in one-frame increments.

The new range of AK-HC900 high-definition cameras offer variable frame rate capture of 6, 12, 18, 24, 30 and 40 fps. The AK-HC931 supports variable frame rates. 480i is standard with an upgrade path to 1080i or 720p. It features 12-bit A/D with 38-bit internal processing. Sensitivity is rated at F10/2000 lux, with a low smear of -130 dB. The AK-HC900 is a compact camera with similar features of the HC900 line. Its three 2/3-inch CCDs are 1280x720 with 38-bit processing. It weighs 3.9 pounds with a 4.4x5.3x7 inch footprint. The AK-HC930 offers dual format standard with 1080i and 480i.

Thomson multimedia Broadcast Solutions showed cameras from the Philips and Thomson lines, now under the new ownership name. The latest offering is the Viper FilmStream camera with companion disk recorder, which captures information without traditional video processing. It transfers its output via dual HD-SDI links at 2.97 Gbits/s. The data then plays back through Specter Virtual DataCine and is treated in much the same way as a 2k film scan using 10-bit log. The Specter then plays back the data at any SD or DTV format and frame rate, including 2k data for recording to film. Viper also supports traditional HD rates in RGB or YUV mode via a single HD-SDI link at 1.485 Gbits/s, at which point the camera uses traditional video processing.

The LDK 5000 and LDK 6000 feature 12-bit analog-to-digital conversion, 22-bit high-definition signal processing, a patented "crawler," which adds motion to the edges of objects that are in focus, and a unique ability to zoom up on an area of the viewfinder to enhance focusing on small details. The LDK 5000 is a standard-definition camera with an upgrade path to the LDK 6000 Mk II high-definition camera. The standard LDK 6000 Mk II offers 1080i and 720p at 59.94 and 50 fps. The LDK 6000 Mk II Worldcam version is an upgrade to the LDK 6000 Mk II that provides 24p formats in 1080i and 720p.

Thomson also displayed the LDK 20 studio camera and companion LDK 200 portable cameras along with the LDK 100 series of cameras. The LDK 100 offers numerous configurations, including DPM and IT sensor versions in EFP configurations or camcorders with either DVCPRO or DVCPRO50 recorders.

From the original Thomson line the 1707, 1557 and 1657 models were also shown.

Hitachi showed the second generation of its SK-3100P and SK-3300P cameras. The SK-3100P (2.2 million pixel IT) and SK-3300P (2.2 million pixel FIT) both feature 12-bit A/D and simultaneous 1080i/480i outputs; 1080i/720p/480i is optional. The DK-H3 is Hitachi's first POV and graphics HDTV camera. It uses standard-sized lenses, but the camera size is extremely small, measuring 3.86x4.13x6.7 inches.

**The LDK 5000 is an SD camera with an upgrade path to the LDK 6000 Mk II HD camera.**

Hitachi's SK-555 4:3/16:9 switchable camera has a newly developed 640,000 IT CCD with 12-bit A/D conversion. It offers 63 dB of signal-to-noise and a wide dynamic range. The Z-3000W features a full F-stop of greater sensitivity (F11/2000 lux) than previous cameras, and has 4:3/16:9 with 2/3-inch CCDs.

The Eagle pan/tilt remote system incorporates control of pan, tilt, zoom, focus and camera menus for the Hitachi DK-H3, HV-D15, HV-D30, HV-D5W, HC-300 and Z-3000W cameras. The

# Product jackpot

### Panasonic AJ-SD930 and AJ-SD955 DVCPRO50 editing VTRs

Dual-format camera system provides 1080i performance and optional 480i acquisition; equipped with next-generation digital processing LSIs and 12-bit analog-to-digital conversion circuits.

800-528-8601; www.panasonic.com

### Snell & Wilcox Ingest Station

Professional SD/HD MPEG mastering solution, file-based content storage and repurposing system; incorporates Prefix MPEG preprocessing and Ph.C motion compensation.

408-260-1000; www.snellamerica.com

### Snell & Wilcox Alchemist Platinum

Ph.C standards converter is capable of future upgrades and options; provides 12-bit processing; HD upconversion and video-to-film processing now available.

408-260-1000; www.snellamerica.com

### Wheatstone D-8000

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# Product jackpot

**TANDBERG Television nCompass**
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407-380-7055; www.tandbergtv.com

**TANDBERG Television Voyager Lite**
End-to-end system of wireless backpack transmitter with MPEG encoding, RF transmission and control, antennas, downconversion and a range of IRDs.
407-380-7055; www.tandbergtv.com

Eagle also has the ability to be controlled via the Internet.

The Canon XL-1S offers numerous improvements over the popular XL-1. It has new CCDs that offer 4 dB of improved sensitivity, and has +18 dB and +30 dB of gain available. NTSC inputs and outputs lacking from the previous model have been added. True anamorpic 16:9 images and the progressive 30 fps mode are attractive features for the XL-1 fans. The XL-1S comes standard with a 16x lens that features image stabilization. Options including interchangeable lenses designed for the camera and adapters to use 35mm still photo and motion picture lenses are available. All options are interchangeable for the XL-1 and XL-1S.

**Metadata made some showings this year, with some cameras able to record data items such as GPS location of the camera.**

JVC's newest DV camcorder, the GY-DV300, is based on the image sensors from the DV500 and DV550 cameras in a smaller footprint. It offers the unique ability to be turned into a streamcorder by adding the KA-DV300 network adapter package. It streams video in real time via MPEG-4 and Windows Media Player. A network package enables four cameras equipped with KA-DV300 and LAN or CF cards to be controlled via a PC with a standard Web browser. This allows CCU-like control of each camera and deck. The camera offers a 14:1 lens with optical image stabilization, an available wide-angle adapter and two XLR microphone inputs.

Through a marketing agreement with 3DV Systems, JVC is offering ZCam, a depth-sensing camera. It offers the ability to record Z-depth information of a scene, allowing real-time compositing of multiple layers

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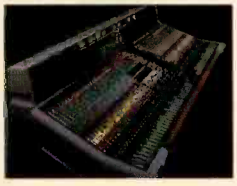

### Midas B2000

Console is designed specifically for TV studios and mobile video production; supports all broadcast standards; provides mono, stereo, surround, 5.1 or 7.1 outputs.

952-884-4051

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without the traditional chroma key screen. It provides an alpha signal of the objects in a scene the camera captures, with objects closer to the lens appearing whiter than objects further from the lens. This allows a subject in the middle of a scene in the Z-axis to be composited both in front of and behind objects. 3DV Systems has made numerous enhancements to the product since last year, improving ease of use and quality.

**FCC Chairman Michael Powell at the vintage camera exhibit at NAB2002.**

New to the Ikegami HDTV line is the HDK-79E(IT), an IT CCD version of the HDK-79E camera. It offers 2.2-million pixel 2/3-inch IT CCDs with 12-bit A/D and 38-bit internal processing. The HDK-79E(IT) provides 1080i/480i outputs as standard, and 720p/480p progressive output is available as an option. A separate optical block version of the 79 series is offered in the HDK-79NA, providing a platform for applications such as microscopic and POV installations. The HDK-79E MPEG includes a built-in MPEG encoder.

The HDK-720P is a 2/3-inch one-megapixel FIT CCD-equipped camera with native 720p/60 mode. It provides 720p output without the need to do any conversion. It provides 480i and 480p outputs through a CCU that incorporates upconversion or downconversion as needed. It is available in a studio and handheld configuration.

The HDL-20 camera is a two-chip 1080i camera with 2.2 million pixel IT CCDs, offering 1000 lines of TV resolution. The camera head has a small footprint, 1.575x2.086x2.807 inches, for use in applications such as POV, remote camera installations and helicopter mounts. HD-SDI outputs are provided from the camera control unit.

The HL-60W is a three-chip CCD with newly developed AIT CCDs. It offers 12-bit A/D conversion, 750 lines of resolution, high sensitivity of F11/2000 lux and a low smear level of -135 dB. It also offers hyper gain of +48 dB, allowing a minimum illumination of .12 lux. The sensitivity can be further increased with an option to provide longer exposures than 1/60 of a second, which is designed for special application in near dark illumination. It has a standard memory card for setups, using SD or SmartMedia cards manufactured by Toshiba.

In the Editcam2 line, Ikegami introduced the DNR-20 hard disk recorder. It offers the user the ability to replace the traditional portable VTR with a hard disk recorder. It offers several recording qualities, including Avid AVR-75, JFIF (3:1/10:1) or DV at 25 or 50 Mbits. IMX compression is expected to be released soon. Recording time at DV 25 Mbits resolution is estimated at 70 minutes. It utilizes Fieldpak 2 removable disk packs.

The HL-DV7W DVCam camcorder offers 2/3-inch IT CCDs, providing 520,000 pixels in NTSC. It offers images in 4:3/16:9 switchable screen formats. The DV5 provides 4:3 images with 420,000-pixel NTSC. Both cameras offer i.LINK (DV6P terminal) output for use with desktop editing systems. Twenty-six-pin VTR outputs, multicore CCU and Triax configurations are also available.

**Increased variable rates now range from 4 fps to 60 fps in one-frame increments.**

Canon lenses included long lenses with the company's Shift-IS system, providing imaging stabilization to reduce wind and other vibrations. Shift-IS is used on the Digi Super XJ75x9.3B and XJ86. It is also available in HD portable lenses HJ40x10B and HJ40x14B.

Canon also displayed the HD-EC 2002 lens, which featured improvements in reduced breathing, the amount of image size change that occurs when the lens is racked in and out of focus.

Canon introduced the new J17ax7.7B with the widest-angle ENG lens available in their line (7.7mm

wide angle with 17x zoom). In their professional line, Canon showed the 19x and 12x lenses with improved zoom motors that feature 30 percent speed improvements.

Fujinon showcased a set of HD Cine Prime and zoom lenses, including fixed focal length lenses HAF5B-10, HAF8B-10, HAF12B-10, HAF16B-10, HAF20B-10, HAF34B-10, HAF40B-10 and HAF54B-10. The HD zoom lenses included the HA10x5B-10, HA17x7.8B-10 and HA20x7.8B-10.

In the long lens line for sports and entertainment applications, Fujinon displayed its OS-Tech anti-vibration device. The adapter is designed for use as an option for current and past lenses, attaching between the camera head and the lens. The HD 87x lenses, XA87x9.3ESM and XA87x13.2ESM, feature long focal lengths of up to 2300mm.

Fujinon also introduced the new A13x6.3E and A13x6.3 lenses that feature wide focal lengths and high telephoto ratios, 6.3mm and 82mm, with 164 with 2x extender. These two lenses are designed for 2/3-inch CCD cameras, with the S13x4.5E and S13x4.5 lenses for ½-inch cameras.

The Angenieux 26x7.8 made its appearance at NAB. It offers long focal ranges for ENG lenses, with telephoto lengths of F203mm, F406mm with 2x extender, and a wide angle of F7.8mm (59°). It has a maximum aperture of f1.8.

New to NAB this year was the Optimo HD lens 12 x 9.7. Other HD offerings included the Angenieux and Carl Zeiss HD adapter, which allows 35mm cine lenses to be used on 2/3-inch HD cameras.

Several lenses were shown with the company's AIF function. This allows a lens zoom setting to be preset before zooming in quickly to adjust the focus and returning back to the memorized setting.

Producers and engineers now have more depth in camera and lens products. Most camera manufacturers have both HD and SD resolution cameras available. Thomson's new Viper system certainly opened eyes as the first camera to be resolution independent. This has become the standard in computer images, and we should see more applications for this in camera and recorder technologies. DV cameras have opened up high quality capture for a host of new video users and have increased the opportunities for traditional video uses.

How the camera is adaptable to your needs is probably the most important feature to evaluate. Software control is available in almost all cameras now, not just the high-end systems of yesterday. It is now important to evaluate the control systems and the features they offer your photographers. BE

*Dan Stark is president of Stark Consulting.*

# Compression

BY JIM BOSTON

The art and science of compression continued its onward, and upward, march at this year's NAB. Some claim that compression products shown this year can deliver the same quality using a third of the number of bits as was required by offerings just eight years ago. Improvements in compression algorithms, hardware and noise reduction technology have led to a 10 percent to 15 percent decrease in bits required for comparable quality from one year to the next. The common toolkit used by most compression systems is still MPEG-2. But MPEG-4 is increasingly present, and MPEG-1 is still around, as the streaming folks still find it computer-friendly.

HD seems to be slowly moving to critical mass. Neil Brydon, product marketing manager for Harmonic, noted "significant interest from the ATSC, cable and DBS space," attributing the increase in interest to factors including competition between cable and DBS, more HD content and a reduction in the cost of HD receivers.

The theme of increasing efficiency in MPEG compression was demonstrated by a significant number of telco suppliers at the show. Harmonic showed delivery of two broadcast quality video signals over a single DSL line. Optibase demonstrated a TV streaming platform designed for streaming multiple live channels over broadband networks such as DSL, fiber and Ethernet LANs. Compression is also transforming the archi-

# Product jackpot

### Stagetec Cantus Mk II
Digital mixing console is designed for post-production applications and remote production; eight output program busses capable of supporting stereo, surround, 4.1, 5.1 and 6.1 outputs.
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### KTech SPG-100
Generates all required PSIP tables including STT, RRT, VCT, MGT and four static EIT; creates and stores virtual channel information for up to six program streams.
818-773-0333; www.ktechtelecom.com

### FOR-A digiStorm
Turnkey 3-D on-air graphics solution; provides real-time, high-quality 3-D CG graphics animation for sports, weather, mapping and statistics box applications.
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www.for-a.com

### Harris Ranger
Low-power, solid-state ATSC UHF transmitter; available in 460 W or 900 W power levels.
513-459-3400
www.harris.com

### Accom WSD/HDX
Digital disk recorder serves as a platform for HD and SD; features an integrated disk array; configured for standard record capacity of 22 minutes of uncompressed 1080i/60 HD video; expanding storage option.
650-328-3818; www.accom.com

### DataDirect Networks S2A 3000
Silicon storage appliance provides aggregate bandwidth up to 400 Mbytes/s for one to eight compute nodes; manages network environments ranging from 500 GBytes to 7 TBytes.
800-TERABYTE
www.datadirectnet.com

### Dayang X-edit
Core of the X-series post-production system; integrated with X-CG to provide real-time graphic creation capability.
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**Compression exhibits at NAB included demonstrations of new products that use fewer bits to deliver higher quality content.**

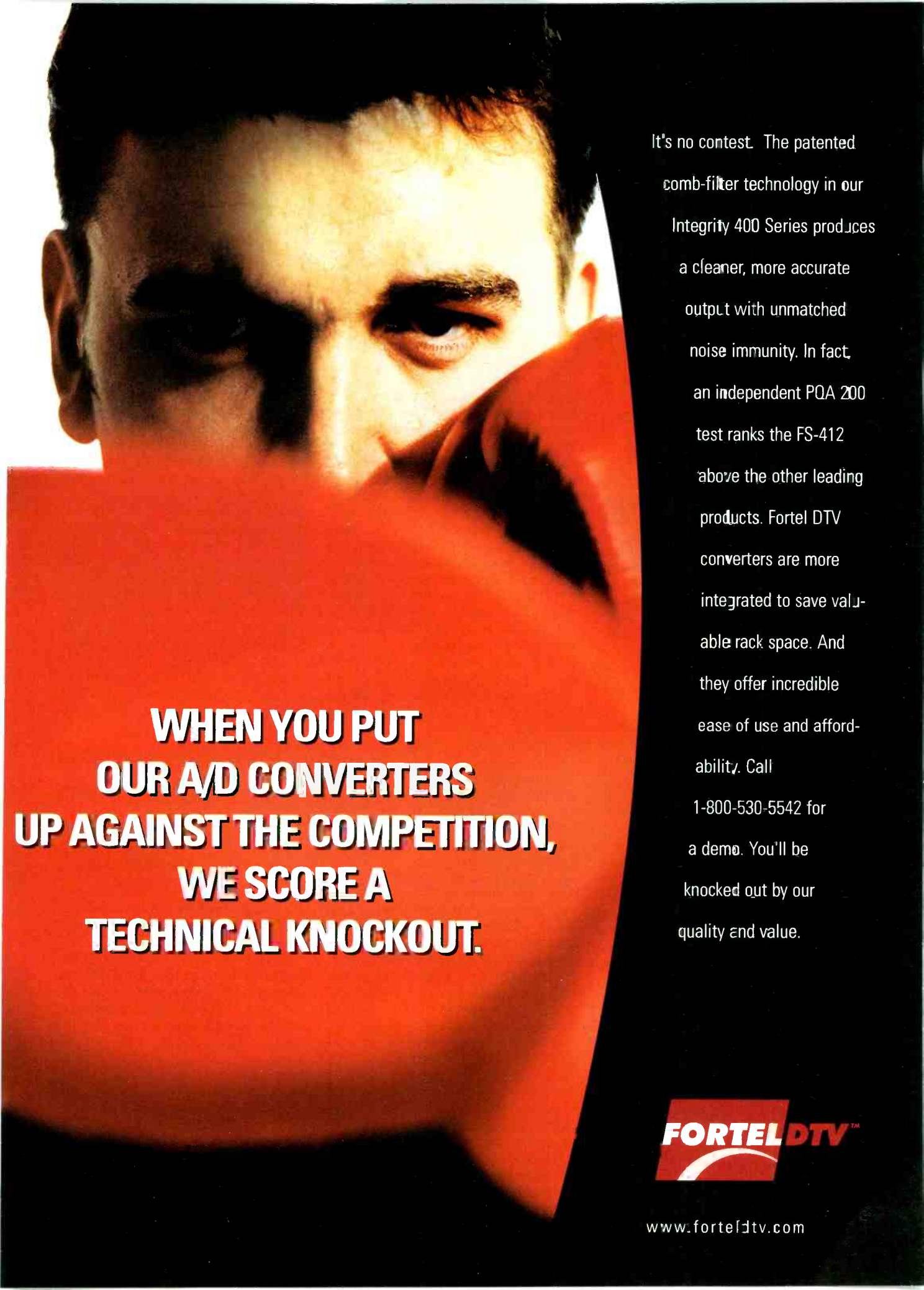
tecture of cable systems. Instead of the traditional RF multiplexed approach to sending services from headend to the home, telco and computer LAN topologies are now being employed. SONET rings carrying MPEG wrapped in ATM is one approach that cable is using to upgrade their systems. Another approach is Gigabit Ethernet. A single Gigabit Ethernet LAN can handle approximately 250 SD television programs, thanks to the ever-increasing power of today's MPEG encoders. The topology used in such an approach would be MPEG over IP on Ethernet from headend to QAM devices that reside in distributed hubs near the viewer. The capacity that compression and telco technologies bring to the game is allowing the rollout of video-on-demand services to be offered in a growing number of locations.

Just as video servers have become closely aligned with asset management, compression systems are beginning to be integrated into asset management. Francois Abbe, a product manager at Snell & Wilcox, points out that broadcasters have realized that media asset management is fundamental to the workflow of a new business. The problem he sees today is that there are many media asset management systems, but few asset creation systems. By ingesting content and creating metadata effectively from the start, the broadcaster has relevant information about the content that will help to index that content properly. Once ingesting is done, the broadcaster can have accurate shot-change information and can

## Compression is transforming the architecture of cable systems.

know exactly what is in those shots. Down the line, it will help to distribute content outside of the main distribution channel, which in most cases is the broadcast television station. This content can also be sent to Web sites, or from business to business. Content owners now have the potential with ingest and management systems to reference content, advertise it, and put it online for a faster turnaround and greater return on investment.

Compression technology enabled the video server to take root and rapidly come to dominate the storage realm in television. As such, servers and many VTRs today have embedded compression systems. Therefore, these vendors face many of the issues that vendors of stand-alone compression systems face. Doremi Labs, a manufacturer of HD disk recorders, points out that the MPEG-2 standard maximum bit




It's no contest. The patented comb-filter technology in our Integrity 400 Series produces a cleaner, more accurate output with unmatched noise immunity. In fact, an independent PQA 200 test ranks the FS-412 above the other leading products. Fortel DTV converters are more integrated to save valuable rack space. And they offer incredible ease of use and affordability. Call 1-800-530-5542 for a demo. You'll be knocked out by our quality and value.

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# Product jackpot

**BOXX Technologies HDBOXX**
Editor offers variable frame rate support for Panasonic's AJ-HDC27 Varicam HD cinema camera; features 10-bit and eight-bit YUV and eight-bit RGB support.
512-835-0400; www.boxxtech.com

**Devlin Design Group/Darim Vision**
**SoftSet-VS2000 solution**
Combines DDG's SoftSet with Darim's VS2000 PC platform; includes hardware, operating system and three semi-custom virtual environments for news, sports and entertainment applications.
858-535-9800
www.ddgtv.com; www.darim.tv

**Synthesys Research HD292**
HD video test system with time code analyzes the output of HD recording systems to identify signal errors and finds specific clips as needed; supports HD formats including film-oriented segmented-frame formats.
650-364-1853
www.synthesysresearch.com

**Editware Fastrack VS**
Hybrid editing system is designed to interface with and control disk-based video servers, VTRs, mixers, switchers, character generators and other peripheral devices.
530-477-4300; www.editware.com

**Extron QSD 204**
Video decoder features four-line adaptive comb filter; accepts composite video, S-video or component video on three inputs; configurable for an SDI input.
714-491-1500; www.extron.com

rate is 100 Mbits/s, which covers only high quality broadcast equipment, but not high quality editing equipment that requires higher bit rates. In addition, there is no standard defined for compressing 10-bit component video.

According to Jay Adrick, vice president of strategic business development at Harris, the continual evolution of compression systems are constantly evolving, with bit rate usage improvements, simplification of GUI control, the introduction of lower cost encoding and the addition of options such as stream remultiplexing.

ATSC encoders continue their feature growth. More broadcasters are becoming interested in statistical multiplexing as they put multiple program streams into their ATSC MPEG transport stream. Increasingly ATSC multiplexers, which can contain multiple encoders, act like master control switchers. Some can switch between network "pass-through" streams and multiple locally encoded streams by rapidly assigning a program ID (PID) from one program stream to another. These systems can also key like a switcher as the number of encoders that provide bug insertion to brand the station, and even individual program streams, continues to grow.

AgileVision, which was recently acquired by Leitch, is a good example of a compression system moving past the master control stage and into what they call a "DTV station in a box." The AgileVision box not only does MPEG encodes, switches and keys over live MPEG HD, SD or data, but also drops/adds programs from the incoming network transport stream and handles Emergency Alert System requirements. As additional evidence that distinctly different technologies increasingly find themselves in the same box, the AgileVision system also can store incoming MPEG streams, generate PSIP and act as an automation control system. Jerry Berger, vice president of marketing for AgileVision, points out that using the AgileVision system also allows you to "localize" your DTV transmission of network programming and meet the other requirements posed by DTV.

**Compression has become central to television operations, from acquisition through storage and on to transmission.**

Let's look at a sampling of compression solutions introduced at this year's NAB:

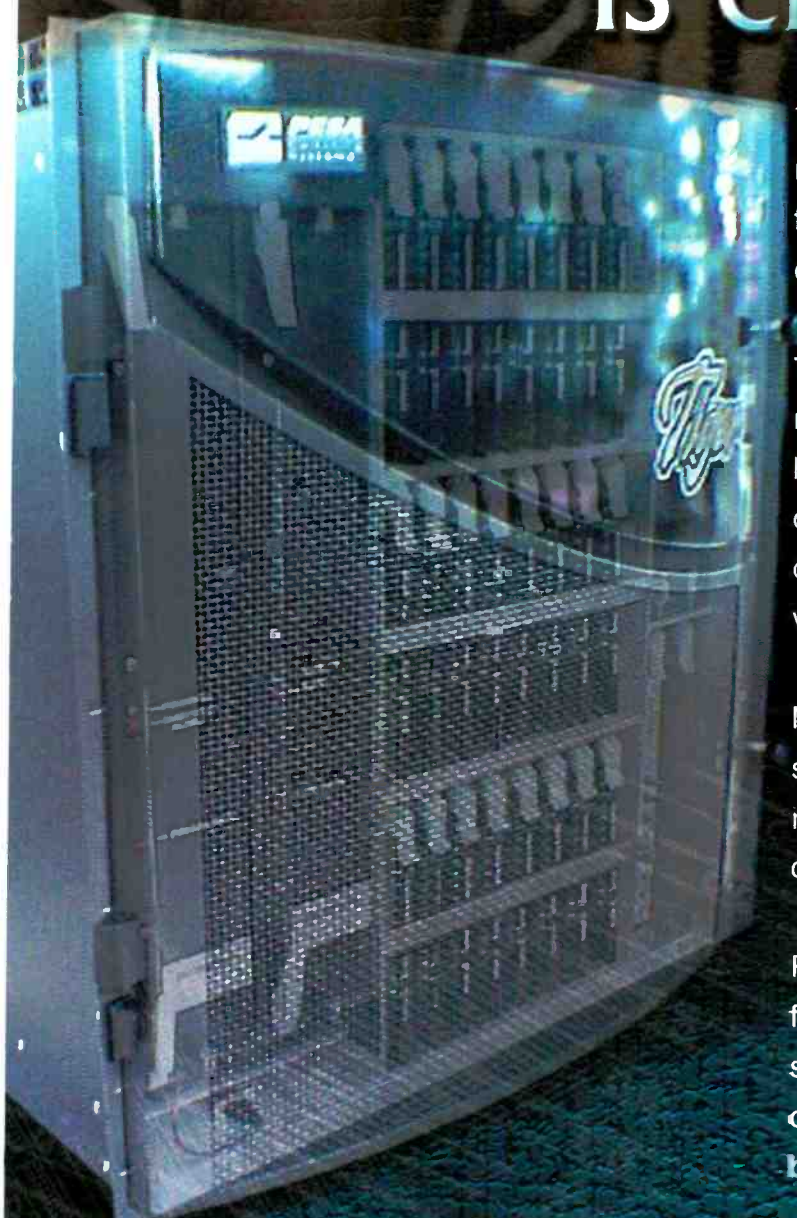
Harmonic has a number of new items at this year's show. Their DiviCom MV400 HD encoders are now enabled with variable bit rate capabilities for statistical multiplexing. Their systems are able to statistically multiplex HD, SD and data. They also showed expanded adaptive behavior in the MV50 encoder with its ENRGY intelligent noise reduction system, which attacks noise only when it is present. Harmonic also introduced Narrowcast Services Gateway for cable video-on-demand deployments. The gateway employs Gigabit Ethernet to increase video-on-demand (VOD) network scalability and capacity. They also introduced a Broadcast Network Gateway for HD and SD digital turnaround applications in cable networks. This product accepts four program inputs and provides either two ASI or two 256 QAM RF outputs. The ASI is intended to feed downstream scramblers for premium channel use.

Harris introduced the NetPlus HD IRD to complement the HDP 100 FlexiCoder, which encodes HD video. NetPlus decodes both 4:2:0 and 4:2:2 HD signals in most formats. NetPlus accepts satellite RF input signals as well as ATM- and ASI-based transport streams. CBS uses Harris FlexiCoders and NetPlus IRDs to support their HD contribution and HD network distribution requirements. Harris also introduced two new FlexiCoder modules, the EVA 162 for single-channel SD 4:2:0 applications, and the EVA 210 for dual-channel SD 4:2:0 applications. Both have optional statistical multiplexing.

Microspace Communications of Raleigh, NC, featured four live video and data demonstrations centered on the company's Velocity digital broadband satellite-based delivery service. They included MPEG digital video at 1.5 Mbits/s, streaming video to a desktop over 512 Kbits/s video channels, video-to-TV and video-to-PC solutions, and Velocity's File Forward service – a pay-per-megabyte means of delivering bandwidth-intensive corporate data or similar business-critical content.

Optibase introduced the latest version of MGW 2000. MGW 200 transmits multiple channels of live TV and video-

# The *Tiger* Advantage is clear to see



The PESA **Tiger** is the most recognizable routing switcher in the industry. The reasons for the **Tiger**'s overwhelming success are easy to see.

The PESA **Tiger** is adaptable to a wide range of requirements. Standard frames can be populated with a mixture of analog and digital cards in increments of 8 inputs and 16 outputs. This architecture makes expansion very affordable.

Many leading mobile production companies specify the PESA **Tiger** due to its proven reliability and rugged construction. Its compact size is another great advantage.

PESA control options for the **Tiger** are very flexible, too. The versatile **3500** series control systems support a wide range of panel choices. The PESA **e-Route** provides TCP/IP based router control from the desktop.

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Tel: 631-845-5020 • 800-328-1008 • Fax: 631-845-5023 • www.pesa.com

# Product jackpot

### eyeon Software Digital Fusion 3.1

Able to output Web-ready text animation to Flash; spreadsheet format for editing frames; offers new timeline filters to allow users to customize the sequence of tools and keyframe information.

416-686-8411; www.eyeonline.com

### Harmonic NSG 8200

Based on standard Gigabit Ethernet and ASI interfaces; features an MPEG-2 multiplexing core; supports centralized VOD architectures and Gigabit Ethernet-based cascading.

408-542-2500; www.harmonicinc.com

### AMS NEVE Logic MMC

Digital audio console features an intuitive channel-strip-based design and 24-bit, 96 kHz operation; has strip-by-strip routing buttons and display.

212-965-1400; www.ams-neve.com

over-IP networks. It can receive up to six live analog signals, encode them in real time to MPEG-1 or MPEG-2, and then stream them over an IP network in multicast or unicast mode. MGW 2000 also supports near on-demand transmission of 10 prerecorded streams, including MP3 files. The latest release, version 2.7, supports low latency and scheduled encoding and streaming. Optibase has also released the MGE-200D FD1, an entry-level digital MGW encoding module.

**Compression itself is rapidly becoming a pervasive utility that binds the source, be it video, or even multimedia, with the viewer.**

Stellat announced preparations to launch a new satellite in May. Positioned at 5°W, Stellat 5 in C-band provides full connectivity with the United States and near Asia, and high elevation angles across Europe, Africa and the Middle East. The satellite features four 72 MHz and six 36 MHz transponders. The satellite supports a variety of applications, including TV and Internet content distribution and IP backbone connectivity.

Snell & Wilcox introduced Ingest Station, which is used for compressing video (SD or SD/HD) for archive storage and broadcast playout. It is intended as the front end of a media asset management system and uses proprietary and open standard technologies including Ph.C phase-correlation motion estimation technology, and MOLE. MOLE is metadata about how video was initially encoded into MPEG so that MOLE-aware devices that decode the MPEG stream can recode the video back into MPEG with minimal loss of quality. The Ingest Station is designed to achieve the quality content while generating relevant metadata so that the user ends up with an MPEG-2 master plus data for the media asset management system.

TANDBERG Television introduced the E5710 and E5720 ATSC SD encoders. These are targeted at broadcasters looking for a cost-effective solution to begin ATSC transmissions. The E5720 has six expansion slots and will have an HD upgrade card in the future. TANDBERG Television perceives a number of issues that have affected ATSC encoder sales, and they say that their new encoders address those. Barry Hobbs, director of new technology for TANDBERG Television, notes that the modulation debate and early lack of HD programming coupled with the high cost of DTV consumer electronics have prompted many broadcasters to delay implementation of their DTV channel for as long as possible.

Compression has become central to

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# Product jackpot

### PatchAmp PA-3200
A 4RU high density DA frame holds up to 32 1x5 DA modules; uses coaxial connections; low insertion loss mid plane design provides 75 Ω from signal in to signal out.
201-457-1504; www.patchamp.com

### Incite Editor
Runs on Matrox DigiSuite platforms and Windows 2000; optional support for Matrox MAX; features multiple real-time FX, multi-layer mixing capabilities and live input editing.
+41 22 3085757; www.inciteonline.com

### Klotz VADIS D.C.II
Console is based on the VADIS 880 digital audio/media platform; features one-button Store and Recall and mic, analog line and AES/EBU/S-PDIF digital line inputs.
678-966-9900; www.klotzdigital.com

### Sundance Digital NewsLink
Automation system provides control and management that interlocks video servers, editors and newsroom computers; features on-air interface and master system databasing.
972-444-8442
www.sundancedigital.com

### PESA Switching Systems SMC 3000
Compact multichannel SD master control switcher; 16 channels can be controlled from single control panel.
800-328-1008; www.pesa.com

### Leitch Neo
Plug-and-play modules; advanced interface automatically recognizes each card and updates its technical parameters; features NEOSCOPE and confidence monitoring.
800-231-9673; www.leitch.com

### Scientific-Atlanta Transis RateCompressor
Employs new Intellirate transrating technologies such as closed-loop processing; can handle large bit-rate reductions.
770-236-6190
www.scientificatlanta.com

television operations, from acquisition through storage and on to transmission. While the compression efficiency slope might not be quite as steep as the computer industry's Moore's Law (computing power will double every 18 months), compression itself is rapidly becoming a pervasive utility that binds the source, be it video, or even multimedia, with the viewer. Given that compression is central to DTV, it is understandable that compression vendors are branching out in an attempt to handle more of the broadcasting process. BE

*Jim Boston is a West Coast consultant.*

# Format conversion

BY JAMES R. BAIRD

Most stations with large news operations deal with multiple formats now. Today, stations are lucky to deal with only two formats, one for news acquisition and news production, and another for air operations. With the new mantra of modern content creation "produce once – publish many times," this will put pressure on engineering budgets to come up with format conversion tools that are seamless and easily operated. Stations are mainly converting analog to SDI, SMPTE 259 to SMPTE 292, tape to disk, and performing some simple file conversions for graphics. Tomorrow, with multi-broadcast opportunities becoming a reality, there will be a need for increased efficiency in conversion.

Format conversion will begin to touch many station systems. Some of these, such as news production, studio production, nonlinear editing and single-channel transmission, we are familiar with as traditional broadcast engineers. Multichannel transmission, streaming media encoding and Internet broadcasting will stress today's content production tools, archive, routing and distribution systems. With the right format conversions we will be able to repurpose the content that we use in the control room for streaming media revenue streams.

**Tomorrow, with multi-broadcast opportunities becoming a reality, there will be a need for increased efficiency in conversion.**

No matter what format you produce your content in, at NAB2002 there was a conversion box that would fit your needs. Omneon's Networked Content Server System is a scalable system that allows stations to make infrastructure changes from analog to digital, tape to disk, and single channel to multichannel.

The Omneon system supports a variety of formats, including DV, DVCPRO, DVCPRO50, MPEG-2, 601 (uncompressed), SDTI and AES/EBU, AC-3, and Dolby E. All supported file types reside together in the storage system as data. When the media is called for, the data is sent across the network and the actual conversation takes place in the Media Ports at the edge of the network.

Leitch highlighted its Neo line of modular interfaces, featuring modules for frame synchronization. Neo updates technical parameters for each module and works with command control system applications to provide remote control, diagnostics, inventory and monitoring.

Axon Digital Design also had its conversion products on display, in particular the Synapse, which features embedded audio as an integrated part of the system and allows all parameters to be monitored carefully. The system can be remote-controlled and upgraded to be compatible with SNMP.

The Ensemble Designs' booth this year featured the Avenue signal integration system for video and audio conversion. The system's 3RU mounting tray accommodates up to 10 modules and includes provisions for the networkable remote control system, while the 1RU mounting tray accommodates up to three modules.

Visual Matrix demonstrated its upconverter, the MiniXBox. The MiniXBox features image processing with motion adaptive analysis and includes frame-based conversion for maximum vertical resolution. It has

real-time zoom, pan and scan, and complete aspect ratio controls. All 18 HDTV formats are supported, as well as NTSC, PAL and PAL O/S.

Teranex offered its Xantus-one to provide broadcasters with a cost-effective upgrade path to HDTV in a 3RU unit. The Xantus-one features colorspace conversion, 3:2 telecine, detail enhancement, scene change detection and aspect ratio conversion.

Cobalt Digital featured its conversion system, Model 4035, which converts 4:2:2 serial digital input to analog component, composite, S-video and two SDI outputs. The system also features auto NTSC/PAL detection and configuration, external configuration switches and a built-in color bar generator. As facilities plan modifications to the operating infrastructures to move from analog to digital, it becomes apparent that stations' subsystems will have some commonalities. Media will move from local environments to shared systems. Various media formats can be stored as shared files to develop end products efficiently and to increase the facility's productivity. Systems can be configured for production, transmission, archiving, networking and streaming media applications and will be able to benefit from "create once, publish many times" economies. BE

*James R. Baird is an engineering manager for WEWS-TV.*

# Production systems

BY DAVID HIGGINS

Vendors offering production systems at NAB2002 looked to improve efficiency, expand interoperability and offer more integrated solutions. Production switchers with onboard DVE, clip players and color correction; still stores with character generation capability; and character generators with multi-layering, multichannel effects environments, all strive to enhance a single operator position with greater functionality.

Today, many systems import, manipulate and store JPEGs, MPEGs, TIFFs, AVI, QuickTime, BMP and a wide variety of other formats along with hundreds of true type fonts. Relying on drag-and-drop functionality, they are relatively intuitive to use, fast and feature rich. Systems can operate on Ethernet or accommodate a dedicated SAN, and have interfaces to multiple platforms. These capabilities provide the graphics designer, CG operator, or TD with the tools to create complex stills, cell animations, effects and multi-layering 3-D on-screen images that just a few years ago would have required a considerably greater investment in isolated hardware platforms.

The first of several highlights at the show was the Thomson booth and their introduction of the Grass Valley product line with the existing Philips and Thomson brands. Traffic at the booth was heavy around the Kalypso 4M/E 80-input standard-definition production switcher. The Kalypso was being demonstrated with an onboard DVE and, new for this year, an integrated KlipCache still store and Kurl effects. The KlipCache had 1800 pages of still store and is capable of 60 seconds of animation playback. The Kalypso AUX Bus supplements the system with a dedicated power supply, 32 inputs with two external keys and emergency bypass functionality. Also shown was a 1M/E version of the Kalypso and the Zodiak production switchers, updated this year to include a new transform engine that offers 12 channels of video and key effects such as page turns, cubes and other effects, as well as four full-function keyers per M/E.

Nearby was the Thomson XtenDD high-definition switcher and a standard-definition version. The platform is designed as a single frame that can be upgraded from a 2M/E to a 4M/E system via software. The XtenDD is capable of 90 inputs and 36 outputs and can be outfitted with up to four full keyers with chroma key and eight downstream keyers. It has four channels of 3-D digital video effects and four channels of RAM that can provide up to 32 seconds of clip storage.

Thomson was also displaying the Grass Valley Concerto router, the 7500

# Product jackpot

### Livewave Contingency News Gathering

Manage camera movements in real time by remote control; allows recording in DV50, DV25 or MPEG-2 formats; camera feed can record to a local hard drive and remote networks.

401-848-7678; www.livewave.com

### Opticomm DVX 104

Video transmission system; addition to the Digiband family transmits one SDI with four external audio channels or two stereo AES/EBU signals at up to 270 Mbits/s over one single-mode fiber.

858-450-0143; www.opticomm.com

### Parkervision PVTV News CR4000

Production automation system features enhanced video, keyer, audio and control capabilities; performs back-to-back transitions with up to five upstream key layers.

800-532-8034; www.parkervision.com

### Pathfire Digital Media Gateway

Users can aggregate content from a variety of sources; content arrives automatically on DMG servers at stations; minimizes the need to schedule or monitor satellite feeds.

770-619-0801; www.pathfire.com

### Sencore TMS 1780

Monitors 8-VSB signals, transport streams and video in one unit; can tune to any UHF/VHF channel and monitor the 8-VSB parameters needed to qualify the RF signal.

605-339-0100; www.sencore.com

### SGI (Silicon Graphics) DMediaPro DM5

New option for the Octane2 visual workstation; real-time preview of high-resolution, color-converted imagery without rendering.

800-800-7441; www.sgi.com

# Product jackpot

**Panasonic AK-HC931**
Studio camera supports variable frame rate capture at 6, 12, 18, 24, 30 and 40 fps over 60 fps for off-speed acquisition; operates at 480i resolution; converts 720p HD signal to 480i SD output.
900-528-8601
www.panasonic.com/broadcast

**Telestream FlipFactory TrafficManager**
Gateway automation system automates receipt and redistribution of commercials and other digital media at TV stations; detects incoming media from a variety of digital sources.
530-470-1300; www.telestream.net

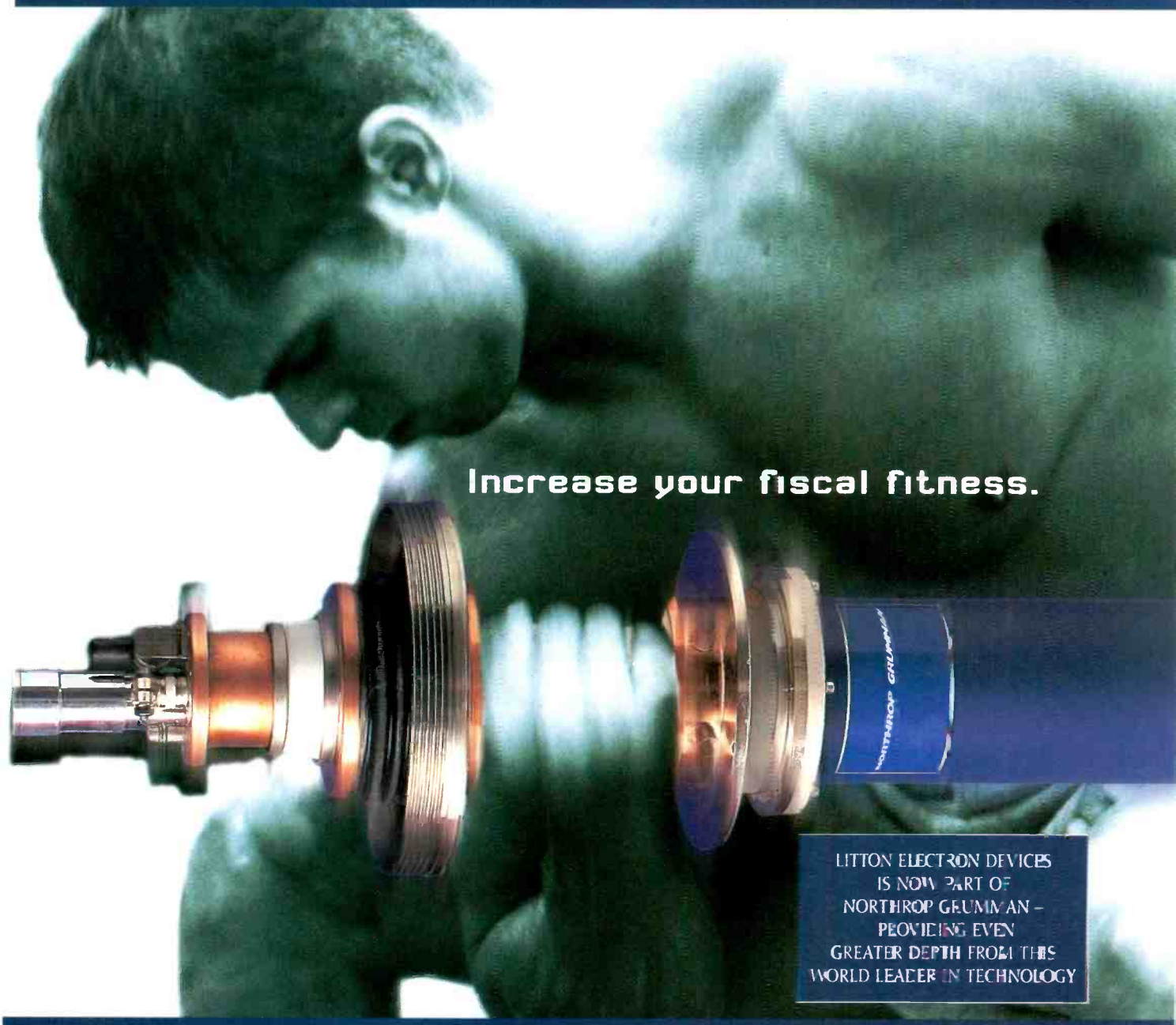
series router, the Philips Venus system and the new Trinix router. The Trinix routing systems are available in three chassis sizes: 8RU for a 128x128, 15RU for configurations up to 256x256, and 32RU for a 512x512 system. The Trinix router currently runs on the Jupiter control system platform. An additional feature of the Trinix 512 routing switcher is the Broadlinx Web-based status and alarm monitor, which provides users with real-time status. The Grass Valley NetCentral software will integrate with the Broadlinx application to provide users with SNMP-based reporting capabilities.

The next standout was the large Sony booth in the new South Hall of the Las Vegas Convention Center, which featured the MVS-8000 production switcher – an 80-input, 56-output multiformat switcher. Further expansion is possible via S-bus connectivity to the Sony router. The switcher supports HD at 1080i, 1080p, 720p and 480i, as well as 24p. The same frame can support HD and standard definition, has an onboard DVE with up to eight DME channels, and is complemented with a shotbox system capable of 192 custom defined register recalls or switcher commands. There are four keyers per M/E, and all have chroma key capability.

Also shown at the Sony booth was the Sony eVTR solution: the MSW-M2000 and the BKMW-E2000. This system can play multiple formats natively such as Beta SP, SX and Digital Beta, while also translating to MPEG-2. The BKMW-E2000 interfaces the MSW-M2000 VTR to a standard Gigabit Ethernet network via the use of MXF files. The eVTR also supports the local encoding of metadata.

Finally, Sony had the HDS-3700 and HDS-5800 routing switcher solutions on display. Both are compact systems. The 3700 is 8RU for a 128x128 configuration, while its larger cousin, the 5800, stands at 22RU for a 264x272 SD or HD router. The 5800 can be expanded to 1056x1088 by cascading multiple frames. Both systems rely on the Sony S-bus control system, are front-loadable and have hot-swappable modules for ease of maintenance.

The Pinnacle booth experienced heavy traffic. It was showcasing a four-

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# Product jackpot

### Teranex StarFilm
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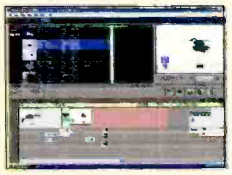
407-858-6000; www.teranex.com

### Trilogy Mercury VOIP intercom system
Box equipped with Mercury and application software forms network between existing digital matrix communication networks and Mercury's VoIP Ethernet system.
+44 1264 384000
www.trilogy-broadcast.co.uk



### Pinnacle Vortex
News editing software features easy-to-use graphical environment; allows for drag-and-drop storyboard editing and timeline-based editing for video, audio and titles.
650-526-1600; www.pinnaclesys.com

### Vela RapidAccess Version 3.0
New version of MPEG-2 video server adds enhanced playlist functionality and support for HD playout; offers options for simultaneous encoding in multiple formats.
727-507-5300; www.vela.com

### Vitec Multimedia MultiPEG
Multichannel, multi-board MPEG encoder; can be used as a four-channel real-time standard MPEG compression board for network streaming.
408-752-8483; www.vitecmm.com

### Equator Technologies BSP-15
Digital signal processor supports Microsoft Widows Media video endcoding and decoding solutions; enables Widows Media playback at resolutions up to 720p.
408-369-5200; www.equator.com

### Multidyne RGB-2000
Fiber-optic transport system carries RGB and XVGA signals plus various configurations of H and V sync over three fibers; total system bandwidth up to 500 MHz.
800-488-8378; www.multidyne.com

channel Thunder, capable of character generator content creation and equipped with an onboard DVE. Their FX Deko II had a clip player with 30 hours of storage, a Deko object controller, and the ability to input and manipulate a wide variety of files, clips and images. Rounding out their production suite systems, Pinnacle displayed the PDS 6000i and 9000i production switchers. The 9000i was shown equipped with nine integrated 3-D DVE channels; an EMEM system integrated with the Thunder and FX Deko, allowing drag-and-drop capability; and 19 onboard four-page frame stores with an optional onboard RGB color corrector and standard chroma keying. The Deko, Thunder and 9000i, when demonstrated running together, created complex visual imagery and effects transitions with drag-and-drop type editing via timeline or snapshot platforms.

A popular demonstration on the show floor was Chyron's Duet LEX running Lyric software. With 500 true type fonts, the graphics system had a clip player and a dual-channel DVE with real-time 2-D and 3-D graphics and timeline editing capability. The system was also configured with the new Harvester plug-in, giving it the ability to access a user-specified Web site and pull predetermined source information like stock prices, election results or sports scores to automatically update a given CG page. The Aprisa on display was also running Lyric software, giving it 3-D animation capability, multiple light sources and texture mapping. The system comes standard with six hours of storage.

**Production switchers enhance a single operator position with greater functionality.**

Kaydara and BOXX Technologies announced the Kaydara's production solution, FiLMBOX online 3.5 with video I/O, is available on BOXX's 3DBOXX workstation. The FiLMBOX system integrates real-time character-based 3-D content into virtual environments. It features camera tracking with Intersense, Radamec and hybrid motion-tracking systems, as well as virtual set integration with Orad and vizrt.

Pixel Power, with over 1300 installations worldwide, showcased updates to its Clarity, Collage and Graphite character and graphics generator product lines. A new enhancement was the RapidRecall keypad. Designed for live applications, it gives immediate access to stills, clips and character generator pages from a small, low-profile keypad device. The new PixelBrowse image browser provides desktop viewing of still images across a network of Pixel Power devices. The PixelCOM is an easy to use interface to external databases, documents and spreadsheets.

Leitch had the spotlight on their MediaFile still store system, capable of communicating over standard PC networks as well as Leitch's proprietary StillNet network. Existing StillFile customers can expand their still store capabilities, while bridging the gap between proprietary StillFile systems and existing data networks. The system has an integrated CG and real-time effects capability. Also on display was Leitch's Integrator router system, scalable from 32x32 to 512x512, as well as modular products, frame synchronizers, clocks and amplifiers that are in use throughout broadcasting and production facilities.

A.F. Associates, a systems integrator providing consultation, design and integration services, announced the construction of a new Network Operations Center for USA Cable. USA Cable's existing origination facility underwent a complete transformation, from hybrid analog/digital infrastructure, to a fully digital, multichannel NOC, employing advanced archiving and digital asset management systems.

Another systems integrator, Doyle Technology Consultants, has announced a new relationship with StorageTek, which offers digitized data storage. Additionally, Doyle Technology has been named a Master Value Added Reseller for LSI Logic's product offering of large storage area network solutions. LSI has recently partnered with StorageTek in a nationwide distribution program.

Ross Video was showing their Synergy line of production switchers including the 1M/E Synergy 1. The Synergy 1 is a 16-input switcher with internal aspect ratio converters for simultaneous 4:3 and 16:9 production, "Squeeze&Tease" 2-D digital video effects, and an Ultimatte Insider matting device.

The Barco booth was displaying their virtual monitor wall solution, the iSTUDIO system. This user-

configurable projection system can display up to 30 individual sources per module in any combination of composite analog, serial digital video, PAL, SECAM or NTSC, 4:3 or 16:9. The system also supports SVGA up to UXGA formats, as well as computer-generated objects such as digital clocks, counters or animated logos. The visual indications include audio monitoring with on-screen level meters, dual tally displays, and source identification and loss of signal alerts. The system is currently available in 50-inch, 67-inch, and 84-inch versions.

At the Videotek booth this year, the Digital Prodigy production switcher was on display. It comes with five standard-definition, serial digital video inputs (plus options for analog composite, component or additional serial digital inputs) and two upstream keyers with three dedicated key cut input connections. A small footprint switcher, the Digital Prodigy is capable of six layers of video and has an optional RS-422 serial port that links to a variety of editing controllers.

At this year's show, Pesa's high-definition and standard-definition routing solutions were front and center: the Ocelet at 16x16, the Cougar at 32x32, the Jaguar at 64x64, the Tiger at 144x144, and the Cheetah topping out at 512x512.

Also on display was Ultimatte's HD matte compositing system, which features dual-link, 4:4:4 I/O, internal 4:4:4:4 image processing, external matte input, automated ambiance color adjustment, field-upgradeable software and support for all broadcast HD and digital-cinema 24p/psf image standards. Panavision announced that it will be the exclusive distributor of Ultimatte's compositing system and will make the 24p high-definition Ultimatte systems available through Panavision offices worldwide.

Fairlight has acquired the intellectual property of DSP Media. The acquisition includes DSP's V motion and AV transfer products. Fairlight launched new releases of AV transfer and V motion as Fairlight-branded products at NAB2002.

The Systems Group was selected as the systems integration consultant for WJLA and NewsChannel 8, the Allbritton Communications combined ABC affiliate and regional cable news channel for Washington, D.C. TSG will integrate the automated server-based air operation for this multichannel facility and provide integration services for all core operation systems. The project is scheduled for completion in July/August 2002.

Canal+ Technologies released the results of a survey conducted by CANALSATELLITE with its subscribers in France. The survey shows that interactive TV applications resulted in $133 million (U.S.) in revenue for 2001. New interactive TV services such as Mosaic Navigator, pari-mutual (horse races) betting, custom portals, T-Commerce and digital pay-per-view events were identified as the biggest draws for subscribers.

DVB and CableLabs, a technology consortium for cable systems operators in North and South America, have announced that North American cable operators have agreed that MHP is to become the core of the OpenCable Application Platform. The OpenCable set-top box will allow cable households to access both digital broadcasting and interactive digital applications. More than 85 percent of North America's cable households could potentially benefit from MHP-based interactive services.

Of additional note were offerings from Snell & Wilcox and Evertz. Snell & Wilcox showed the HD DaVE 2524 production switcher. This 32-input system can be configured with a dual-channel 3-D digital video effects system per M/E and is available in a 16-input, 1M/E version as well. Evertz's line of standard-definition closed captioning systems, frame synchronizers, embedders and other modular products, as well as an HD test generator, were also on display.

Whether it was at the new South Hall or back on the main show floor, the next generation of production systems were popular stops for attendees at NAB2002. Vendors presented highly integrated solutions that accommodate a wide range of graphics and image formats, surf the Internet for content automatically, can be browsed from desktop applications, and are controlled under simple operator interfaces. In ad-

**More than 85 percent of North America's cable households could potentially benefit from MHP-based interactive services.**

# Product jackpot

### Sony MSW-900
Professional camcorder records images in MPEG I-frame format at a bit rate of 50 Mbits/s; uses digital signal processing technology and 12-bit analog-to-digital converters.
800-686-SONY
www.sony.com/professional

### Magni AVM-510A-T
Automated video monitor measures analog transmitter signal; displays and monitors incidental carrier phase modulation, differential gain and differential phase for both NTSC and PAL environments.
800-237-5964; www.magnisystems.com

### Gepco 552624GFC
Digital audio multi-pair; interconnects digital audio, consoles, recorders, processors and routers; features a 110 Ω impedance, low jitter and attenuation.
800-966-0069; www.gepco.com

### Media 100 844/X
Nonlinear editor and digital video effects workstation uses media supercomputer that delivers 420 MBytes/s sustained throughput.
508-450-1600; www.media100.com

### Multicast Technologies Digital Express (DEx)
Digital asset management and distribution system provides point-and-click method to distribute content and verify that it was received intact; scalable worldwide reach; database integration.
877-706-2278; www.multicasttech.com

### Astro Systems GG-161
PCI-64 bus-compatible HD-SDI frame-memory board allows input and output of HD-SDI signal with external HD devices; has one channel of HD-SDI input and three channels of HD-SDI output.
818-848-7722; www.astro-systems.com

# Product jackpot

### DK-Audio de-embedder module

SDI input module allows integration of SDI embedded audio into DK Audio's MSD600M audio-metering tool; up to four modules can be installed for a total of 32 SDI channels.

+45 44 85 02 55; www.dk-audio.com

### Audio Processing Technology E1/T1

Multichannel audio compression/decompression system features full-duplex operation; analog and AES/EBU digital I/O; 32, 44.1 and 48 kHz sampling frequencies.

323-463-2963; www.aptx.com

### Quantel iQ

Media platform is abile to work in fully uncompressed, video of any resolution in real time, all on the same timeline; no need to convert or compress.

+44 1635 815891; www.quantel.com

dition, flexible production switchers with integrated DVEs, multiple layers of keying and shotboxes that can provide cell animation playback, offer today's technical director tremendous capabilities from a single position. The story of this year's show is that content production capabilities operating across multiple platforms are now available from a number of vendors and are scaled to fit most budgets and technical requirements. BE

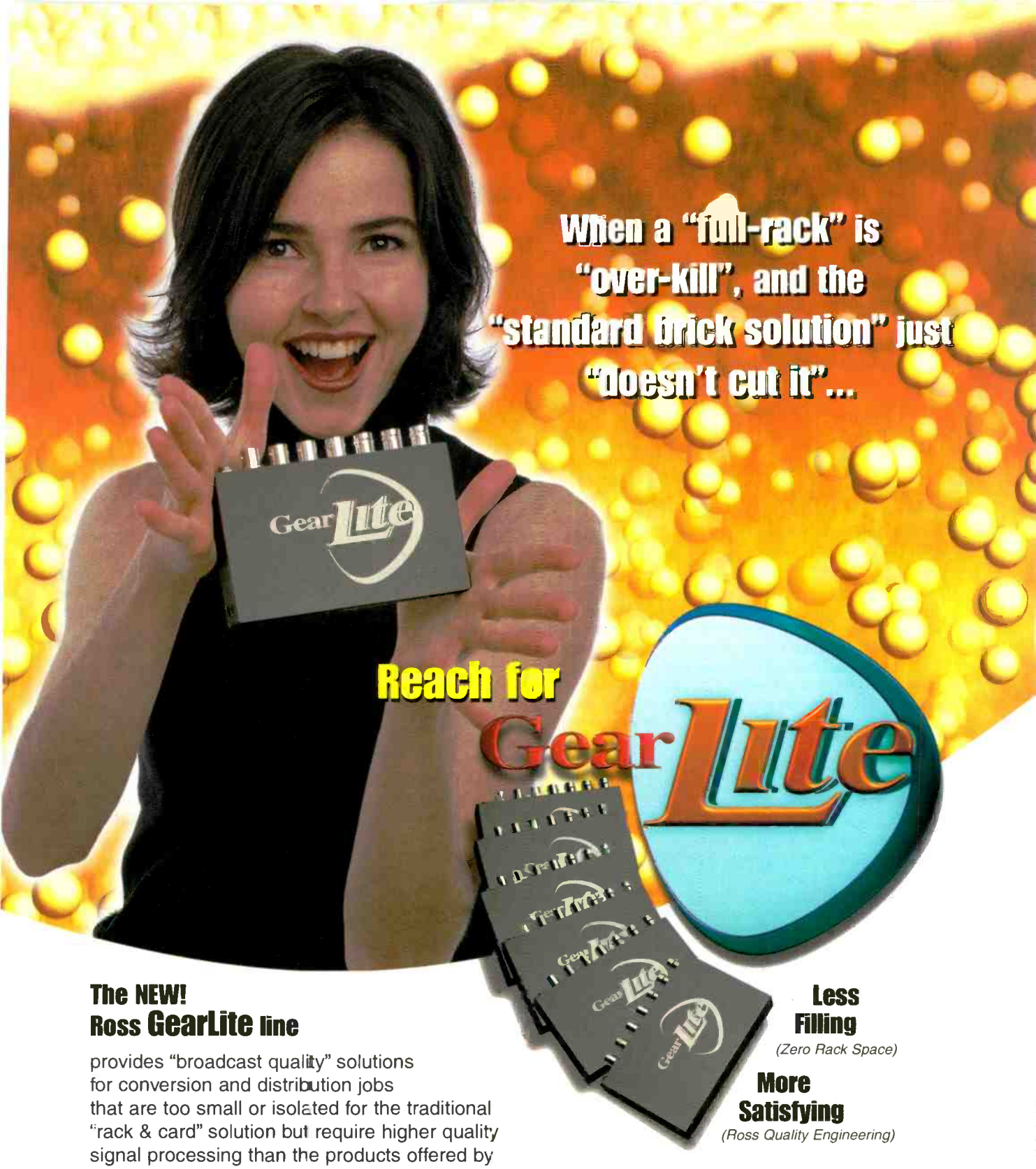
*David Higgins is the director of project development for The Systems Group.*

# RF products

BY JEREMY RUCK

In making my way across the convention floor this year, the common line I heard from many vendors was they didn't have anything new that they were showing this year. While the quantity of new products this year may not have been as high as in previous years, the quality of these products and concepts was certainly equal to or better than in previous years.

Beginning with transmitters, I had never heard of a company called Astre Systems, and you probably haven't either, but I suspect in the years to come this will all change. If you didn't get by to see their new DIGITAL*plus* transmitter, you missed out on one of the better products at the show. At the heart of this transmitter is the new CEA tube from Northrop Grumman (formerly Litton), which varies both voltage and current,

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# Product jackpot

### Radamec Scenario XR
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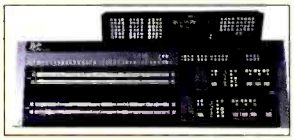
732-846-0536
www.radamecbroadcast.com



### FOR-A Hanabi
Digital video mix/effects switcher available in three new SD versions and three new HD versions; all six models have four still stores.
352-371-1505; www.for-a.com

### MassTech Group MassStore
Archive management system offers 1000 to 100,000 plus hours of fully managed storage; 18,000 hours of content fits into one rack; direct interface to video server and automation infrastructure.
905-886-1883
www.masstechgroup.com

### Neutrik EtherCon
Cable carrier features D-sized receptacles in vertical and IDC terminations; includes a new chassis type for vertical PCB mount.
732-901-9488; www.neutrik.com

### Studer Vista 7
Digital console's DSP core uses parallel processing architecture with an internal word length of 40 bits; system can be used in 48 kHz or 96 kHz mode; audio interfaces offer full 24-bit resolution between 32 and 54 kHz.
+41 1 870 75 11; www.studer.ch

### Logitek Remora digital console
Small, modular surface for Logitek's audio engine; main control module incorporates fader input selection, monitor and headphone controls, and stereo VU meters along with four faders.
713-664-4470; www.logitekaudio.com

resulting in efficiencies twice that of IOTs or klystrons. The Astre design approaches the crowbar differently and, as a result, does not have the long periods of downtime associated with a trip. These features are combined with a multilingual sound-enhanced GUI.

A new low-power transmitter named Ranger was introduced by Harris this year. This platform is of the low-power solid-state type, which will allow broadcasters to migrate to high power while minimizing their initial investment. The Ranger contains many components utilized in its bigger brothers, and is available in 460 W or 900 W ratings.

Thales had a similar new product on display this year, the Affinity. Available in six power levels ranging from 50 W to 1 kW, this new solid-state transmitter has a decent efficiency, and a small footprint. Because of its low cost, it provides an effective interim solution for DTV conversion, or can serve as a standby.

Acrodyne, now known as Ai, has undergone a significant face-lift in recent years. On display this year were the Quantum series IOT transmitters for both analog and digital applications. These transmitters provide full legal power outputs and come with an integrated remote control system. They also had available the Rohde & Schwarz solid-state transmitter line, which has the ability to migrate to a high-powered quantum series at a later date.

NEC was displaying its Versatile series transmitter, which combines broadband solid-state amplification with a frequency agile exciter. One transmitter can operate at a range of frequencies in either the UHF or VHF band. Their DTU and DTV series of transmitters were also shown. These are available in six configurations ranging from 500 W to 9 kW for COFDM or 8-VSB service.

**The common line I heard from many vendors was they didn't have anything new that they were showing this year.**

Axcera had on display this year an updated version of its VHF Innovator DT solid-state transmitter, and is introducing this year a low-power DTV transmitter system designed with future upgrades in mind. This low-power system uses LDMOS power amps and the Axcera DT25B broadband exciter. Finally from Axcera, their DTValue product was on display. This transmission system occupies a single rack, and is available in power levels from 250 W to 3 kW.

Andrew has two new solutions for DTV or auxiliary NTSC uses. The first, the AL8 series antenna, is a cost-effective, lightweight and low maintenance solution for meeting the Commission's minimal DTV facility requirements, and for use by low-power NTSC operators. The antennas in this series are horizontally polarized UHF antennas designed to handle 10 kW digital or 23 kW analog. With this antenna, ERP levels of up to 450 kW digital and 1 MW analog can be achieved. Multichannel and directional versions of this particular antenna are also available.

The second antenna from Andrew is the Trasar LT which, depending on patterns and gain, can be up to 80 percent lighter and reduce wind load by up to 52 percent over standard antennas. It has a shorter delivery time.

In my wrap-up of the show last year, I mentioned the TUV-H antenna from Dielectric. Well, the boys in Maine did it again this year. Dielectric has rounded out the product line with the introduction of the TUV-M and TUV-H antennas, which allow users to operate VHF and UHF in the same aperture with one antenna, and either directional or omnidirectional patterns for the UHF band. The TUV-L antenna allows operation of Channel 2 or 3 with a UHF channel, while the TUV-M antenna is designed for use by channels 4 through 6 and a UHF channel. With Dielectric's other transmission line products, it is also possible to eliminate the second transmission line run.

New this year from Electronics Research (ERI) is a side-mount TV antenna. ERI's new antenna is designed for low- and medium-power applications and is intended for use on a single, user-specified channel. The antenna is designed with lightweight aluminum construction, and has a single-piece radome for effective weatherproofing. ERI will also provide pattern studies for on-structure pattern effects.

MYAT has introduced a number of filters this year, among them the Mercury series for low-power UHF and VHF use, the Double Barrel DTV mask filter and single-tube DTV mask filters for medium-power use, and the multiple tube DTV mask for high-

power applications. All are available in mild or sharp tuned rejection requirements, and have small footprints to conserve transmitter room space.

Dielectric had on display their version of the UHF low-power DTV mask filter, which has input ratings of up to 4 kW average, and 1 5/8-inch EIA I/O connectors. Also from Dielectric is the UHF triple-mode constant impedance DTV mask filter. Through their design, two square waveguide cavities provide for the implementation of a six-section filter. Dielectric also had on display their Unitized UHF DTV coaxial RF system, which includes the filter, patch panel, directional couplers and station load on a single frame for either floor- or ceiling-mount configurations.

Andrew augmented their line of filters this year by introducing a low-power UHF harmonic filter. Their version features 60 dB rejection at the second and third harmonics, has 1 5/8 inputs, and handles power ratings of up to 5 kW average. Other new offerings include a DTV triple-mode filter and a low-power tunable filter. The triple-mode filter is Andrew's compact, medium-power filter. The low-power tunable filter preserves capital investment of the broadcaster by providing frequency agility. The filter can be retuned to any channel in the UHF band should the allocation of the station change in the future.

There were other notable products that didn't fit in the transmitter or RF systems areas. MRC had some new products on display, one of which is the REPORTER, a wireless camera-mounted transmitter with inboard COFDM and MPEG with remote control software. Also from MRC this year is the STRATA portable microwave radio. STRATA is user-configurable and remote-controllable.

CPI's Eimac division had on display a new IOT, the K2D150, which achieves 150 kW peak and 37 kW average power in DTV service. On the analog side of things, they are rolling out the K2100W, which has 100 kW peak-of-sync output for visual-only use.

So while I heard many times "we don't have anything new this year," those vendors and manufacturers who did have something new offered some innovative products that will continue to revolutionize our industry as we move forward with the transition to digital. BE

*Jeremy Ruck is a senior engineer with D.L. Markley and Associates.*

# Routing systems

BY MIKE BETTS

Switching video, audio and data signals is still a major function within a broadcast facility infrastructure. Every situation is somewhat different, and there are routing switchers in a wide array of sizes to fit every situation. Routers vary from small analog video and audio 4x4 or 8x1 utility switchers to expandable wideband serial digital routing systems of 512x512 and larger, with an extensive selection of control capabilities and external interfaces. Selecting a new large routing switcher today is more a case of "How do you want to control it?" than "How big a matrix do you need?"

As networking becomes more integral to the broadcast facility's needs, video and audio routing will become less of a central requirement. The use of servers and Ethernet networks to move files around a facility and browse the facility archives is becoming the norm, while conventional video and audio routing may soon become a thing of the past. In the meantime integrating analog and digital, video and audio together will still be important. The question today is often how best to deal with current needs while planning for the future.

Conventional facilities today may still need a mix of analog video and audio in conjunction with newer digital video and AES digital audio. The central nature of a routing matrix, or matrices, requires a great deal of thought about making the transition to a new system. Those lucky enough to be moving to a new building with a large amount of new digital equipment have the advantage of going fully digital in one big step.

Those who must add a digital matrix now and still use some of the existing analog infrastructure have a different dilemma. One solution is the Chyron Sirius series of routing switchers that offer both analog and digital I/O so that signals going in as analog or digital are available on digital and analog outputs

# Product jackpot

### Lectrosonics miniature transmitter

70 mW output with an RF circulator/isolator; battery status and audio input levels are indicated by LEDs on the side panel.

800-821-1121; www.lectrosonics.com

### Visual Matrix XBox

Video converter provides conversion between multiple video formats including HD, SD digital video and computer RGB video; features complete aspect ratio controls and image enhancement filters.

818-843-4831; www.visual-matrix.com

### Pixel Power Clarity2

Graphics system features dual AMD Athlon MP1900+ processors and multiple pixel processors; available in SD and HD configurations; supports optional clip player.

561-395-4801; www.pixelpower.com

### Fujifilm DV131

DVCAM cassette provides up to 184 minutes of digital video recording and higher C/N ratio stability; offers improved still-frame video, tracking and playout.

800-800-FUJI

www.fujifilmtradeshows.com

### Applied Magic ScreenPlay

Edit four stereo channels, including full audio envelope control and audio scrubbing; add titles, transitions, special effects and color effects.

888-624-4255; www.applied-magic.com

### Dolby Laboratories DP564

Multichannel audio decoder decides and monitors Dolby Digital, Dolby Surround and PCM soundtracks; features two AES inputs, an optical input, a linear time code output, and an Ethernet port.

415-558-0200; www.dolby.com

### Digigram EtherSound

Network audio device creates low-latency audio networks using standard Ethernet cabling and components; connects digital audio sources to networked devices.

703-875-9100; www.digigram.com

# Product jackpot

### ADC Unipatch
Modular patching system features a universal chassis that allows users to combine data, audio and video patching modules in a single 2RU modular panel; supports custom configurations.
800-366-391; www.adc.com

### Pandora MooreMegaDef
Software-based hardware acceleration engine for image processing; includes a dual primary color corrector; processing is performed at up to 16-bit resolution in real time.
+44 1474 5610000
www.pandora-int.com

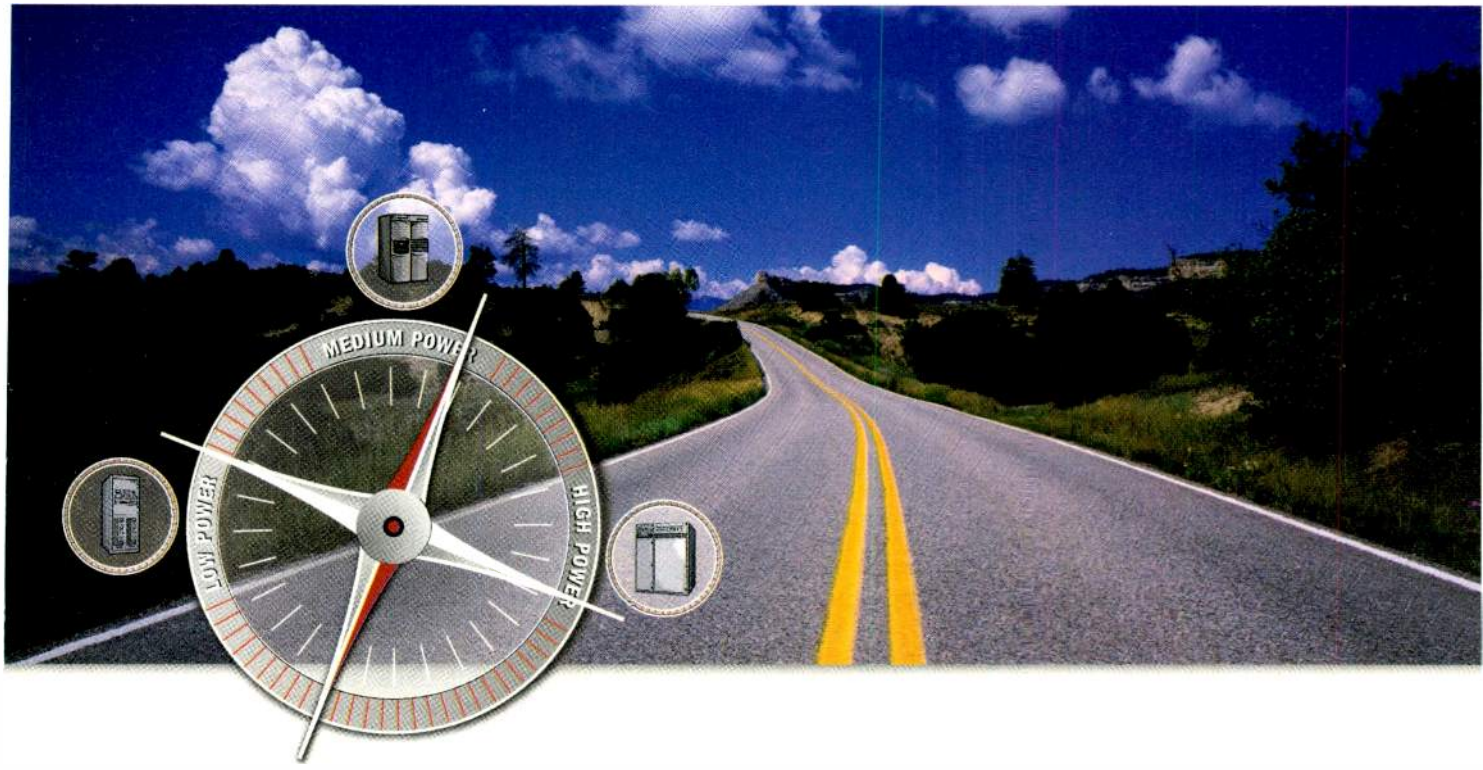
### Genelec LSE series active subs
7071A is designed for stereo or multichannel applications; 7070A employs a single 12-inch proprietary driver; 7060A features a 10-inch proprietary driver.
508-652-0900; www.genelec.com

simultaneously. This approach allows for a mixture of analog and digital within the same matrix and would be suitable for an analog facility that needs to maintain the mix of signals for a prolonged period.

Adding a digital matrix to an analog facility or extending an existing one requires new hardware often with an associated control system, unless the existing equipment manufacturer offers a control system that can control both the old and the new. At the large end of the range are the Thomson (Grass Valley Group and Philips) systems and the Miranda (Nvision), Leitch, Utah Scientific, Sony and Chyron (Pro-Bel) routers. All of these offer a variety of matrix sizes and control choices.

Systems such as the Grass Valley 7500 WB or 7500 NB series provide a way to integrate a new digital router with existing 7000 series hardware and can even interface with the older Horizon series of routers if needed. The new Encore control system provides a way to control legacy frames and can also control other routing systems such as the Philips Trinix or Venus series. The Trinix system can also be integrated into an existing Jupiter control system. Adding a control system for a new matrix that can control existing hardware certainly has economic advantages and allows new hardware to be added in parallel with on-air operations. The Grass Valley Concerto system allows a mix of video and audio signal types and with built-in A/D and D/A capability can save on external conversion units. Concerto is also expandable within a frame from 32x32 up to 128x128 and can also be controlled by the Encore control system.

The Utah Scientific UTAH-400 router aims at high crosspoint density with a 160x160 switch in just 8RU, or as large as 640x640 in 48RU. The UTAH-400 systems also provide the ability for full output monitoring and the ability to expand to greater than 1000x1000. Leitch offers the Integrator series of routing frames that can be combined to form a distributed routing fabric that provides both control and switching redundancy by distributing the control and switching over a group of smaller matrix frames, rather than housing all of the hardware in a single frame.

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# Product jackpot

### Audio-Technica AT4040
Microphone minimizes unwanted internal reflections; features extended flat frequency response and a wide dynamic range; can handle high SPLs.
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www.audio-technica.com

### Florical ShowTimer Version 2.0
Capable of automating program asset acquisition with control of satellite antenna/receiver systems, routing switchers, VTRs and video servers.
352-372-8326; www.florical.com

### Digital Voodoo HD Fury
Video card allows users to work with uncompressed 10-bit 4:2:2 HD-SDI 10-bit YCbrCR video; supports 1080i, 1080psf and 720p television systems with SMPTE 292/296 video input and output.
702-948-4976; www.digitalvoodoo.net

### Brick House Video VTB-1D
Four-input switcher capable of operating as a stand-alone unit or as a rack-mounted switcher; manual and auto wipe, manual and auto dissolve and auto fade to black.
+44 23 8067 6026
www.brickhousevideo.com

### NTI Digilyzer
Includes audio signal analysis, ancillary data interpretation and carrier signal analysis; handles AES3 signals, unbalanced S/PDIF and ADAT signals.
800-661-6386; www.nt-instruments.com

### Rohde & Schwarz ETX
Monitoring receiver provides quality control in broadcast networks; provides measurement functions to monitor the quality of digital broadcasting.
+49 89 4129-13779
www.rohde-schwarz.com

Most large routing switcher manufacturers also offer tie line capabilities allowing sources in an analog matrix to be selected and automatically routed to a digital matrix through external A/D converters or vice versa. For facilities that are combining existing analog and digital hardware this too provides an important capability to integrate the old with the new. Automatic tie lines are also capable of connecting individual distributed matrices together to allow routing of sources from one area to another using a single control system. This can reduce the size of a single matrix and allow smaller distributed matrices to be utilized around a facility while still using a single control system that can communicate to the individual matrix frames.

A digital matrix frame today often offers the ability to route a wide range of different serial digital signals within a single matrix. Many systems, like the PESA Cheetah series of digital video routing switchers, are available from 64x64 up to 512x512 and are specified as being able to route signals from 3 Mbits/s to 1.5 Gbits/s. This has the advantage that one frame can be used for routing 3 Mbits/s serial digital AES audio, 19 Mbits/s serial transport streams, all of the different SD video standards from composite video at 143 Mbits/s up to 360 Mbits/s, 540 Mbits/s signals, and uncompressed HD at 1.483 Gbits/s or 1.485 Gbits/s. This advantage is countered by the size requirements and location for a matrix that can do everything vs. the use of smaller distributed routers for a specific type of signal. A universal digital matrix does, however, offer the ability to change the signal type and incorporate HD signals, for example, when they need to be added. Sony offers a router that covers both SD and HD video up to a 1056x1088 matrix size with multiple VI switching points to allow for different timed source material.

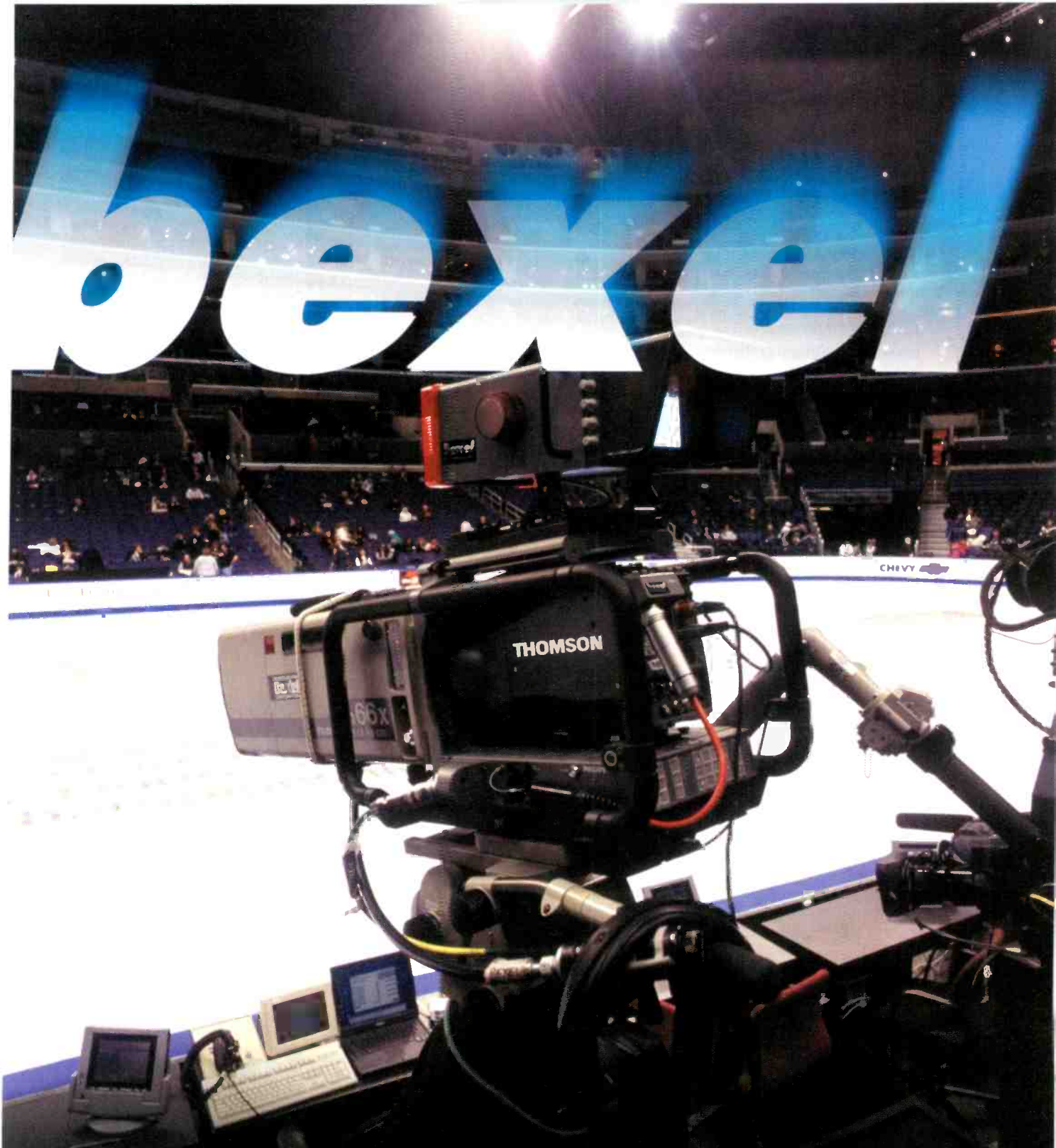
Reliability is always an important factor for large routing systems. Most manufacturers offer front-pluggable and hot-swappable modules to reduce signal path downtime. Redundant control and power supplies are a minimum requirement, but the new Miranda Nvision routing systems provide redundancy of both matrix control and signal outputs. A manual changeover switch can be used to switch to a backup control and output module that provides online stand-by capability. Digital video, audio, time code and data matrices up to 256x256 are all available. The audio frames also provide audio processing and utilize a TDM architecture.

When it comes to choosing a router, however, the choice of a control system plays a major role. Usually the choice is between standard control panels with fixed capabilities at relatively low cost against programmable control panels that can be customized for individual control locations' requirements. Customized control panels are often more costly, but the ability to change their operation between shows or from day to day can be a big advantage over a fixed panel. Panels can also be taken off-line as necessary to eliminate control from specific locations.

There is a wide variety of programmable panel styles using an even greater array of button and display choices. Using programmable panels require careful thought about button placement and the functionality required to produce a user-friendly button layout. Buttons should have a positive action and provide instant feedback to the operator. Some buttons are awkward to use and provide poor feedback. The panel display, legend or button readout should be easy to read and the panel operation intuitive to the user. The choice and length of source names can also make a difference in the speed and ease of use of a control panel. Different colors also aid in differentiating between panel functions when used logically to break up control, for example, of source or destination selection.


**Among this year's exhibits were switching solutions for every situation.**

Most new control systems are Ethernet-based, which makes cabling easier and less costly than some previously used proprietary control systems. Careful network management may be required if panels are to be connected to a facility's internal network infrastructure. Ethernet control also provides for a straightforward con-

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# Product jackpot

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www.odetics-broadcast.com

### Standard Communications SDR422CI

Fully MPEG-2 and DVB compliant receiver; the unit is plug-compatible with the Alteiaplus IRD, and responds to the same remote control commands; optional SRC4 remote control.

310-532-5300
www.standardcomm.com

### Telescript Ultimate Field/ENG

Features HiBrite Performance to deliver easy-to-read text in any lighting condition; features Telescript's FPS-120 Field/ENG flat-panel teleprompter.

201-767-6733; www.telescript.com

### Canon VB-C10

Combines a compact, user-controlled pan/tilt/zoom camera with a network server.

800-OK-CANON; www.usa.canon.com

### Canon HD-EC 2002

Zoom and prime lenses all utilize Hi-UD glass and Fluorite; all lenses exhibit high MTF with significantly reduced aberrations; HD-EC 2002 zoom lenses have been refined.

800-OK-CANON; www.usa.canon.com

### Thales Angenieux Optimo 12X9.7 HD

12X9.7 HD zoom lens features an optical design combined with proprietary high-resolution glass; features the same optics as the Optimo 12X9.7 24 to 290 mm film lens.

973-812-3858; www.angenieux.com

nection for external control systems and automation or production switcher interfaces. The control system often keeps the system information on a server database that can be mirrored for online redundancy. Changes to system configuration, capabilities and names can usually be performed online with the ability to implement the changes without affecting the current systems operation. Configuration changes should be within a few seconds following the commitment of the change to the routing system. Minor configuration changes, such as changing a source name, should be immediately visible on all panels and displays where that name shows up. Ethernet control also enables long-distance monitoring and remote control of a matrix (with appropriate security) from the Internet using a browser or PC-based application. This can be used to easily expand router control for temporary or permanent remote applications with a minimum of interface requirements. Internet browser applications or custom PC-based GUIs are now offered by companies such as Grass Valley, PESA and Sierra Video Systems, to provide central routing switcher monitoring and control.

**Selecting a new large routing switcher today is more a case of "How do you want to control it?" than "How big a matrix do you want?"**

Smaller routing systems are available from a variety of companies, such as the Chyron Pro-Bel Mistral series of small HD and SD serial digital routers with programmable control panels. Extron now offers a Digital XPoint switch for 4x4 or 8x8 serial digital switching for small applications. This unit provides automatic signal selection of SD video inputs and includes Ethernet and serial (RS-422 or RS-232 control). Evertz, Crystal Vision, Network Electronics, Datatek and Ross Video all offer solutions that cater to the low cost, small routing needs for video and audio. The Sierra Video Systems Yosemite router can combine different signal formats by module selection and can be connected to other frames within the same family. Control is via RS-485 panels or a GUI for system configuration.

For computer and monitor switching check out the range of small multimedia switchers from ISIS that provide switching of SVGA signals (R,G,B,H and V). These units are equipped with computer SVGA connectors for I/O instead of the typical BNCs that require adapters for connection of computer equipment. Ensemble Designs also offers an 8x1 and 8x8 range of video utility switches in their Avenue range of products.

Whether your routing need includes a mixture of digital or analog signals, video in SD or HD, audio, data, or something more exotic, the requirement for a stable, flexible control system is as equally important as a reliable router matrix. BE

*Mike Betts is the senior partner of Broadcast Training Partners.*

# Storage technology

BY GREG L. DOYLE

NAB2002 provided an incredibly diverse line of storage solutions for broadcast, production and enterprise data storage. The gamut ran from workstation-attached FireWire (IEEE 1394) drives all the way to NAS and SAN solutions for the enterprise. Storage is a complicated issue with tradeoffs ranging from performance to reliability to scalability to manageability and most importantly, price. These issues are spread across hardware, software, service and support. Today's high-performance storage market offers three basic options: direct-attached storage (DAS), network-attached storage (NAS) and storage area networks

(SAN). Other interfaces, such as FireWire, provide a serial interface to either standard IDE or newer ATA serial interface to standard PC drives but are essentially DAS.

### Workstation-attached storage

Direct-attached storage has been the most common method of attaching high-performance mass storage to workstations, servers and local area networks (LANs). In its simplest form, DAS consists of a disk drive attached directly to a computer through SCSI commands, the most common means of I/O communication between a computer and a hard drive. SCSI transfers data as blocks, which are the low-level, granular units on storage devices.

High-performance storage drives incorporating SCSI connectivity saw a boost in performance this year with implementation of the seventh generation of SCSI I/O: Ultra320 SCSI. The maximum sustained transfer rate of SCSI drives has been increasing to meet the need of modern systems and applications for higher data throughput. Because SCSI allows data to be striped across multiple drives for an increased aggregate bandwidth, a rule of thumb has developed that the SCSI bus bandwidth should be at least four times that of a hard disk drive's maximum sustained data rate. A year ago, a typical SCSI hard drive could theoretically sustain about 55 MBytes/s. New generation drives can sustain close to 70 MBytes/s, therefore, as few as three drives could saturate an Ultra160 SCSI bus. Ultra320 SCSI is projected to provide the interface data rate necessary to satisfy this bandwidth requirement for at least another year, and it's still backward compatible with earlier versions of UltraSCSI interface.

A RAID-5 array with Seagate Ultra320 disk drives connected to a two-channel Adaptec Ultra320 SCSI RAID controller will run multiple streaming video applications with data flowing at 320 MBytes/s across the SCSI bus. Also, in the Ultra320 SCSI controllers, LSI Logic's LSI53C1030 PCI-X to dual channel Ultra320 SCSI controller was featured showing LSI Logic's integrated mirroring at Ultra320 SCSI transfer rates to Seagate's Cheetah

# Product jackpot

**Thales Angenieux 26X7.8AIF**

High-definition and high-resolution series telephoto zoom lens; offers a focal range of 7.8mm to 203mm.

973-812-3858; www.angenieux.com

**Videotek FSM-15R**

Single-rack, standard 15-inch SVGA monitor for use with Videotek's VTM-200, VTM-300 and VTM-400 series of products, or any SVGA-capable computer.

610-327-2292; www.videotek.com

# Product jackpot

**Barco IQ G300**
Projector's picture-in-picture feature allows the presenter to display up to four resizable source windows on the screen simultaneously.
770-218-3212; www.barco.com

**e-mediavision.com Point**
Video writing tool suited to live productions; tools enable the operator to concentrate on the commentary or presentation.
+44 7949 085178; www.e-mediavision.com

**Hamlet Protean 292 Digi Gen**
High-definition signal generator provides comprehensive range of test signals; generates 100 percent and 75 percent bars, bowtie, sweep, and phase-locked loop test patterns.
866-4-HAMLET; www.hamlet.us.com

**Larcan Magnum 2.5 kW**
Transmitter is scalable from 2.5 kW to 5 kW, 10 kW and 20 kW; features Larcan's 2 kW PA circuitry with LDMOS technology; redundant amplifiers and power supplies.
303-665-8000; www.larcan.com

**Axcera DTValue**
Compact DTV transmission system; includes a Dolby 5.1 encoder, an SD encoder and an 8-VSB signal/transport stream/video monitoring package.
724-873-8100; www.axcera.com

**BUF Technology VTC-4000**
Controller for up to 10 RS-422 VTRs, DDRs, and/or server channels; frame-accurate editing and synch rolls plus synched looping.
858-451-1350; www.buftek.com

**Microwave Radio Communications REPORTER**
Wireless camera-mounted transmitter with inboard COFDM and MPEG with remote control software.
978-671-5700; www.mrcbroadcast.com

X15-36LP enterprise drives. LSI Logic's Fusion-MPT based controllers provide interoperability. The Seagate X15 drive operates at 15 K rpm and delivers seek times as low as 3.6 ms and latencies as low as 2.0 ms.

### Storage area networks

SANs are dedicated networks that connect servers to storage devices and transport storage traffic without burdening the enterprise LAN. SANs can be attractive for several reasons, including high performance, reliability, availability and scalability. SANs also are useful when you require large amounts of data backup because high-density storage solutions, such as tape backup or DVD jukes, mount directly to the SAN.

**High-performance storage drives incorporating SCSI connectivity saw a boost in performance this year.**

Unlike network-attached storage, a SAN will provide centralized file management and limit redundant copies or multiple versions of files, which can rapidly consume disk space. If a system is not in place to manage this, servers with high-demand applications and often-used data can become overloaded, while other servers sit idle. SANs help eliminate this problem and improve the efficiency of the LAN by moving the constant stream of storage traffic off the LAN over a host bus adapter (HBA).

The HBA is connected via switched Fibre Channel to the storage device, and a separate file management system tracks metadata related to the files and updates clients on file status. This metadata establishes file access priorities to limit who can write to a file and who can read a file. It would be disastrous to have two people attempt to simultaneously write to the same file.

SANs are built on high-performance RAID arrays that are raw-block devices. These blocks can be very large depending on the storage platform. Users carve up the terabytes of data into hundreds of gigabyte-size chunks called Logical Unit Numbers (LUN) and assign them for private and exclusive use by the individual users. Each server, in turn, places a file system on the LUN, but the server's storage is block-level.

Connectivity between the storage devices and the workstations is achieved using Fibre Channel, either as an arbitrated loop or as a point-to-point switched fabric. This year, SANs saw a boost in performance using the Ultra320 SCSI drives and 2 Gbit Fibre Channel. This combination was shown at several high-end storage vendors, including EMC, LSI Logic, Rorke Data, SGI and StorageTek.

This year, SGI celebrated its 20th year in business and its 10th year as an NAB exhibitor. The company showed the CFXS2 media server, allowing a multi-OS infrastructure to enable sharing of files between different operating systems. Currently supported operating systems are IRIX, Solaris and Windows NT.

StorageTek introduced the D178 disk subsystem through a strategic alliance with LSI Logic. The enterprise disk subsystem supports more than 40 TBytes of information. StorageTek's 9840 tape drives are now delivering 20 GBytes (native) per cartridge allowing a full petabyte (1000 TBytes) in a tape library. Also, the speed to data is 12 seconds, and acts as an alternative to an all-disk implementation, which can be costly. The 9840 can deliver throughput of 19 MBytes/s native and up to 37 MBytes/s compressed. The SN6000 with Virtual Transport Manager (VTM) provides a single storage image for a data center's open systems environment. Unlike conventional server-based and storage-centric approaches, this network-based approach frees application servers from storage management overhead.

DataDirect debuted the S2A 3000 Silicon Storage Appliance, a 1RU SAN appliance that allows users to plug the workstation into one port and a commodity priced JBOD into another. The unit can be configured with up to 7 TBytes of storage.

Avid is now providing a direct I/O device for the Unity line of servers with the Xdeck. The unit incorporates SDI I/O, FireWire support, RS-422 remote control and VTR-like control functions for ingest and playout directly from the Unity server.

SeaChange unveiled its new Broadcast Media Library 2400 server. SeaChange's BML provides online availability exceeding 99 percent. The architecture is different than a traditional SAN with the Fibre Channel fabric spread across multiple nodes in a three-dimensional, toroidal pattern, thus eliminating a single switching point.

SeaChange discussed releasing a 2.5 Gbit bussed architecture for storage access soon. This will be a proprietary

platform that probably will be something similar to Infiniband, where the movement of blocks of data is offloaded from the CPU bus to peripheral hardware devices.

LSI Logic had several high-end storage solutions on display at the show. The MetaStor E4600 storage system features 2 Gbit connectivity, 40 TBytes of storage and up to 390 MBytes/s of sustained throughput from disk to sustain multiple video streams. The E4600 HPCx combines multiple E4600 systems and one or more SAN expansion modules (fabric switch) into an integrated solution. All MetaStor systems offer a modular design and robust SANtricityStorage Manager software. SANtricity-powered MetaStor storage systems support mixed RAID levels, drive capacities and rotational speeds, and individualized volume settings to ensure attached host systems receive their desired storage requirements. And SANtricity provides automated path failover and online configurations, reconfigurations, expansion, maintenance, and performance tuning to ensure valuable data is always available.

**Today's storage market offers three basic options: direct-attached storage (DAS), network-attached storage (NAS) and storage area networks (SAN).**

### Network-attached storage

Where a SAN storage model provides direct access to raw blocks of data, a NAS provides a file system that manages the blocks of data in a file format and provides an embedded engine close to the disks, which represents the disks as a "network file system," or NFS. Hosts see it as a network file system, not a block device. The network-attached model offers ease of administration. It can mean fewer file systems for an enterprise because many servers can simultaneously share each file system. In a network-attached model, an administrator could have a single file system for a terabyte-size NAS device. The entire terabyte would be available to every server at any time.

There are limitations in the areas of performance, impact on host processing, scalability and "unsettled writes" that prevent NAS from being effective in some applications such as multimedia. Host impact refers to how much overhead the LAN traffic erodes in application host CPUs. Moving multiple megabyte-sized files to or from a LAN is much more expensive than moving data from a direct-attached pipe (SCSI, Fibre Channel). The scalability limitations are due to CPU performance and the physical makeup of the LAN. Across a LAN, traffic must be processed at both the application host and the NAS server end. "Unsettled writes" can be caused by the fact that LAN-based writes are not 100 percent ensured to be settled out to real storage at the moment they are acknowledged. Once data is moved out to the LAN, the application is typically told it is free to continue its job, however, when capturing live video as a constant stream you need 100 percent assurance that the data is recorded or you'll start dropping video frames.

NAS servers are seeing great improvement in performance by applying multiple CPUs or parallel processing along with gigabit Ethernet and 10 Gbit Ethernet for faster throughput across enterprise or wide area network (WAN) connectivity.

Ciprico demonstrated its new DiMeda 2400 server incorporating gigabit Ethernet to the workstation in a news editing demonstration. Ciprico states performance levels exceeding 120 MBytes/s aggregate bandwidth while concurrently serving multiple application clients running Windows, MAC or Unix operating systems. Because the server utilizes file access technologies, it is application independent.

Avid introduced the Avid Unity LANshare, an entry-level gigabit Ethernet system with up to six dual-stream ports or 10 single-stream ports with up to 640 GBytes of storage capacity.

### SAN-attached file system

A SAN-attached file system has the potential to bring the best of both worlds to the workstation. These systems can be expensive, but they allow the application to request data at a file level and receive it at a block level. In SAFS architecture, one server performs as a NAS with a LAN connection to the application server or workstation. The back-end of the NAS server is attached to the storage elements, or the SAN, using Fibre Channel or SCSI. Another path to the SAN is provided to the ap-

# Product jackpot

### Ikegami TDP-370H

HD portable switcher with 2M/E busses and multi-standard operation in 1080p/24p, 1035i and 720p; two built-in keyers and up to 16 inputs and six output busses available.

201-368-9171 www.ikegami.com

### Ikegami HDK-720P

2/3" native 720p CCD portable camera in a flexible, field-ready package.

201-368-9171; www.ikegami.com

### Aspen Electronics Roq-4000 Pro

Portable four-channel fast charger for Aspen NiMH and NiCD brick-style batteries; equipped with an internal microprocessor that monitors the charging of four batteries simultaneously.

714-379-2515

www.aspenelectronics.com

### Belden Electronics Division Brilliance 1505F

Flexible version of Belden's 1505A RG-59 digital video coaxial cable; designed for use in patch bays, mobile studio trucks, field locations and studio setting.

800-BELDEN-4 www.belden.com

### Ross Video DAC-9013-R video converter

Program path SDI to analog composed and component conversion; -R version has reclocked SDI outputs; 10-bit DAC; 10-bit data processing.

613-652-4886 www.rossvideo.com

### Videoframe VTECS

Cost-effective approach to monitoring signals using VTECS enterprise monitoring software; stores signal monitoring information in a database of log messages.

530-477-2000

www.videoframesystems.com

### Andrew DTV triple-mode filter

Designed for medium-power digital TV broadcast systems; features all-aluminum construction and patented thermal compensation.

708-349-3300; www.andrew.com

# Product jackpot

### Broadcast Technology DTVD 1000
MPEG-2 decoder features ASI input; supports MPEG-2 4:2:2 video and audio; offers a conditional-access module slot, embedded audio outputs, SDI and analog video outputs, and embedded audio output.
+44 1264 332633; www.btl.uk.com

### BT Broadcast Services optical fiber service
Carries a permanent 622 Mbits/s transatlantic service linking London to Los Angeles via New York; new portfolio of services includes the company's Facility*Line* at 270 Mbits/s.
+44 20 7555 0037; www.bt.com

### Canopus DVStorm
Software update to nonlinear editor allows DVStorm to deliver five simultaneous real-time video streams; features more than 23 real-time filters.
877-739-EDIT; www.canopuscorp.com

### CPI Wireless Solutions (K2)²
UHF amplifier for use with 8-VSB, COFDM and similar modulation schemes; features an advanced electromagnetic compatibility designed input circuit.
650-592-1221; www.eimac.com

### Discreet cleaner streaming studio
Interoperable suite for Webcasting, editing, authoring and publishing of on-demand or live event Web content; includes cleaner live, cinestream and cleaner.
866-317-1011; www.discreet.com

### Doremi Labs V1-MP2
MPEG-2 disk recoder offers simultaneous record and playback capability and MPEG-2 4:2:2 video compression (up to 50 Mbits/s); drop-in replacement for a videotape recorder of any format.
818-562-1101; www.doremilabs.com

### Dremedia iTVNow
Provides automatic delivery of interactive content via multiple channels; makes recommendations based on automatic categorization of content.
415-243-9955; www.dremedia.com

plication server via Fibre Channel to an HBA on the server's PCI bus for block-level access. Applications on the hosts believe they are talking to the file server, which they basically are. The file server performs authentification and layout of the file on the storage, as well as all other NAS-type functions.

EMC displayed such a system using the Celera NAS server in conjunction with the Symetrix SAN and an application called Celera High Road. As large files are requested via the Celera server, the system automatically opens up the second path directly to the SAN for block-level access.

### Internet SCSI
A few vendors were talking about incorporating Internet SCSI (iSCSI) for WAN connectivity to storage area network platforms. This will become important as workgroups are spread across multiple facilities such as a centralcasting model. iSCSI is a software package that emulates SCSI protocols, but the connection method is via an IP network instead of a direct SCSI-compatible cable.

The promise of iSCSI is that storage management software, which was originally written for the well-established SCSI standard, can now be used to make a remote disk or tape drive on a network operate just like a local disk. Block-level access can be achieved across a LAN such as Ethernet or even the Internet. The potential benefit is that users can connect to remote storage devices to replicate data without having to write huge amounts of new software.

### FireWire frenzy
The popularity of FireWire-attached storage has been incredible. While initially aimed at the prosumer market, this storage technology has found a home in audio and video editing platforms and content capture. With a theoretical bandwidth of 400 MBytes/s, this platform can provide an inexpensive and portable storage solution.

At NAB2002, a few FireWire storage platforms were based on stand-alone operations, such as the Data Video DV Bank FireWire recorder. This system operates on a self-contained processor eliminating the need to tie the storage to a laptop: You can connect the camera or video mixer directly to the DV Bank and start recording. The device also has an RS-422 interface for connectivity to an NLE suite and VTR-like controls on the front of the box. The unit comes configured in a 60 GByte or a 100 GByte drive.

Glyph Technologies exhibited several FireWire storage options for audio workstations and small- to medium-range NLE workstations. The companion storage platform for audio workstations is optimized to reduce noise and vibration to help keep it quiet in the audio suite. FWHS is a 1RU, two-drive FireWire storage unit with up to 240 GBytes of hot-swappable storage. The DV Project is a FireWire RAID drive with up to 240 GBytes of storage at 40 MBytes/s of throughput. This would be great for those using medium-level editing workstations from Apple's Final Cut Pro, Avid DV Express or Media100. If your projects get larger in scope, you can stack more of the DV Project drives and stripe across them for up to 1 TByte of storage.

**When you implement your storage platform, you need to determine your storage and filing applications for the long run.**

While some lower cost storage systems provide reasonable to high performance, you should also do some risk assessment to determine which platform will best suit your needs. Just because a drive performs to your bandwidth needs doesn't necessarily make it the right choice. When shopping for a storage solution, consider what the application will be and what the business model can justify. Also consider your legacy systems and determine if newer proprietary systems will play well together with what you already have. As storage technologies evolve, it looks as though NAS and SAN developers will come up with ways to make their products look more like each other. When you implement your storage platform, you need to determine your storage and filing applications for the long run. BE

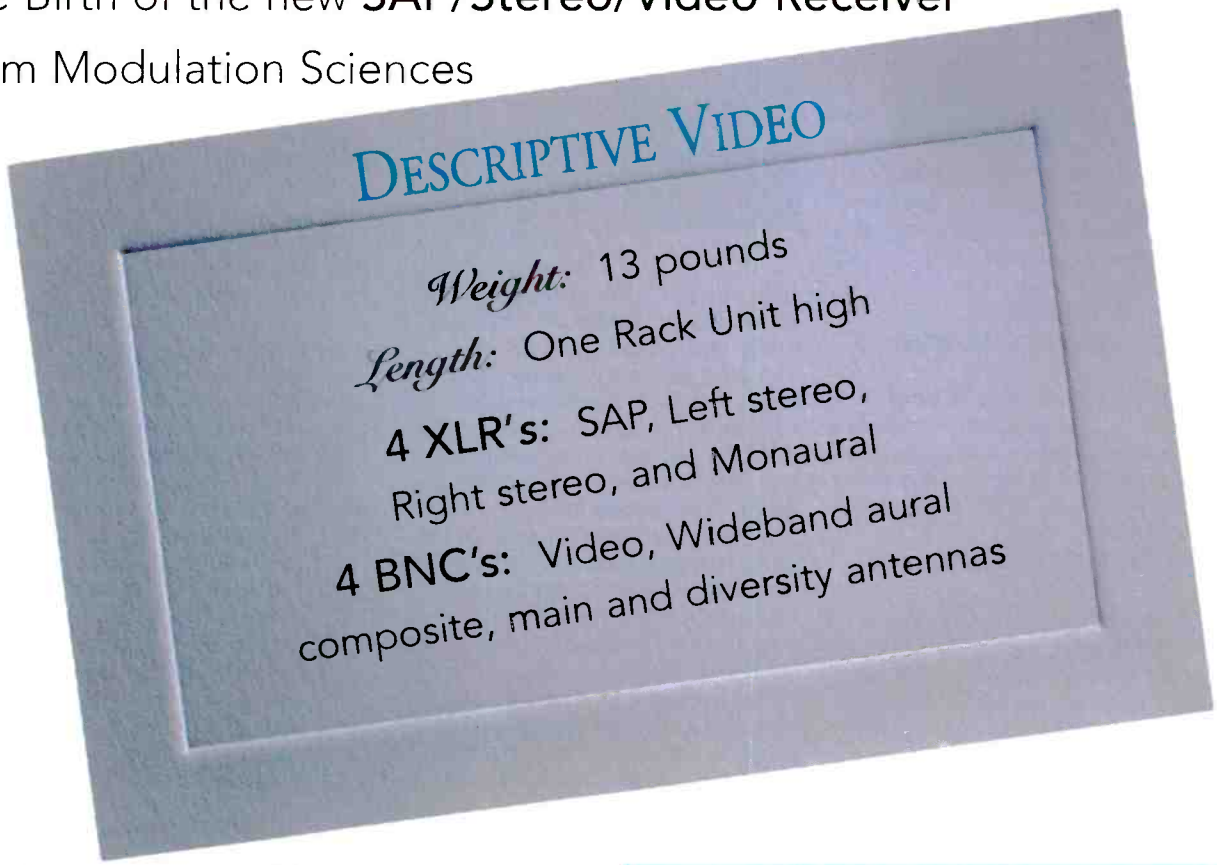
*Greg L. Doyle is president of Doyle Technology Consultants.*

# DESCRIPTIVE VIDEO

*Announcing*

the Birth of the new **SAP/Stereo/Video Receiver**

from Modulation Sciences




Modulation Sciences' SAP Generator is proud to announce the birth of a son, the **msi 189 SAP/Stereo/Video Receiver**.

All outputs are available ***simultaneously*** and all are balanced line level.

This is an exciting time for the Modulation Sciences SAP family of products as they will be called to duty when the FCC implements *Descriptive Video* for the sight impaired in early 2002.

**Are you SAP ready?**

**Please contact Modulation Sciences for more information on their SAP family of products.**

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Fax: (732) 302-0206
E-mail: sales@modsci.com
www.modsci.com

# Product jackpot

**Ensemble Designs Avenue**
Provides a full complement of conversion for video and audio, along with distribution amplifiers and synchronizaton.
530-478-1830;
www.ensembledesigns.com

**eMotion MediaPartner 4.1**
Digital media management software offers added functionality including a customizable brand management project workflow, IPTC tag support and eMotion Viewer.
866-236-6846 www.emotion.com

**EVS Broadcast Equipment CleanEdit**
Virutal nonlinear editor; workstations become an integrated multi-user production environment when paired with a server; nonlinear editing is performed along a timeline with drag-and-drop operation.
973-575-7811; www.evs.tv

**Northrop Grumman CEA Tubes**
IOT technology with a multiple stage depressed collector, allowing the CEAs to operate at a total power conversion efficiency of about 60 percent; correctable average power output of 30 kW.
800-861-1843
www.northropgrumman.com

**Eyeheight Eyesight**
Data monitoring system allows DTV broadcasters to monitor metadata throughout a distributed network; comprises nine compatible modules including AU-2 audio descriptor and ID-2 EyeDentify SDI source verifier.
+44 1923 256 000; www.eyeheight.com

# Streaming

BY STEVEN M. BLUMENFELD

When I asked a friend about his favorite part of NAB, he responded "Thursday afternoon, one minute after close" because that was the longest time until the next NAB. I do not share his pessimism, but after attending these shows for a quarter of a century, I surely understand the sentiment.

It seems that every year the show gets bigger and more diverse, which means a lot more products to see and understand, but also a lot more to regret missing. This year's scene was no less fascinating. With the new LVCC South Hall's two floors, the Sands Convention Center and the behemoth North Hall, three-and-a-half days is just not enough.

The show was kicked off with a keynote from AOL Time Warner's CEO Designate, Richard Parsons. He spoke on the perennial topic of convergence, with the understanding that convergence is happening not only in the broadcast business, but in the creation of all media.

There has been some significant revamping of the streaming industry. Many of the players that were here last year are gone. The idea of streaming as a major competitor to broadcast has been replaced by a more realistic view. Streaming is now being billed, by the marketing types, as an adjunct to broadcast instead of a direct replacement. New products from AnyStream, Envivio, Real, Panasonic and others are making streaming more accessible to many.

How can any article about this show start with anything but the fabulous Apple booth? Their recent purchase of Nothing Real – developers of the compositing program "Shake" — gives us an insight into how devoted Apple is to the high-end post-production industry. Their newly updated Final Cut Pro 3 and DVD Studio Pro run on a dual 1 GHz G4 with the new Nvidia GeForce4 Titanium graphics card for real-time rendering.

Anystream announced an entry-level modular Agility Enterprise product specifically designed for live Webcasting applications for corporations, producers and service providers doing audio/video or audio-only live Webcasting.

The solution for streaming IP-based content also offers users the ability to add video-on-demand and other features. The Agility Enterprise product family can integrate seamlessly with existing workflows and scale to manage a varying number of simultaneous streams. The software also runs on off-the-shelf servers, eliminating the need for proprietary hardware.

The new configuration enables clients to Webcast several different concurrent live events using multiple capture cards and in multiple formats – Real System, Microsoft Windows Media and Apple QuickTime can be concurrently acquired, preprocessed, watermarked, encoded and archived.

Pioneer showed their new PVR-9000 for the one-off-studio DVD business. It is a stand-alone professional DVD recorder that can use either DVD-RW (re-


**Part of Scientific-Atlanta's exhibit at NAB was this Lego bridge illustrating the merger between Scientific-Atlant and BarcoNet.**

recordable) or DVD-R (write one) disks and will play back multiple formats such as: DVD-R, DVD-RW, CD-R, CD-RW, DVD-Video, CD Audio and Video CD.

It has both analog (composite and Y/C) and digital (IEEE 1394) inputs and some limited editing functions. One of its most interesting features was its abil-

# A Smart Investment in DTV


**Consensus:** Strong buy recommendation on a hot new issue in Test and Measurement.

## VTM-420HD/SD

***Videotek introduces the latest in Multi-format On Screen Monitors with auto-recognition HD and SD***

Videotek's new VTM-420HD/SD beats the street by incorporating an abundant array of features that are traditionally available only in several stand-alone products:

- High Definition Waveform, Vector, Audio Measurement and display
- SDI Waveform, Vector, Audio Measurement and display
- HD and SDI picture monitoring in 16:9 and 4:3 formats
- SVGA high resolution monitor output
- Closed Captioning display in HD and SDI
- Auto-detection of input formats: 720p, 1080i, 1080p, 525/60, 625/50, 480p embedded in 1080i
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The VTM-420HD/SD includes SpyderWeb™ Unattended Network Monitoring software, free software updates and the Videotek assurance of quality with a five-year warranty.

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Dolby® is a registered trademark of Dolby Laboratories Inc.

# Product jackpot

### IBIS P2
Business management system supports acquisition, program management, planning, scheduling, library and media management, and compliance and EPG preparation.
+44 1458 851150; www.ibistv.co.uk

### Irdeto Access PIsys
DVB conditional access system designed for large-scale satellite DTH, cable, IPTV and terrestrial broadcasting; features blockout control, positive and negative entitlements, and IRD.
858-618-3500; www.irdetoaccess.com

### Mathematical Technologies DubCheck
Software tool for verification of video and audio transfers from source to tape; runs on either SGO or PC platforms with integrated video and audio I/O.
401-831-1315; www.mathtech.com

### Scopus Network Technologies RTM-3300
1RU system offers up to 10 inputs for medium-size headends and digital turnaround applications; features include statistical multiplexing support and advanced remultiplexing.
858-618-1600; www.scopus.net

### OmniBus Systems Colossus
Provides a timeline display, allowing the operator to monitor the status of up to 1000 channels and focus in on any single stream and confirm its data.
530-470-1700; www.omnibus.tv

### OmniTek OmniGen
Provides all the common test signals used in standard-definition and high-definition applications; can generate resolution-independent images for data transfer.
+44 1256 88 1110; www.omnitek.tv

### Pixelmetrix DVStation-Q
Four-port, 2RU version of DVStation for remote applications for regional and local monitoring applications; features two hot-swappable redundant power supplies.
954-472-5445; www.pixelmetrix.com

ity to record at different compression levels, allowing up to six hours of content to be stored on a DVD-RW. The PVR-9000 can serve as a utility recorder and allows users to archive off-lines for clients. It could also be used as a small-scale IP broadcaster to allow limited content streaming.

Panasonic showed off some interesting tools of their own, including the new IDVR100 (desktop) and IDVR200 (rack mount) digital video replay servers, which are low-cost HD-quality video presentation systems.

The IDVR is an Internet-enabled HD MPEG server with built-in DVD-RAM drive, with 24- and 60-frame progressive high-definition playback plus stereo, or optional 5.1 channel surround sound. They are capable of storing approximately 30 minutes of MPEG-2 HD-encoded video at the nominal 19 Mbits/s data rate from a single 4.7 GByte capacity DVD-R or DVD-RAM disk; and in the case of the iDVR200, much longer elements may be stored and played back by caching from the DVD disk to an internal hard-disk array.

The compact iDVR100 is designed for desktop or shelf-mount installation, while the iDVR200 has a 4RU rack-mount frame designed for additional internal hard-disk drive array storage and installation in equipment rooms. Both units are networkable via Ethernet, allowing video content to be distributed to just a specific iDVR, or any nominated group of iDVRs, over an IP network (either public Internet or corporate intranet). In addition, content can be distributed via DVD-R or DVD-RAM pre-recorded disks. iDVR operating functions can also be remotely controlled via the Internet. iDVR features include scheduled video playback with content verification for targeted advertising and pay-per-view program applications.

On a slightly different front, Real Networks has slowly but surely been filling out their suite of Internet commerce tools with the recently announced RBN managed subscription service, a customizable revenue-generating business solution through Real Broadcast Network (RBN). It is a turn-key subscription solution for media companies seeking new e-commerce opportunities and stronger brand alliance with online audiences.

The new Real Networks service offers content providers the necessary components to create and launch a stand-alone, branded online subscription service, reducing the cost and time required to build their own infrastructure. This scalable solution — which allows for pay-per-view, rental and subscription online commerce models — includes the following components: customer registration and subscriber management, content security systems to protect against unauthorized access, payment processing and billing systems, user report accounting, end-user customer service, and back-end hosting systems through RBN.

The most interesting piece of this solution is that it seems to be the first to offer a full end-to-end system to distribute content and collect revenue, something other CDNs have failed to supply.

Wacom showed off one of the best user interface devices for content creation I have seen. The new Cintiq 18sx interactive pen display is pressure-sensitive and allows Mac and PC users to draw directly on the LCD. The SXGA screen has a resolution of 1280x1024 and includes a pressure-sensitive wireless pen. Besides the screen display, Wacom has all but eliminated the annoyance of connecting cables by incorporating the power, video and control cables all into one. The stand allows the user a wide variety of different positions.

Discreet announced Cleaner Streaming Studio — a new package combining the Internet streaming media software applications Cleaner Live, Cinestream and Cleaner.

**The idea of streaming as a major competitor to broadcast has been replaced by a more realistic view.**

Cleaner Live helps deliver live Web events through integrated streaming and PowerPoint presentations and supports real-time media capture for archiving projects. Cinestream, the DV-based content capture and non-linear editing tool with interactivity authoring capabilities, enables users to produce visual experiences for the Web. The Cleaner software is a desktop content mastering application used to capture, author, filter, compress, format, secure and publish media for on-demand delivery.

InterMedia Solutions' authoring software LiVE-CONTROL and the encoder management solution

ENTERPRiSE-CONTROL allows automation of production and distribution processes. The unified console interface enables the creation and live transmission from multiple streams at different bandwidths and in different formats in parallel. The multiple formats and bandwidths enables users to reach a wide audience. The new A/V option extends the capabilities of LiVE-CONTROL to control audio/video inputs and allows superimposing of logos in video streams.

The ENTERPRiSE-CONTROL software enables reliable encoding by detecting malfunctions and alerting the operator while the built-in failover functionality starts standby encoders within seconds with the same parameters as the failed system so that the stream to the viewer will not be interrupted. ENTERPRiSE-CONTROL runs independent from any specific hardware platforms and allows mixed operation of encoder hardware from a variety of manufacturers.

Envivio showed off their integration of the Envivio MPEG-4 streaming server with SeaChange International's VOD system. The streaming server is capable of streaming ISMA and ISO MPEG-4 through almost any transport medium — Internet, intranet and broadcast networks — with controls to optimize the presentation of audio, video and mixed media. They also showed other components of their suite of end-to-end software products.

Envivio's Live Broadcaster is a full-resolution MPEG-4 real-time encoder that provides improved compression and advanced options for streaming higher quality content at lower bit rates. The encoder utilizes the Intel Xeon processor. The Broadcaster includes new and advanced encoding algorithms, user-friendly APIs for development, a remote management system and real-time encoding at full D1 resolution.

ViewCast showed off the Osprey-540, a professional digital and analog capture device designed specifically for streaming media applications. It offers an array of inputs, outputs and advanced features that allow streaming to seamlessly integrate with professional media equipment and workflow environment. Closed-caption extraction from analog and SDI inputs, enhanced audio/video synchronization and analog audio/video outputs for real-time monitoring are also new features on the Osprey-540. Video formats the device works with include Digital SDI and DV, analog composite and S-Video. On the audio side, the device offers Digital SDI, AES/EBU, analog balanced and unbalanced stereo. The Osprey-540 features

**Streaming is now being billed as an adjunct to broadcast instead of a direct replacement.**

hardware de-interlacing, scaling, cropping and color conversion.

Microsoft was showing off their relatively new Corona suite of compression technologies. The key feature being touted is the "instant" playback streams. Other features within the suite are a new audio codec with six discreet channels, 24-bit/96 kHz at data rates of 128 Kbits/s to 768 Kbits/s, and server-side playlists. The system comes with the Microsoft DRM system to protect your content.

Philips and Minerva Networks have formed a strategic marketing partnership to sell integrated hardware and software solutions for the distribution of video content over broadband IP networks.

### MPEG-4

Several vendors were showing off MPEG-4 based systems. Macrovision (yes, the company that protected our VHS tapes from being pirated) is working closely with iVast to provide

**On the MPEG-7 front, only a few vendors/research institutes were directly participating in the MPEG-7 booth.**

an integrated suite of content protection services (from tamper resistance and copy protection to watermarking). Several vendors were demonstrating set-top boxes that in-

# Product jackpot

### Scopus Network Technologies IVG-6100

DVB MPEG-2 platform allows content to be delivered over broadband IP networks into the home or corporate office space by telecom and other service providers.

858-618-1600; www.scopus.net

### Sonic Foundry Sound Forge 6.0

Digital audio editing and mastering system; enhancements include nondestructive audio editing, multitask background rendering, DirectX Plug-in Manager and new video render options.

608-256-3133; www.sonicfoundry.com

### Telecast Fiber Systems Digital Copperhead

Provides SDI and HD compatibility via a two-core, single-mode fiber optic cable; mounts directly onto ENG/DSNG cameras to deliver both digital and analog video.

508-754-4858; www.telecast-fiber.com

### Video Design Software Synapse

Graphics plug-in allows Quantel operators use of any of the 56-supported Boris AE production-oriented plug-ins, including fast blurs, true optical color correction and displacement mapping.

631-249-4399

www.videodesignsoftware.com

### Evertz X1200

Twelve input routing switchers route SD and HD serial digital signals; X1200S routers are used for 270, 360 and 540 Mbits/s SD signals; X1200H routers are used for 1.5 Gbits/s HDTV signals.

905-335-3700; www.evertz.com

### Kasenna MediaBase XMP

Video delivery system supports industry-standard formats; delivers VOD capability across multiple deployment channels with bit rates ranging from 64 Kbits/s to 11 Mbits/s.

50-943-8600; www.kasenna.com

# Product jackpot

### Pinnacle Systems CinéWave Classic

Designed for artists and editors who already own Final Cut Pro; delivers uncompressed video for creating graphic-intensive intros, outros, IDs and promos.

650-526-1600; www.pinnaclesys.com

### Prime Image Digital 50 III

Synchronizes digital video; time-base corrects and synchronizes analog video as well as transcodes.

408-867-6519; www.primeimageinc.com

### Quantel generationQ for Post

Provides a common user interface, common toolset and common operating system; consists of the iQ media platform, which offers digital post across the board, 2k performance and digital film.

212-944-6820; www.quantel.com

### Telex Communications BTR800

Features two intercom channels, stage announce with relay closure, wireless talkaround, 1440 frequencies and all metal beltpacks.

952-884-4051; www.telex.com

### IDX Technologies Endura

Allows two E-50 direct mount batteries to be stacked together on a camera back; fits directly onto new cameras that have the wedge-style V-mount already built in; uses the lithium ion technology.

310-891-2800; www.idxtek.com

### Anton/Bauer Titan Twin

Companion to the Titan 70 camera/power supply; mains input range of 90-250 VAC 50/60 Hz; allows charging of two batteries at once; chemistry independent; provides a charge routine specifically designed for the battery.

203-929-1100; www.antonbauer.com

cluded MPEG-4 decoders. Interestingly, we saw a wide range of supported bit rates with everything from standard-definition to high-definition content. Interoperability is a necessity for this format to become an accepted industry standard. Therefore, it is no surprise that interoperability of various MPEG-4 systems was being stressed at the MPEG-4 Industry Forum booth.

### MPEG-7

On the MPEG-7 front, only a few vendors/research institutes were directly participating in the MPEG-7 booth. Franhoufer showed an interesting demonstration of music track identification compliant with MPEG-7 using strictly the physical characteristics of the analog audio signal as input. Smoothy, a Japanese-based company, demonstrated the utility of MPEG-7 as an interoperability feature for their IP-based digital content distribution system. On the floor, metadata creation and capture was given a lot of lip service. When I asked the vendors what their development plans were, almost all said they were working on MPEG-7 compliant metadata specifications.

Could MPEG-7 compliant applications be the big news for NAB2003? BE

*Steven M. Blumenfeld is vice president of technology, AOL Time Warner CTO's office.*

# 24p production

BY CRAIG BIRKMAIER

24p has come of age. With the release of *Star Wars: Episode II – Attack of the Clones*, electronic cinematography and 24p post production have attained blockbuster status.

Is film dead? Not by a long shot.

But the arsenal of tools available to Hollywood's best and those who aspire to join their ranks is growing rapidly, along with acceptance of digital cinema technology. Cinematographers can now choose to acquire their images on film, or a growing range of 24p cameras. Meanwhile, the workflow for all forms of imagery – film, digital video and computer-generated — is converging, allowing for natural and synthetic imagery to be combined seamlessly.

Beyond the application of the Sony's CineAlta 24p HD camera for image acquisition, *Star Wars: Episode II* is being screened at more than 100 theaters equipped for digital projection. Many reviewers are proclaiming the end-to-end digital experience to be better than the "film look" that 24p digital seeks to emulate, and someday surpass.

Perhaps no other product category at NAB inspired as much enthusiasm and debate as systems designed to acquire and process 24p images. A two-day Digital Cinema Summit provided an opportunity for the motion picture and television industries to assess the status of HDTV and digital cinema — to determine if the technologies are converging and how they will impact the disparate worlds of motion picture and television production. Perhaps the best way to summarize the conclusions reached is that both sides are talking to one another. Given the historic rifts between these creative communities, this is real progress.

One area where there seems to be growing consensus is the desirability of the "p" component of 24p. Hollywood has steadfastly refused to accept the use of interlace for the acquisition of imagery. While 24 fps is an important number for exhibition – a critical component of the "film look" – it is not always the shooting rate. Film cameras allow for adjustment of the frame rate, enabling cinematographers to undercrank or overcrank the frame rate to achieve a variety of motion effects. Frame-based acquisition systems deliver significantly higher image quality than interlaced systems when playback speed is changed. Deinterlacing is still more of an art than science.

Panasonic has focused on this important aspect of the electronic cinematography process with their AJ-HDC27 Varicam HD Cinema camera. The 720p camera supports variable frame rates from 4 to 60 fps. At NAB Panasonic announced the Cine-Style Gamma option, which allows for ad-

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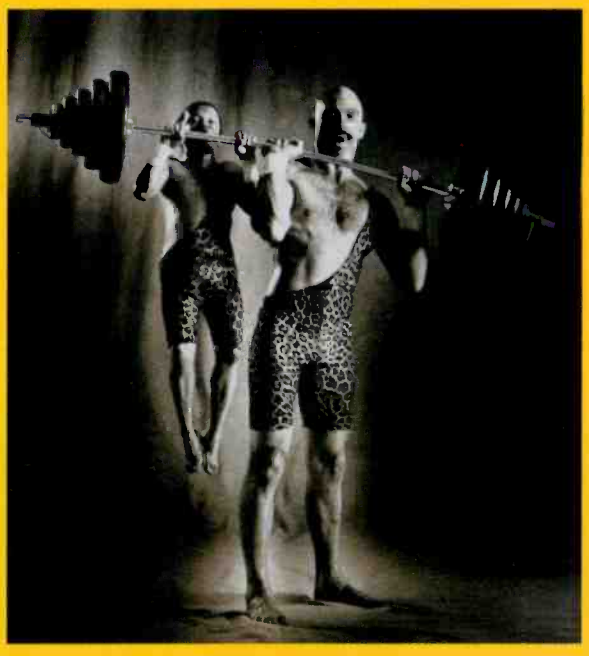

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# Product jackpot

**Videotek DM-145GCR**
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610-327-2292; www.videotek.com

**Switchcraft SWC MVP/SWC VAP**
New line of mid-size video jacks, patchcords and patchbays.
773-792-2700; www.switchcraft.com

**Wohler Technologies VAMP-1**
Composite video and two channel analog audio monitor offers the ability to monitor both audio and video from a single analog source; contained in a 2U unit; monitors video in either NTSC or PAL.
650-589-5676; www.wohler.com

justment of the frame rate in single-frame increments and improved dynamic range performance.

The option extends the camera's usable dynamic range, especially in traditionally limiting areas such as highlight handling, a limitation of both SD and HD video cameras. Cine Gamma provides the user with a closer approximation of film's ability to maintain smooth image tonality even when compressing extreme highlights.

Panasonic did not limit its efforts to popularize 24p to products targeted at Hollywood cinematographers. The company introduced two new standard-definition cameras that offer 24p acquisition capabilities for video professionals and aspiring independent producers.

**Many reviewers are proclaiming the end-to-end digital experience to be better than the "film look" that 24p digital seeks to emulate.**

The AJ-SDX900 DVCPRO Cinema camera features three newly developed 2/3" 520,000-pixel CCDs that capture high-sensitivity images at 60 fps 525 lines (480 interlace scan) and at 30 frames or 24 fps progressive. The DVCPRO recording system in this camcorder is switchable between classic DVCPRO and EFP-quality 50 Mbits/s 4:2:2 DVCPRO50 modes. It supports both 16:9 and 4:3 aspect ratios, and offers 24 fps progressive scan (24p).

Rounding out its 24p offerings, Panasonic introduced the AG-DVX100 24p DV Cinema camera, a mini-DV camcorder that captures cinema-style, 24-frame progressive-scanned images.

The palm-sized AG-DVX100 will be equipped with three, 1/3" 410,000-

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# Product jackpot

### ESE Network Time Protocol

Provides a method of putting accurate time information onto a network; includes ES-104, ES-289, ES-299 and ES-911/NTP.

310-322-2136; www.ese-web.com

### Inscriber CG-FX

Provides ability to combine streams of dynamic data with video and graphics; able to produce graphics and real-time animations while integrating other newswire information.

519-570-9111; www.inscriber.com

pixel progressive-scan CCDs, with a 4:3 aspect ratio. Support for 16:9 will be provided by letterbox extraction from the 4:3 images, or through the use of an anamorphic lens adapter.

Paralleling the 24p camera announcements at NAB, Panasonic and Apple announced they are collaborating on two important technologies for the professional video industry. Panasonic will be adding FireWire to upcoming DVCPRO50 and DVCPRO HD VTRs, making them the first tape decks to support full ITU-601digital 4:2:2 quality video at 50 Mbits/s, and high-definition video at 100 Mbits/s data rates over FireWire. The addition of FireWire to the VTRs eliminates the need to add a specialized PCI capture card in the computer, as well as the need to decompress the video prior to transfer. Apple will develop new software DV codecs to support DVCPRO50 and DVCPRO HD, and add support for the AG-DVX100 camcorder to Final Cut Pro.

**Perhaps the best way to summarize the conclusions reached is that both sides are talking to one another.**

### Go with the flow

Over the years European video equipment vendors have focused on the needs of the film industry, developing a range of tools that have become part of the new digital workflow in Hollywood, New York, London and other centers of film production around the world. Through a series of mergers and acquisitions, a comprehensive workflow solution for the film industry is now being developed by Thomson multimedia Broadcast Solutions. The film imaging product line includes the Spirit DataCine, Specter Virtual DataCine, VooDoo media recorder, and digital image processing

tools including the Scream and Shout, a new application for film restoration.

At NAB Thomson also entered the electronic cinematography arena with the introduction of the Viper FilmStream camera, based on HD sensor and camera technology acquired from Philips.

Viper extends creative control into the post-production process, providing many of the benefits of working with film negative. The film acquisition/production process is optimized to provide latitude in post production. Film offers excellent dynamic range, with up to eight F-stops of exposure latitude; this results in good detail in shadows and highlights and good linearity through the mid tonal range. And film does not subsample color detail like most video recording systems.

Cinematography involves is a two-step process: shooting, and then grading and processing the images to achieve the desired look. While shooting the cinematographer need only select any desired optical filters, set an appropriate light exposure (F-stop) and the shutter angle. The cinematographer concentrates on focus and framing while shooting; critical image adjustments are deferred to the post-production process.

Typically, the RGB outputs of a video camera are heavily processed. The processing steps, many of which are irreversible, include: gamma, knee (several parameters), matrix, gain, white/black balance, contours (many parameters) and black stretch.

The Viper FilmStream camera emulates film, in that the only critical decisions for the cinematographer are exposure and shutter angle. The uncompressed RGB outputs of the sensors are sampled using a 12-bit A/D process, then converted to 10-bit logarithmic values for data storage. The logarithmic quantization curve is the Cineon log curve, which is now in the standardization process in SMPTE. Using logarithmic values places more quantization steps in the black and shadow areas of the image, closely matching the way the human visual system perceives brightness (aka luminance).

The uncompressed RGB data is transferred to storage via dual HD-SDI links

# Product jackpot

### Folsom Research PresentationMASTER

Designed specifically for systems integrators; supports true seamless switching and superior scaling technology for professional A/V presentations; features eight universal A/V inputs that accept composite (NTSC/PAL), S-video, component, computer and HDTV video.

916-859-2505; www.folsom.com

### Bogen Photo Manfrotto 540ART Road Runner

Composed of carbon fiber tubes to support ENG cameras weighing up to 33 lbs; features a integrated automatic mid-level spreader mechanism for quick setup and a multisurface system for all-terrain stability; 100 mm bowl and 75 mm bolt-on adapter to accommodate all popular video heads.

201-818-9500; www.bogenphoto.com

# Product jackpot

**Leader Instruments LV 5700**
Rasterizer; XGA TFT color LCD tilt panel; total digital processing; 20 HD+SD-SDI 525/625; Ethernet; digital audio de-embedded displays surround; bargraphs; hex readout all data; AC/DC operation standard; optional auto-HD eye.
800-645-5104; www.leaderusa.com

**Panasonic AG-DVX100**
Palm-size mini-DV camcorder captures cinema-style, 24-frame progressive-scanned images; equipped with three newly-developed 1/3-inch 410,000-pixel progressive-scan CCDs.
800-528-8601; www.panasonic.com

using the 4:4:4 RGB 10-bit mapping that conforms to SMPTE proposed standard 372 M, now in the final phases of standardization. Viper can also output YUV 4:2:2 via a single 1.5 Gbits/s HD-SDI link, and it can be upgraded to a version with full support for HD video processing techniques.

Another feature of the Viper is support for multiple spatial resolutions, frame rates and aspect ratios (see Figure 1). The ability to support multiple spatial resolutions comes by virtue of a technique called Dynamic Pixel management (DPM). (See Figure 2.)

For the 1920x1080 formats, vertical samples are combined in varying proportions to support both 16:9 and 2.37:1 aspect ratios. Both horizontal and vertical samples are combined to produce the 1280x720 raster. Because of the reduced raster size 720 lines at 24/25/30/60 fps are supported, while for 1080 lines 24/25/30 fps are supported along with 60 fps.

**The gala premiere of 24p Digital Cinema has been well received.**

How do you deal with the ~3 Gbits/s FilmStream output? In a facility with a Specter or other high-bit-rate data recorder, the camera output can be streamed directly to the storage that will be used during post production. To deal with location shooting, Thomson has partnered with Director's Friend, a German company specializing in tools to support digital cinematography.

The df-cineFS is a field image processing, editing and display console optimized to capture and process the FilmStream outputs. Another version, the df-cineHD works with 24p cameras that provide a 1.5 Gbits/s HD-SDI output. Integrated color correction tools make it possible to view a high-resolution preview of the acquired image data.

HDreel is a portable hard disk storage unit suitable for DC operation. The 576 GByte total capacity supports

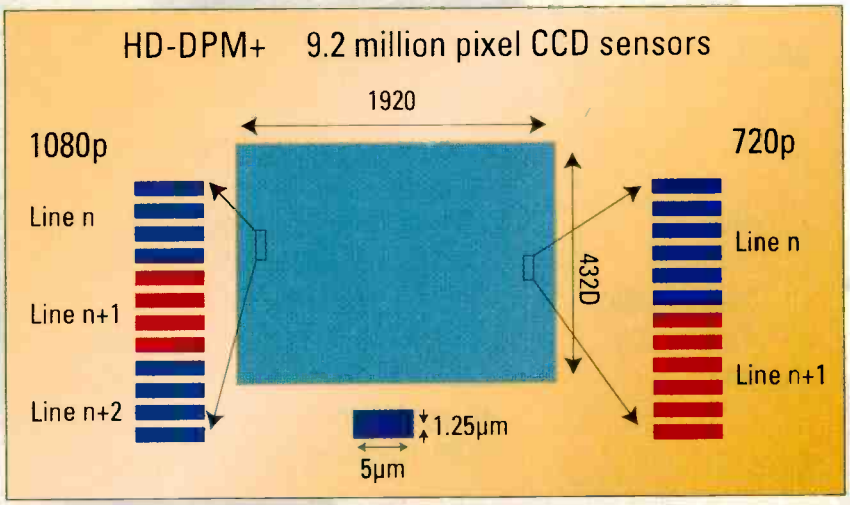


**Figure 1. The Viper Filmstream camera from Thomson offers support for multiple spatial resolutions, frame rates and aspect ratios.**

about 96 minutes recording time at 24p (YUV/8-bit) and 48 minutes at 24p (RGB/10-bit).

## Eager anticipation

Thomson will be working with a variety of industry experts, both cinematographers and those who will work with the FilmStream images, to explore and refine the capabilities enabled with this approach to digital cinematography. Gary Demos of DemoGraFx, has spent much of the past decade developing image processing and compression technology for digital cinema and Digital TV. Demos has long advocated the use of logarithmic coding for high resolution images.

"The use of a logarithmic representation in an electronic camera is a real step forward. In our experiments, LOG coding provides a better representation for compression that the traditional gamma corrected video representation."

To be fair, Thomson is not alone in pushing for an extended gamut when working with digital cinema images. For *Star Wars: Episode II*, Industrial Light and Magic utilized direct RGB links from the Sony CineAlta HDCam for capturing all of the model imagery use in this effects intensive motion picture. Virtually every frame in the picture was processed in some way.

Equipment from Snell and Wilcox played key role in the production of *Attack of the Clones*, which used a 2.37:1 "scope" extraction (1920x818) from the 16:9 source. 4:4:4 10-bit disk stores were employed to capture RGB data from the cameras. The movie was graded on using the Snell &Wilcox Picasso tool suite, which has a Pandora color corrector at its core. And in the private showings the final scaling to the Texas Instruments DLP-cinema projector head was through a Snell & Wilcox HD6200 interformat converter.

Anticipating the increased interest digital film and HD video production, vendors of digital post-production systems announced upgrades and new products at NAB to meet the growing demand for 24p production tools.

Avid Technology announced new versions of the Avid|DS family, featuring a new Media Composer-style interface, enhanced conform capabilities and support for key HD formats and frame rates, including 24p for mastering. The Avid|DS HD v6.0 system integrates paint, animation, character generation, special effects, compositing and HD finishing capabilities, with Avid's familiar editorial environment. In addition, more than 80 percent of the titles, effects, and graphics commonly created in an offline session can be automatically transferred to the Avid|DS HD v6.0 system for high-resolution finishing.

At NAB, Discreet Logic announced mixed resolution support for flint, flame and inferno. These products will now support all resolutions from film and video to DTV/HDTV – all with universal 24p mastering capabilities. Mixed resolution support gives artists the ability to create and manage intricate effects by freely combining, mixing and matching images of different size, aspect ratio and color depth in one unified environment.

Pinnacle Systems continues to offer one of the most cost effective solutions for 24p film and HD production, CinéWave HD. The CinéWave hardware and bundled software work seamlessly together to address the full range of post-production requirements

# Product jackpot

### Modulation Sciences msi 189

Provides simultaneous all-mode reception for SAP, Stereo, and monaural audio via balanced, line level KLR connectors; features a stable synthesized tuner; uses dual antennas inputs; operating channel is selected by jumpers inside the receiver.

800-826-2603; www.modsci.com

### Miller Fluid Heads Sprinter

Features include dual, side-action Sprint-Loks, fully variable mid-level spreader, rapid set-up transport clips, sprint-grip carry handle and reinforced 100 mm bowl.

973-857-8300; www.miller.com

### AutoPatch Cat-5

Combines a Category-5 transmitter/receiver set with a high-performance matrix switcher providing all the benefits of twisted-pair signal transmission with full crosspoint control signal routing; available in multiple A-V connector configurations and features special Level Optimization Circuitry providing high-quality signal transmission.

509-235-2636; www.autopatch.com

### Fiber Options B745AV transmission system

Supports four composite video and eight channels of line-level audio handling standard audio and SAP audio channels; all-digital processing platform features 10-bit video and 24-bit four-channel audio processing.

631-567-8320; www.fiberoptions.com

### Winsted Model T2802

Moves laterally on ADA-recognized anti-tip racks with a patent anti-tip bracket; five-cabinet system holds up to 2940 ¾-inch Umatic or 3500 large Betacam tapes in their cases; the individual shelves are adjustable on 1-1/2-inch increments.

952-944-9050; www.winsted.com

### Intelsat global satellite services

Broadcast services support satellite news gathering; special events, such as news, sports and entertainment; studio-to-studio; television broadcasting; and direct-to-home.

+44 208 899 6035; www.intelsat.com

# Product jackpot

### Broadcast Microwave Services Carry-Coder
Module provides wireless digital transmission of audio and video signals; can be installed in a backpack or plugged directly into the back of most professional video cameras; also available in a package for helicopter applications.
800-669-9667; www.bms-inc.com

### Spectrasite Broadcast Group community broadcast facility
Allows multiple broadcasters to use a common transmission site in order to shorten project timelines and preserve capital; Spectrasite obtains the site, gets zoning approval, and builds and manages the facility.
888-468-0112; www.spectrasite.com

### ARRIFLEX 435 Advanced
Camera offers comprehensive accessories and new interfaces for applications including motion control to in-camera effects with speed ramps; features an electronically adjustable mirror shutter; new minimum frame rate has been reduced to 0.1 fps.
845-353-1400; www.arri.com

### Allen Osborne Associates Hilomast FM series
New floodlight mast; coiled cable enters the base of the mast and exits into a junction box on top of the mast for lighting connection; three standard models with four cores of 2.5 mm/sq., rain shield, rotation handle and pressure relief valve.
805-495-8420; www.aoa-gps.com

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| - | 1920 x 1080i | at 50, 59.94.60 Hz |
| - | 1280 x 720p | at 50, 59.94, 60 tps |
| | and | 23.96, 24, 25, 29.97 and 30 tps, with internal frame repeats available as 59.95, 60, 50, 59.94 and 60 Hz repect. |

- Dual aspect ratios: 16.9 or widescreen (2.37:1) in 1080p
- All of this without format converters!

**Figure 2. The Viper uses a technique called Dynamic Pixel management (DPM) to support multiple spatial resolutions.**

via the Apple Power Mac G4. CinéWave HD supports uncompressed SD and HD formats; it includes a full version of Apple's Final Cut Pro and Pinnacle's Commotion Pro and Knoll Light Factory. At NAB Pinnacle announced support for Apple's OS-X operating system; the upgrade will be free for all CinéWave owners when it ships in July.

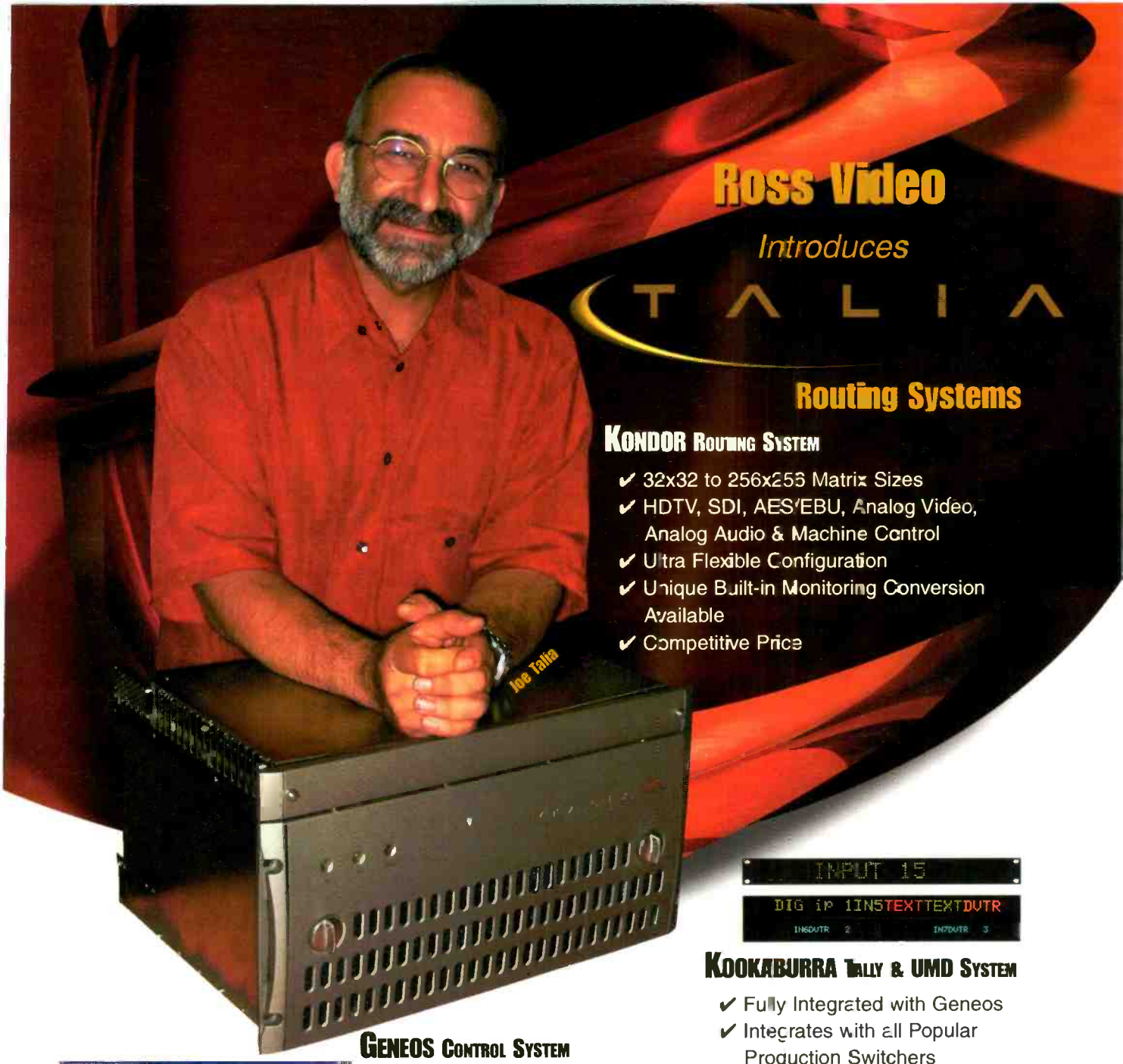
Just before NAB, Quantel made a somewhat belated announcement of peaceful coexistence with the world of "open systems" - software-based image and video processing tools that run on popular computing platforms. The company, which once dominated the market for video paint systems and DVEs, was the last holdout from the era of dedicated video processing gear. Following ownership changes and the evolution of the marketplace, the company announced a bold new initiative just before NAB - Generation Q.

Generation Q products will offer scalable solutions from Windows-based desktops to lightning-fast high-end Quantel hardware. Each product like will offer "resolution co-existence," spanning the full range of video resolutions from the Web to film and HD. Resolution coexistence means storing all media in its original format, editing this native media on the timeline, then outputting in a choice of spatial/temporal resolutions and aspect ratios.

The Quantel iQ post-production system can support real-time 24p production with rasters of up to 2048x1556. A fully configured system offers 7 TBytes of storage, enough to accommodate 16 hours of 1920x1080 at 24p digital images. At NAB Quantel also announce the availability of eQ, a cost reduced version of iQ for facilities that work primarily with SD, but have the occasional need to offer HD production capabilities.

The period of anticipation appears to be coming to an end. The gala premiere of 24p Digital Cinema has been well received. The marketplace is responding with a wide range of tools to fit virtually every budget. Now the process of collaboration to refine the tools begins. BE

*Craig Birkmaier is a technology consultant at Pcube Labs, and hosts and moderates the OpenDTV Forum.*

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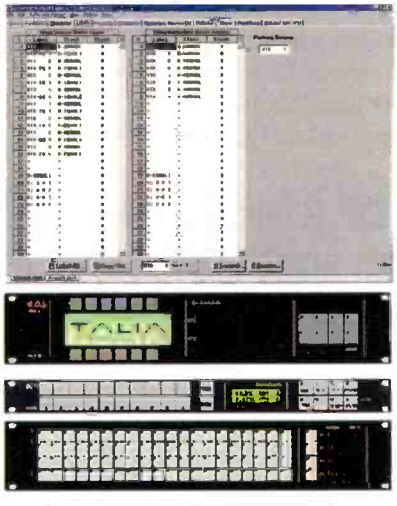

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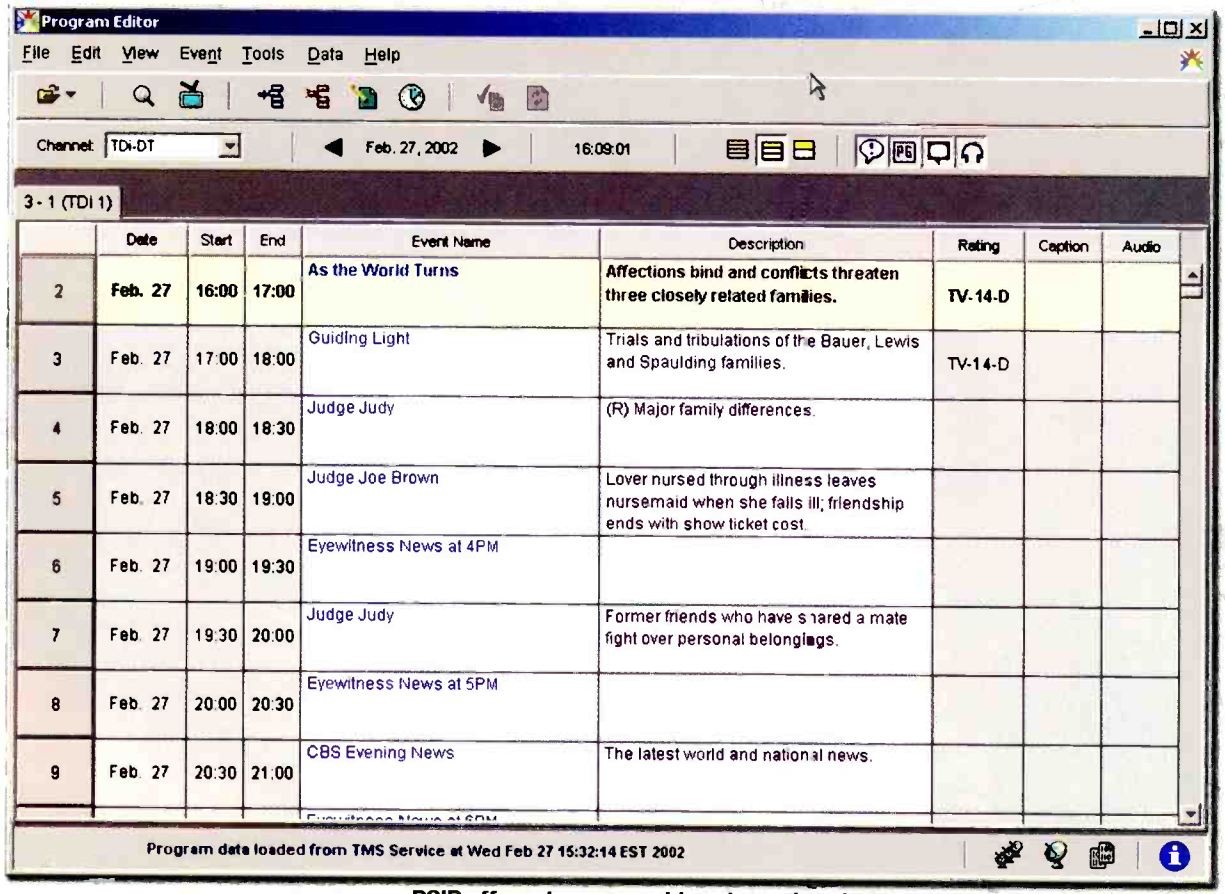
# PSIP and EPG




| | Date | Start | End | Event Name | Description | Rating | Caption | Audio |
|---|---|---|---|---|---|---|---|---|
| 2 | Feb. 27 | 16:00 | 17:00 | As the World Turns | Affections bind and conflicts threaten three closely related families. | TV-14-D | | |
| 3 | Feb. 27 | 17:00 | 18:00 | Guiding Light | Trials and tribulations of the Bauer, Lewis and Spaulding families. | TV-14-D | | |
| 4 | Feb. 27 | 18:00 | 18:30 | Judge Judy | (R) Major family differences. | | | |
| 5 | Feb. 27 | 18:30 | 19:00 | Judge Joe Brown | Lover nursed through illness leaves nursemaid when she falls ill; friendship ends with show ticket cost. | | | |
| 6 | Feb. 27 | 19:00 | 19:30 | Eyewitness News at 4PM | | | | |
| 7 | Feb. 27 | 19:30 | 20:00 | Judge Judy | Former friends who have shared a mate fight over personal belongings. | | | |
| 8 | Feb. 27 | 20:00 | 20:30 | Eyewitness News at 5PM | | | | |
| 9 | Feb. 27 | 20:30 | 21:00 | CBS Evening News | The latest world and national news. | | | |

**PSIP offers viewers an aid to channel navigation in the form of the electronic program guide. The guide shows which DTV program streams are enhanced with additional data. Image courtesy Triveni Digital.**

By Jim Boston

This years NAB demonstrated that our march towards DTV continues. Some might argue that "march" is too strong a verb, but most would certainly agree that "crawl" is not strong enough. Now that the majority of stations have a DTV presence, many DTV facilities are beginning to evolve beyond the minimally required ATSC stream. One area that is receiving increased attention is the collection of "tables" carried in the ATSC stream known as Program and System Information Protocol, or PSIP. (See Figure 1.)

PSIP is intended to provide three important services for the broadcaster and viewer. The first is to preserve a station's branding as they move from NTSC to ATSC. There is a table that is part of the PSIP data called the Virtual Channel Table (VCT). This table's purpose is to list the DTV's virtual channels and link them to the DTV channel's analog equivalent. Thus, the VCT contains a major channel number, which is the current NTSC channel, and one or more minor channel numbers, which list the virtual DTV channels implemented via ATSC in the actual DTV channel. The linkage that VCT provides is intended to preserve branding across a station's analog and digital spectrum. This helps to maintain the current channel branding because DTV receivers will electronically associate the two channels, making it easy for viewers to tune to the DTV station even if they do not know the channel number. This allows the viewer, via the set-top box, to navigate between a station's current analog and its various DTV channels or services. PSIP identifies the associated major and minor channel numbers and indicates to the receiver whether multiple program channels are being broadcast and, if so, how to find them. In addition, the protocol identifies whether the programs are closed captioned and if data is associated with the program, and

**The basic goal of PSIP is that it be simple enough that every receiver can implement at least a rudimentary use of the data available via PSIP.**

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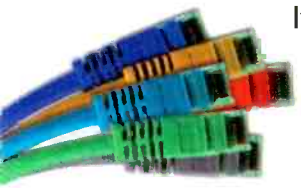

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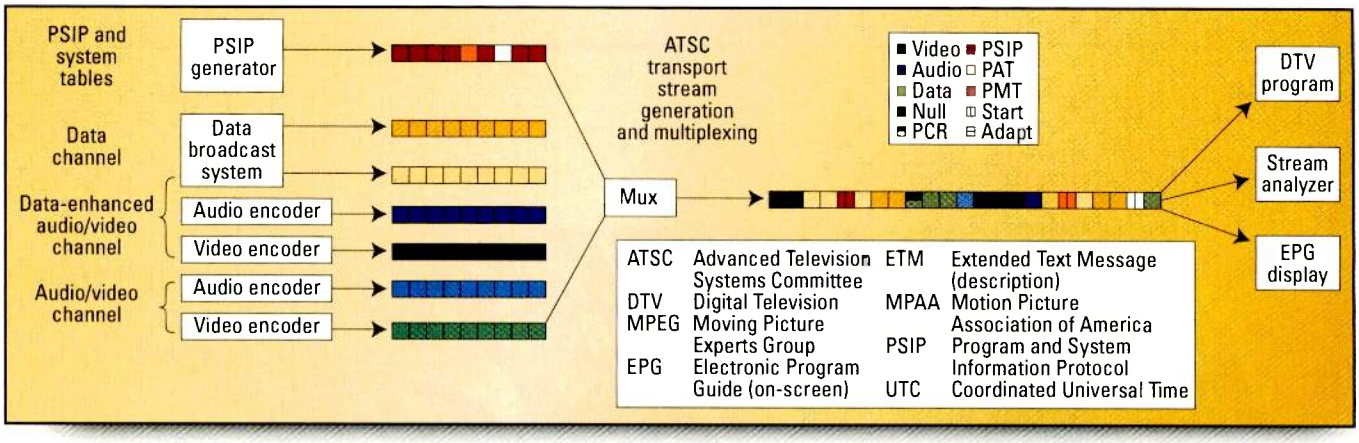



**Figure 1. The next step for stations that have a DTV presence may be the transmission of enhanced services using the collection of PSIP tables carried in the ATSC stream.**

conveys V-chip information.

VCT actually exists in two versions: one for terrestrial and a second one for cable applications. The existence of a cable version probably causes some concern among many broadcasters as it implies cable will be tearing apart terrestrial multichannel ATSC streams and reassembling them based on the cable operator's agenda.

A second aspect that PSIP brings to the DTV table is an aid to channel navigation: the electronic program guide (EPG). This is accomplished via at least four Event Information Tables (EITs), which list TV programs (events) for the virtual channels described in the VCT. An STB, so designed, can use EIT information for actual and virtual channel tuning. The VCT and EITs can work in concert to provide this service via another PSIP table, the Master Guide Table (MGT). The MGT defines sizes, PIDs and version numbers for all of the relevant tables that comprise PSIP.

***ATSC PSIP tables***

| | |
|---|---|
| ***MGT*** | Master Guide Table - tells what PSIP tables are present; gives their PIDs |
| ***STT*** | System Time Table - gives current UTC time |
| ***RRT*** | Rating Region Table - describes content advisory rating system(s) being used |
| ***TVCT*** | Terrestrial Virtual Channel Table - identifies and describes virtual channels |
| ***EIT*** | Event Information Table - identifies "events" (TV programs); gives titles, start times, durations |
| ***ETT*** | Extended Text Table - provides extended textural description of channels and events |
| ***DCCT*** | Directed Channel Change Table - directs receiver to change channels, based on viewer location, preferences, demographics, etc. |
| ***DCCSCT*** | Directed Channel Change Selection Code Table - gives event categories for preference selection. |

**Table 1. The PSIP stream carries several tables, each of which fulfills a different function. The set, taken together, provides the information STBs need to receive enhanced services in broadcasters' digital signals.**

Since we're mentioning PSIP tables, let's discuss the other five tables that comprise PSIP as well (see Table 1):

System Time Table (STT) carries time information needed for any application requiring synchronization.

Rating Region Table (RRT) defines rating tables valid for different regions or countries.

Extended Text Table (ETTs) carries longer text messages for describing events and virtual channels. Each EIT has a flag that indicates whether there is an associated ETT, as does the VCT.

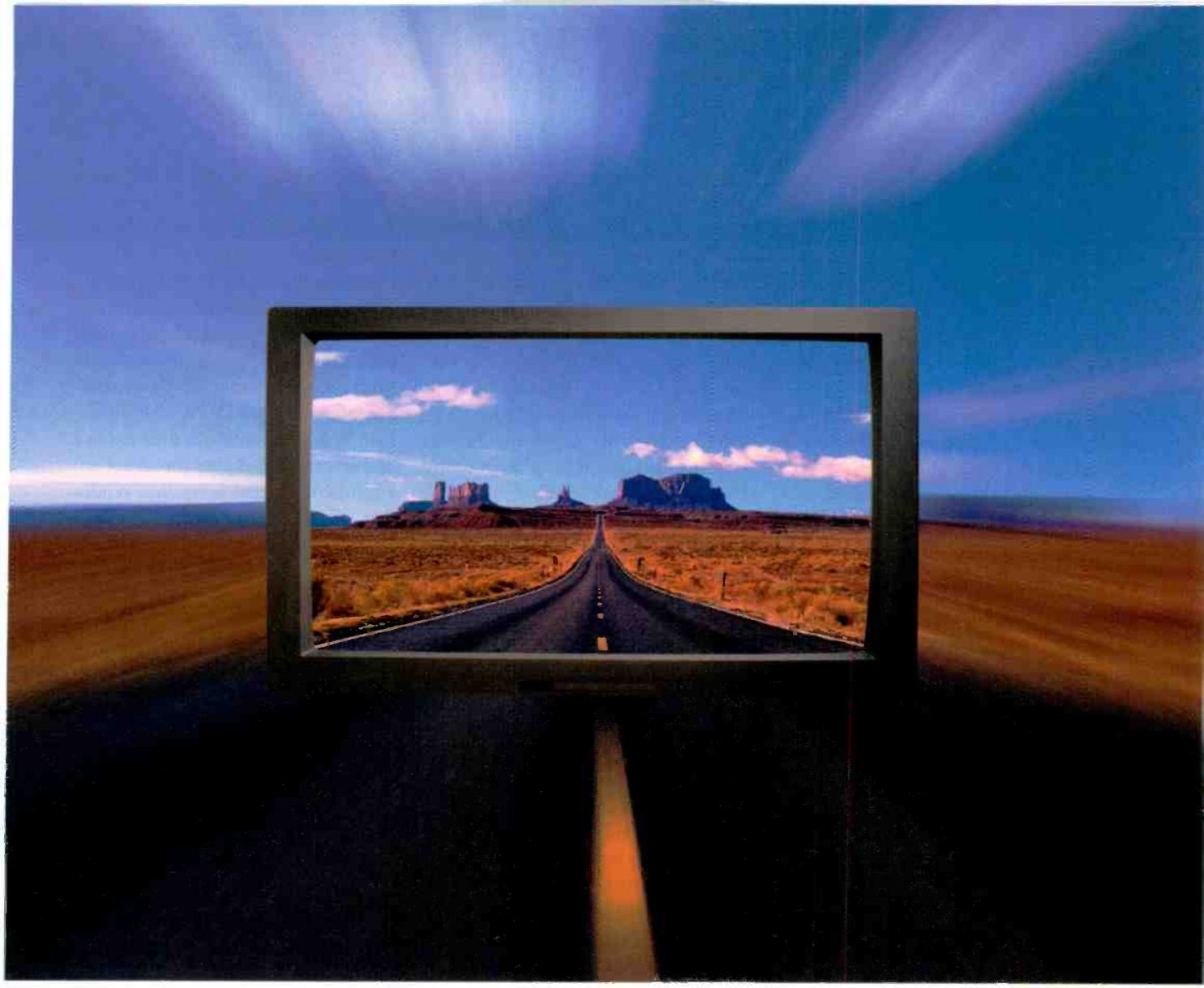
Data Event Table (DET) announces the data portion of a video/audio/data event.

Directed Channel Change Table (DCCT) instructs the receiver to change channels based on viewer preferences, demographics or geographical location. This table from the broadcaster works in conjunction with a Directed Channel Change Selection Code Table in the STB. This table defines the classification scheme used by viewers to express preferences during receiver setup.

DTV also allows the announcement of data-enhanced services via the PSIP tables. Thus, via the program guide, the viewer would see which DTV program streams were enhanced with additional data, such as stats for sports programming or Web page content to supplement the audio and video streams. Additionally, PSIP can announce the existence of stand-alone data. It can be used to indicate such things as times when computer software or electronic versions of the local newspaper are available for downloading.

The basic goal of PSIP is that it be simple enough that every receiver can implement at least a rudimentary use of the data available via PSIP. The ATSC also wanted PSIP to be extensible for higher end products, and to present a small change in tuning concepts for the viewer. Some broadcasters have already found that incorrect implementation of PSIP can render some or all of their NTSC and DTV services unavailable to DTV receivers. Mis-programming of PSIP data has even allowed DTV stations to inadvertently "hijack" virtual channels of other DTV stations in early DTV receivers. Along those lines an interesting ability of PSIP is to tie the virtual channels of separate DTV physical channels together. In the DTV realm duopolies will be able to combine the two stations seamlessly under a single brand.

PSIP, although not explicitly required by the FCC, is an ATSC requirement. Most DTVs to date have met this requirement with static information. At this most simplistic operational level, VCT and MGT tables are manually entered into the ATSC mux and forgotten. This allows rudimentary branding by telling the STB the NTSC and DTV channel association. But if STBs are ever to display worthwhile electronic program guides, all the aforementioned tables



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will have to be filled by the broadcaster, and at an ever-changing rate. Dynamic PSIP requires a separate subsystem, either a separate stand-alone box or modules added to a vendor's mux that accept a constantly updated data stream — from companies such as Tribune Media Services, or organizations such as the PBS National Database, and from traffic and even automation systems — to continually update the PSIP tables.

Like most things in life, there is a lot of differentiation between static and dynamic PSIP. Some vendors offer various stages of dynamic PSIP. It is possible to implement systems that only dynamically update the EIT tables. The basic recommended program schedule presented to the viewer is 12 hours. That requires four EITs. There are offerings that allow you to begin with these four, and progressively add tables to allow your presented EPG to be extended out to cover multiple days. This a la carte approach allows ETTs to be added when desired, to elaborate on the basic program guide presented via the EITs. Then only DCCT need be added, enabling directed channel changes to provide full PSIP capability.

This year's NAB offered a selection of dynamic PSIP solutions, including Digital Vision's PSIP generator, which allows the broadcaster to define its analog and digital services, and then import program-listing data as a single operation. Additional features include compression of textual descriptions, support of caption and multiple audio services, and maturity rating advisory codes. The new Directed Channel Change (DCC) specification is implemented to support switching between HD and multicast modes. Manual editing and live updating of event information allow the operator to handle last-minute changes in schedule. The generator formats a full complement of MPEG and PSIP tables with descriptors and outputs these in real time as a transport stream via a DVB ASI port, suitable for connection to most third-party multiplexers.

Harris also offers a dynamic PSIP solution, the PSIPplus, which allows automatic importation of data from listing services, traffic/automation systems and other databases. It is compatible with Flexicoder and Unicoder encoding systems. The system incorporates proprietary versions of Triveni's technology. Both companies allow multiple levels of PSIP generation. Harris and Triveni refer to the first step up from Static PSIP as Light PSIP. This approach uses four dynamic EITs, as opposed to static, non-changing EITs for Static PSIP. The next level up is Basic PSIP, which provides 24 EITs and 24 ETTs to provide full program information for 72 hours. Harris provides two products at the Basic PSIP level. The PSIPplus Basic product allows input of program information through a manual user interface. The PSIPplus TMS product allows automatic import of programming information from a listing service. Full implementation of PSIP is available using the PSIPplus Pro, which provides all tables needed for receiver tuning, full channel and program descriptions, and an EPG with programming data populated for up to a full 16 days.

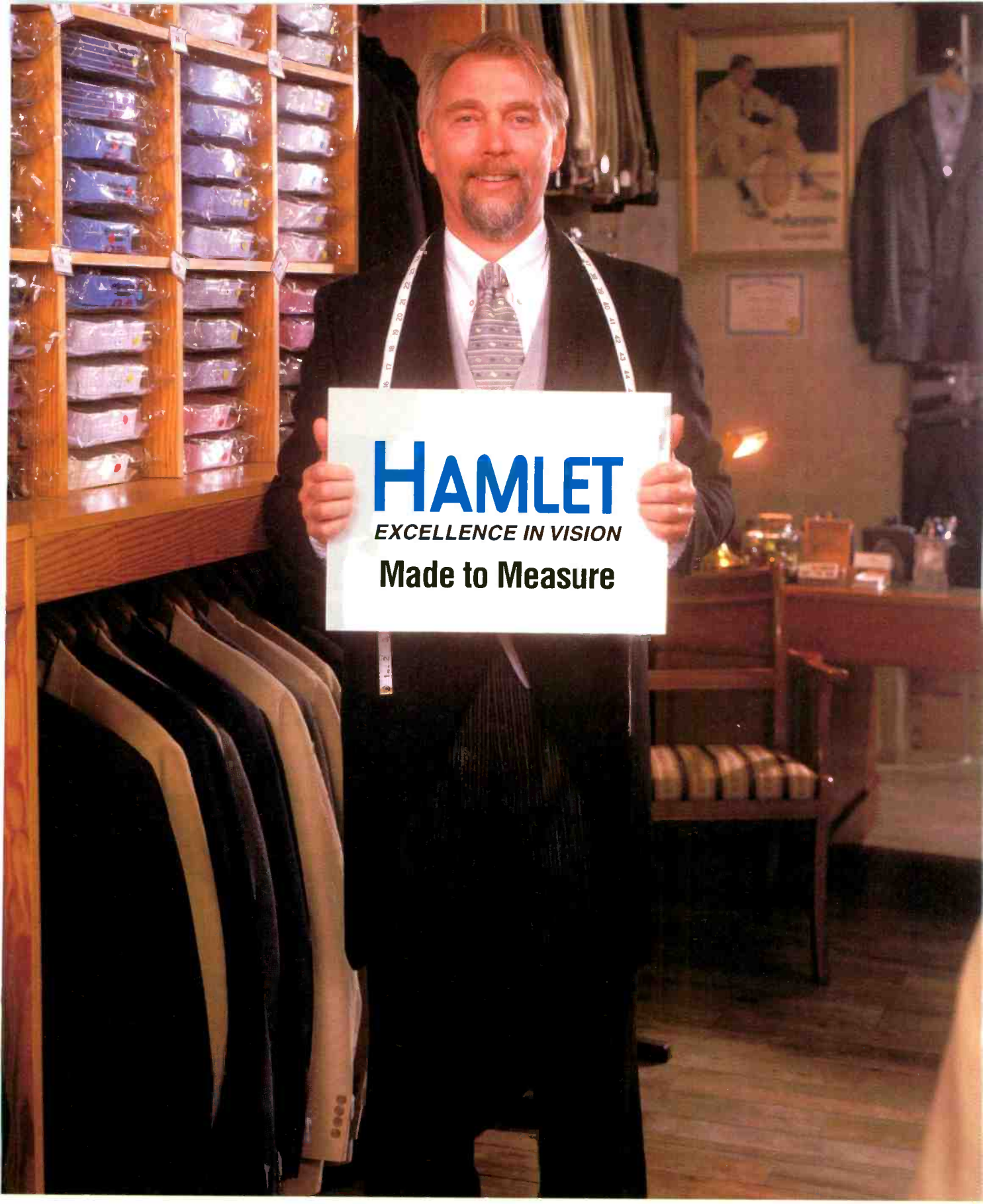
Thales offers the PEARL Editor, which provides a GUI to edit parameters in the PSIP configuration and display playlists. It stores and retrieves configuration and accepts incremental changes via an XML file interface. The PEARL Scheduler deals with the dynamic aspect of PSIP: It generates all the table updates, whether those updates occur naturally (e.g. EIT shift every three hours) or result from a configuration change. The PEARL Output Module stores, packetizes and carrousels all the PSIP tables into a compliant ATSC transport stream. Thales also supports Directed Channel Change. A single PEARL system can generate and cross-carry the information for several streams simultaneously.

Triveni offered its PSIP bit stream generators, GuideBuilder and GuideBuilder Pro, which automatically convert program information from program listing services or traffic systems to the ATSC A/65 PSIP format. This information is then fed to a multiplexer in a digital broadcast environment. Triveni is another vendor that offers a series of migration steps from static to dynamic PSIP. They offer Lite, Basic (Editing and Listing) and Pro versions of GuideBuilder. Their Basic PSIP offerings are the GuideBuilder Editing version that allows input of programming information through a manual user interface, and the GuideBuilder Listing version that allows automatic import of programming information from a listing service. From this level a user can move up to full PSIP with GuideBuilder Pro.

PSIP vendors like to point out that the broadcaster who implements full PSIP now will face a few calls from viewers as the new service shakes out. But broadcasters that wait to implement full PSIP until a much wider rollout of DTV receivers could face a magnitude of calls from viewers complaining about the lack of EPG content or startup errors that occur with most new services. A logical step for STBs down the road will be integration in the receiver of all the receivable PSIPs in an area into a single EPG. At that point the DTV station with full PSIP implementation will fare better than the one using only the basic tables. BE

**The basic recommended program schedule presented to the viewer is 12 hours.**

*Jim Boston is a West Coast consultant.*

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# 3DV Systems' Zcam

BY DR. GIORA YAHAV AND DR. GAVRIEL IDDAN

Sometimes a new piece of equipment can change the way business is done, literally, overnight. Until now, chroma keying has always been required for online manipulation of video images. Not any more. Recently, 3DV Systems introduced Zcam, a new approach to keying and segmentation that's based on real-time video-rate range-mapping of the whole field of view (FOV). The RGBD studio system allows objects to be attached to range layers and segmented in an image, eliminating the need for a special chroma studio and enabling real-time creation of a variety of effects.

True metric 3-D imaging – attaching a numerical value to the range of every pixel of an image – requires imaging and computation far more complex than simple 3-D stereo imaging. The methods used for this type of imaging are generally based on either triangulation or time of flight (TOF). The system is based on TOF. By integrating its 3-D imaging concept with a conventional studio camera, the company created an RGBD studio system that can separate the background and add/subtract image segments in real time. (The "D" in RGBD stands for distance and represents the fourth gray-level image.)

## Camera concept

TOF was chosen because it provides direct numerical range information, which is essential for real-time video-rate operation. In addition, TOF can achieve the required speed because it simultaneously addresses the whole field of view.

To envision this concept, imagine a system that includes a pulsed light source and a gated CCD camera. The light source puts out a train of short light pulses, typically 10 nsec. Each pulse becomes a "light wall" that moves forward and illuminates the field of view so that the field of illumination (FOI) is congruent with the FOV.

When it contacts objects in the FOI, the light wall captures imprints of the objects and is then reflected back towards the camera. As it enters the camera, a fast shutter blocks the trailing half of the light wall. The energy detected by each camera pixel corresponds inversely to the distance that generates a gated image (GI), so the light reflected from a near object is captured completely while the reflection from a distant object appears too late to be captured. Instead, the CCD camera captures a gray-level image where dark objects are distant while bright objects are close. To complete the process, a normalization procedure is used to compensate for non-uniformity in the illumination and variations in the coefficient of reflectivity. During this procedure, an additional ungated image (UGI) is captured. The normalized image is generated by the pixel-by-pixel ratio: $R(i,j) = GI(i,j) / UGI(i,j)$.

Because timing of the illumination and the gating process can be operator-controlled, the operator can locate the range window to correspond to both the talent location and the distance of talent from the camera.

But a TV studio camera must also

**By integrating its 3-D imaging concept with a conventional studio camera, 3DV Systems created Zcam, an RGBD studio system that can separate the background and add/subtract image segments in real time.**

**Until now, chroma keying has always been required for online manipulation of video images.**

capture the highest quality color video (RGB) in addition to range image. The RGBD camera incorporates both color and range simultaneously. (As mentioned earlier, the "D" in RGBD represents a fourth gray-level image corresponding to range, as compared to traditional studio cameras that provide RGB only.) The four images overlap, allowing the device to achieve high quality range keying without modifying existing studio facilities. In fact, any existing standard studio-quality RGB camera can be used with Zcam after a simple adjustment procedure to incorporate it.

During the design process, the company solved several technological challenges. The camera required several components that were not available anywhere. The company designed, patented and fabricated its own solid-state large-aperture image gate, for use instead of a traditional gated intensifier tube. The company also integrated the color and range channels into the same taking lens. This added unique precision zooming capabilities.

The camera currently has a maximum range of 10m and a minimum range of less than 1m. Resolution depends on the range window width. If the window is 1m, a range resolution better than ½cm is achieved. The FOV can be changed by adjusting the lens zoom from five to 40 degrees. Video clips demonstrating the real-time capabilities of the system can be viewed at 3DV's Web site at www.3dvsystems.com.

**TOF was chosen because it provides direct numerical range information, which is essential for real-time video-rate operation.**

The studio system simultaneously acquires color and range images. This information is used for a variety of online special 3-D effects such as background replacement, adding and deleting segments by range, and camera and image rotation based on a single image. Currently, the Zcam is available only as a 3D studio camera, but in the future a smaller low-cost version will also be available. **BE**

*Dr. Giora Yahav is senior vice president of research and development, and Dr. Gavriel Iddan is senior vice president and chief scientist for 3DV Systems.*

# Video Design
## Software's Liberty Reality Studio

BY D.R. WORTHINGTON

The broadcast industry has undergone significant changes in terms of workflow, and the products that are used everyday — both hardware and software — have also had to change in order to keep pace and continue meeting end-user requirements. One example of this trend is the Liberty Reality Studio from Video Design Software (VDS).

The Liberty Reality Studio, a complete graphics creation system that integrates Liberty's paint, animation and compositing software with Leitch's dpsReality DDR, has undergone several changes in the year since VDS acquired the Liberty product line from Chyron, including increased compatibility with other industry graphics applications.

Operators now have the ability to capture video material, create and add graphics, composites or animations, and then output directly to other record and playback devices, all on one resolution-independent system.

**Essentially, there are two ways to establish a broadcast graphics design department.**

The graphics system also features direct native file support and control of most industry-standard graphics and video display/playback systems; and built-in real-time, uncompressed, analog or digital video I/O with key channel, SD and HD options.

The system can be used for applications including network and show look development, news and sports graphics, animation and promotional spots, as well as to composite 3-D renderings and edit work that was produced on other systems.

Essentially, there are two ways to establish a broadcast graphics design department. It can be a turnkey operation where everything is handled within one application, from video ingest and adding graphics to packaging and output. A platform like Liberty Reality Studio could be used in this case. Users can create graphic elements, or can import material from other systems, since Liberty communicates natively with most common industry products.

Alternatively, some graphics departments make the decision to work with multiple software products on consumer quality hardware using remote I/O devices. The problem with this is that some applications, like Photoshop, are general in purpose and not specifically designed for the broadcast industry. The operator ends up spending much of their time rescaling images to meet broadcast aspect ratio criteria, importing and exporting material from one application to another, and then having to output remotely. All these little steps add up to big production time costs. In addition, one will almost certainly encounter the issue of having to import


**The Liberty Reality Studio is a graphics creation system that integrates Liberty's paint, animation and compositing software with Leitch's dpsReality DDR. Operators have the ability to capture video material, create and add graphics, composites or animations, and then output directly to other record and playback devices.**

material directly from Chyron, Aprisa, Avid, Pinnacle or Quantel systems, as general-purpose graphics products typically do not support these industry-standard native file or database entry formats.

With Liberty, users can create graphics in these native formats at proper aspect and save directly to the device, complete with metadata where applicable. The Chyron operator (for example) can then instantly recall the file directly from their message directory. Safe title is safe title, colors are correct, aspect is accurate and key channel is happening.

The same is true when dealing with moving or sequential video. The system incorporates the dpsReality disk recorder, allowing it to provide approximately one hour of real-time uncompressed video I/O with key channel. It also has full control over the dpsReality within its interface including video I/O configuration, clip generation and full transport control. So, animations can be rendered directly within the system as DPS clip files as opposed to having to leave your animation or compositing application, open the dpsReality UI, create a new clip media, go back to your application, and then render sequential image files back to the disk recorder's virtual file system. As with many applications, the operator would then have to use the dpsReality interface for ingest and playback as well.

The graphics system comes in many different system configurations. If facilities were to piece together their own systems, adding applications individually to reproduce the functionality of Liberty, the costs could end up being prohibitive and the workflow process not as efficient.

The system allows the creation of layers of graphics, each of which can be a different type of graphic or element. All these elements can be composited and sent back out or directly to a device such as a Chyron or any number of still stores and clip players. To handle any changes that need to be made, the system has its own layer file structure, allowing users to go back at any time and swap a layer of text or graphics, much like they would in Photoshop.

Liberty reads and writes Photoshop layers, so if there's a facility that has a need to work with Photoshop or wants to move up to a more productive broadcast system, all its archives and other material saved in Photoshop formats is still viable and can be used within Liberty. The same holds true when operators working within the system need to send something to a department that's using Photoshop. They can simply save the work as a Photoshop layer file. The artist also has access to the hundreds of supported Photoshop and After Effects plug-ins within the UI.

There is also a 64-bit version of the graphics system, which is useful for film work. Sixty-four-bit Cineon files are not converted to linear or 32-bit format when they're read into the system, although the display is converted so the image looks good to the artist. The actual work is carried out in log, resulting in a high quality file with no conversion artifacts.

This feature makes the system useful in the feature film community as a tool for efficient rig and dust removal, as well as color correction and other image processing effects. With its built-in dpsReality software and its support for VDS' CPHD-DDR, as well as the dpsRealityHD, special effects artists can rotoscope through their work and save material as large Cineon files, but at the same time they can also be previewing their work in progress, in real time and high-definition resolution. Previewing in film work has always been a problem because if the content is not being viewed in a large enough format, then it's difficult to see if all the little bits, pieces and other artifacts have been caught.

Finally, looking down the road, in addition to continually developing new features and third-party product support for Liberty, VDS is currently re-architecting the product from the ground up. The new product is called Twister. Twister runs as a plug-in or stand-alone Windows application, currently featuring about 95 percent of Liberty's paint functionality. Twister was designed to bring content creation tools to products like Chyron's Lyric running on Duet. **BE**

*D.R. Worthington is director of marketing and product development, graphics products, for Video Design Software.*

# ParkerVision's
## live production automation system

BY KURT STONEBURNER

Throughout the world, broadcast television is constantly evolving. The current realities of broadcasting are forcing stations to cut expenses. CBS affiliate KBAK-TV in Bakersfield, CA, is turning to new technology to assist this process. The station took its first big step in early 2001 with the installation of a ParkerVision PVTV Digital Studio News 24 system, a Windows NT-based production system that integrates video, audio, machine, camera and teleprompter control functions. This allows one to two people to operate all the station's live-production functions.

### Installation at KBAK

KBAK's system includes three Digital CameraMan 3CCD robotic pan/tilt cameras and a Digital SHOT Director multi-camera controller. The station uses the system for 18 hours of live news per week in addition to news cut-ins. As a result, the system has cut production costs and added a layer of consistency to the station's program. The ability of one director to lay out the entire newscast prior to going on-air makes for cleaner shows. In addition, it is not uncommon for the shows to be error-free. The system will pay for itself in about two and a half years.

**Kurt Stoneburner, KBAK-TV's broadcast director, operates a newscast while seated at the station's PVTV Studio News automated system for live production. The SHOT Director multi-camera controller is positioned in front of the panel.**

### The live auction

Recently, the station decided to add a twist to its usage of the news system – it employed the system in a live auction to benefit the renovation of a local movie theater. The event would feature local businesses donating items that would be auctioned off live on-air.

Because this was the first time the station used the system for a non-news shoot, the station had to break out of its news format. It was necessary to set up a new show macro involving different camera shots, effects, hot keys and other elements. The station created a specialized show package through a different set of Transition Macro Elements, or TMEs, which allow it to preprogram and graphically represent the individual elements for each show. In a sense, the station created an entire one-shot newscast for the auction, with a large portion of preparation time spent importing graphics and perfecting the desired look for the show. Final prep work on the day of the show involved perfecting the timing.

> The ability of one director to lay out the entire newscast prior to going on-air makes for cleaner shows.

Like any first, using the system in this format was a valuable learning experience. Station personnel expected a few obstacles during the course of the program. And while most of the show ran smoothly, the highly structured setup for the auction was a mistake. After launching the show, the director and producer realized that they needed to be more flexible with the equipment. The director couldn't simply step down the timeline as he would for a regular live newscast.

### Future plans

KBAK has secured the rights to the live-auction broadcast for 2002, and it plans on using PVTV Studio News to produce the show again. Instead of laying out the entire show this year, the director plans on arranging the elements so he can easily drop in the individual auction sequences as the producer calls for them. The result will be a fluid show with less structure. KBAK looks forward to improving what was a very successful experiment. BE

*Kurt Stoneburner is broadcast director at KBAK-TV, Bakersfield, CA.*

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# BTSI's renovation of KTYO-TV

BY PETER DOUGLAS

Many stations, large and small, offer resistance to change based on incorrect assumptions. In smaller stations this is often brought on by the idea that if the larger stations are doing something technology-wise, it must be too expensive for the small station to afford. This belief makes small stations less likely to seek to use digital solutions for automation and multichannel operations, but these stations may be able to afford these solutions after all.

This fall, Broadcast Technical Services and Burst Communications worked together to complete renovation of KTYO-TV in El Paso, TX. This is a Telemundo affiliate owned by Council Tree Communications. Prior to the rebuild, the station was a manual operation using ¾" tape machines. The salvage pile required to keep these machines going was a sight to behold. The most modern piece of equipment was a four-year-old server system used for net delay that took up almost a full rack. The requirements for the station's new system included file server commercial playback, two-channel operations, automation, modern digital tape format and an SDI-based system. Their budget was less than $350,000. Sound impossible? Not so!

**Even small stations can afford to rebuild and modernize their master control operations.**

**Prior to the re-build, KTYO was a manual operation using ¾" tape machines. The challenge was to completely empty the existing MC and rebuild, while keeping the station outage time to a minimum.**

The station is located on the fringe of the El Paso Airport in an industrial area. Like many stations, it had grown in a hodgepodge manner over the years. Master control consisted of a room 21 feet by 11 feet with a dropped ceiling and four 20A AC circuits.

The challenge was to completely empty the existing MC and rebuild, while keeping the station outage time to a minimum.

The decision was made to move the existing equipment and racks to a temporary location in the adjacent studio for the duration of the work. Two six-hour sign-off periods were requested and granted. Prior to these, the station engineer had arranged for power to be provided in the temporary location and, as soon as the old room was emptied, for 14 20A circuits and a new distribution panel to be installed.

At midnight on Nov. 28, the station signed off the air and the team began moving gear. The primary reason for the sign-off was the fact that the net delay, STL/fiber transmitter and transmitter remote needed to be moved. Complicating the sign-off was the weather. Cold weather had moved in and we were reluctant to leave the liquid-cooled transmitter off the air for too long, since it was not protected against freezing. The STL was quickly moved and a bar generator hooked up to it so that the

**The requirements for the station's new system included file server commercial playback, two-channel operations, automation, modern digital tape format and an SDI-based system. Using a router for primary operations allows stations to rebuild for less.**

transmitter could be put on air as soon as the control computer was moved. The transmitter was up in less than an hour. All went well with the move and the station went back on the air at 6 a.m. the following morning.

The next day the old room was cleaned out and racks and equipment were moved into the MC. The video cables had been pre-cut and assembled using CAD information, and the entire router/patch harness was re-wired. Audio was pre-cut and connectorized using multipair cable.

The system consisted of a router-based MC utilizing SDI and analog audio. The router is used for on-air switching as well as dubs and other station operations. Downstream SDI keyers were installed for mixing and fading keys and bugs.

A two-channel server was installed for commercial playback. Tape consisted of three DVCPRO machines and two BetaSP decks for legacy playback.

Two output channels were provided for to allow separate feeding of an additional channel covering a separate license area. Simultaneous operation is accomplished either manually or via the automation system. Full patching, as well as redundant power supplies, converters and console systems were installed to ensure reliability and operability.

The system is contained in 10 racks with a six-rack counter top and was installed and put on the air in just under two weeks. The final price was $318,000 for the full installation including training.

This is the third system of this type BTSI has designed and installed for Council Tree. The message here is that even small stations can afford to rebuild and modernize their master control operations.

Broadcast Technical Services has been designing routers for use in primary operations since 1994, when it put a multichannel SDI-based system on the air for Encore Media. Using routers for primary operations can be a reliable and cost-effective solution for smaller stations. BE

*Peter Douglas is the president of Broadcast Technical Services.*

# MPEG encoders
## and multiplexers

BY JOHN LUFF

Compressed video has enabled businesses that were only dreams at one time. Beginning with intensive research over 20 years ago, compression products have become vital to much of what we do today. It is valuable to keep the high level view in clear focus.

Compressed video is all about removing data from a television program without degrading the "perception" of quality. It is generally accepted now that 8 to 10 Mbits/s is adequate to provide a good quality picture. At 10 Mb, approximately 4.5 percent of the original picture data rate is transmitted. Part of this is achieved losslessly, by removing redundant information and run-length encoding the result. Part is achieved by deciding what parts can be thrown away without anyone noticing. This process of quantizing – that is to say, making judgments of the relative value of portions of the data and discarding portions viewers will not notice – is the lossy part of encoding and a prime key to the success of encoding. It is important to remember that MPEG is not an encoder specification, but rather a specification of the content of the bit stream that a decoder must know how to reconstruct. Any encoder may be used, so long as it produces a compliant bit stream, leaving manufacturers considerable leeway to differentiate their products.

**Compressed video is all about removing data from a television program without degrading the "perception" of quality.**

Encoding can be done very simply, like that done in software-only products that run on consumer desktop PCs, or with considerable sophistication. Some VTRs now use MPEG, though they use a variant that reduces the coding complexity and raises the bit rate of the bit stream for the sake of producing an encoding engine at moderate cost. Low-bit-rate, real-time encoders are considerably more complex and expensive, for they must compute results with great care to ensure the available bits are being applied where they are most useful.

Two-pass encoding can significantly raise the quality of the result. The picture is first encoded using a known set of criteria, and the result is then evaluated to judge the success of the first approximation. A second encoding pass after either human or machine review is done to optimize the decisions and move the available bits to the most challenging content within each frame or sequence. This can materially improve the picture quality, as seen on consumer DVDs, but with high cost per minute for encoding.

To further improve the picture, one manufacturer has developed a technique that improves the picture when repeated generations of encode/decode cannot be avoided. They do this by aligning the I frame in the output with that of the input, ensuring that less aggressive quantization is needed. This is done by looking at the statistics of each frame and looking for the signature of the repeating pattern of I, P and B frames which all encoders make.

It is important to remember that MPEG is a component video system, and impairments that come from composite signals can force the encoder to work considerably harder on

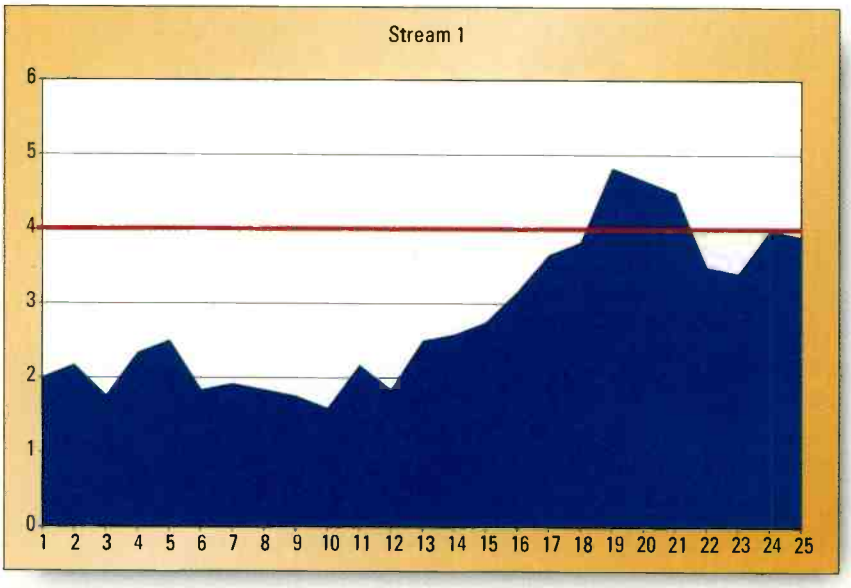


**Figure 1. Example of one stream of video or data**

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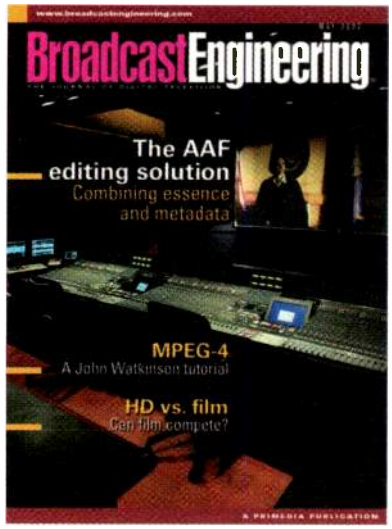


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the edges of portions of the content. You can avoid wasted bits by using an external high quality decoder, or avoiding composite video altogether.

Low signal-to-noise ratios also force the encoder to work harder to determine what is the real content it is compressing. Most encoders have noise reduction algorithms, sometimes optional, which eliminate the noise, to the extent possible, before coding begins. The devil is in the details with noise reduction, as all high frequency content is not noise, and low frequency noise is equally troublesome. As above, an external noise reduction system can materially improve the result. Several manufacturers offer MPEG preprocessing devices that perform some or all of these functions.

When several signals are combined, multiplexed together in one bit stream, further tricks can be applied to provide additional available bits to challenging content. This technique is called statistical multiplexing, and makes use of the fact that it is expected that the time varying content in multiple programs will not all be simultaneously challenging to the same degree. If an encoder has available bandwidth that is not required to maintain acceptable quality (See Figures 1 and 2), it signals the multiplexer that bits can be reassigned, and consequently throttles back its own bit rate to the extent possible. Those unused bits are added to the bit rate available to other encoders. In the examples both streams are intended to be encoded with a fixed rate of 4 Mb, but both have considerable unused overhead most of the time and exceed their budget occasionally. When added together algebraically they never exceed the total available bandwidth of 8 Mb, and in fact leave space for opportunistic data transmission at the same time (See Figure 3).

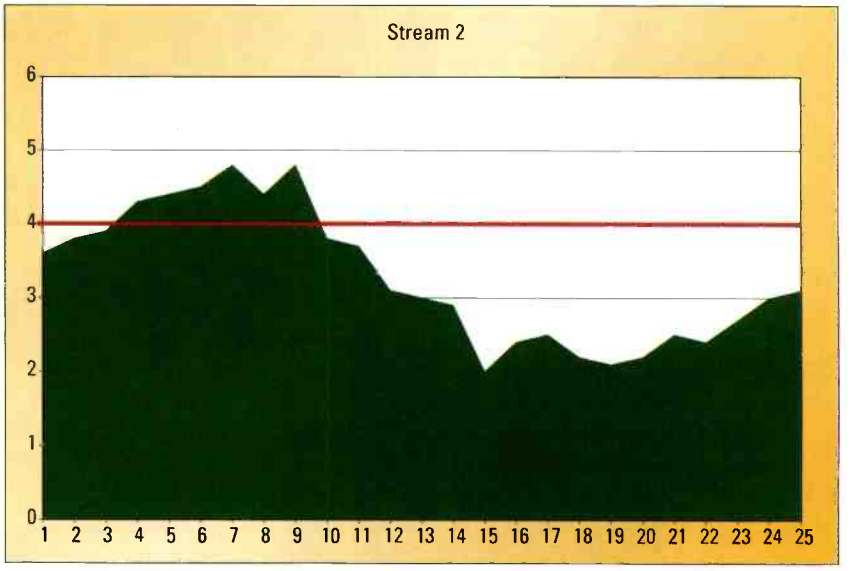


**Figure 2. Example of a second stream of video or data**

Multiplexers provide other services as well. Fundamentally, mux is the traffic cop that turns on an off-individual bit stream under the management of a control system, which can in turn be acting on the commands of an automation system. The mux does not alter the content, but enables multiple simultaneous uses for the composite bit stream. For example, it can encapsulate IP data for transmission as part of an interactive program, add sophisticated program guide data, enable multiple language services, and manage opportunistic data transmission when the bit stream allows.

A mux is typically loaded with default settings for each service. The settings might include the guaranteed bandwidth, allocation of statmux channels, repetition rates for required tables and program guide content, and other services (see figures 1, 2 and 3). The software application that controls the mux must be understandable and provide the user with feedback in concise, understandable displays, for the real work going on behind the scenes is quite complex indeed.

**The Scopus CODICO E-1700 encoder/modulator integrated unit offers full MPEG-2 and DVB-DSNG compliance.**

A mux may allow "remux" functions as well, with the ability to drop one program and replace it with another, and with some sophisticated technology to adjust the bit rate by changing the quantization tables. Keep in mind that once the encoder has thrown away

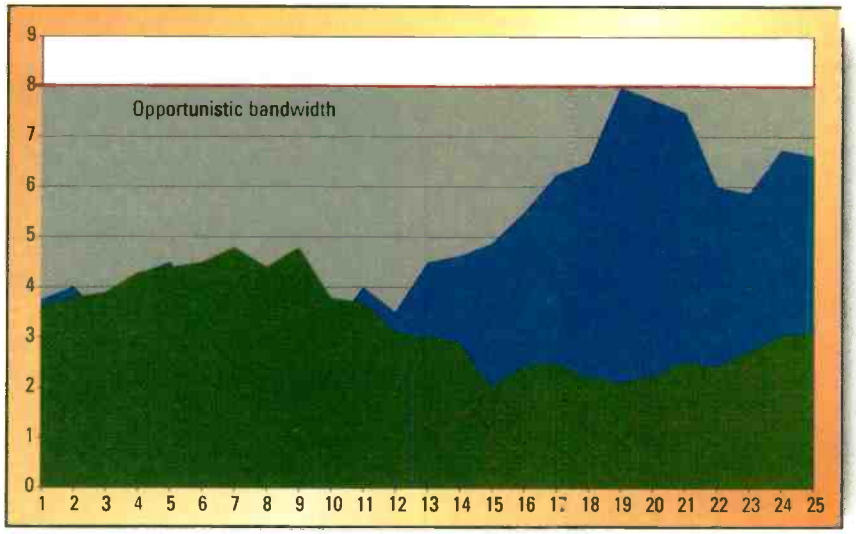


**Figure 3. Combined required bandwidth using statmux**

content, nothing can restore it.

A mux may have a number of inputs, typically DVB ASI (Digital Video Broadcast Asynchronous Serial Interface). This brings up a tangential topic which should be known to most readers, but which is often misunderstood. MPEG is a generic specification. It defines a standard, often called a toolbox, with which an end-to-end system can be designed and built. The real world implementations for the most part have settled in two camps. DVB is a European consortium that standardizes the end-to-end system most often used for worldwide interchange of MPEG streams. It can be used over satellite, or in a variant intended for over-the-air broadcast (DVB-T). ATSC has similarly taken plain vanilla MPEG and customized it for terrestrial broadcast. The differences are subtle, though incompatible. It is possible to build a decoder that would respond to either variant, even though the differences are not in the fundamental technology, except for audio coding which is straight from MPEG in the case of DVB, and Dolby AC3 in the case of ATSC systems.

**The TANDBERG Television E5710 encoder provides images at very low bit rates for maximum bandwidth utilization.**

Most encoders allow the user to select between ATSC and DVB outputs. It is "just software" that defines the differences, outside of audio coding, which is most often done in hardware. The biggest difference may well be in program guide and interactivity standards, where the North Americans and Europeans have not been able to find common standards. Though the debate over DTV in the US has centered on the different modulation standards DVB-T and ATSC/FCC have chosen (the infamous COFDM vs. 8VSB debate), there is significant common ground between the two systems. The fact MPEG provided such a rich syntax allows different uses of the standard to be effective and commercially successful.

Lastly, it is valuable to note that U.S. DTH services use neither DVB nor ATSC, but rather proprietary versions of MPEG which, like it or not, are not required to match any standard. As with ATSC and DVB, the complex and open MPEG standard allows such flexibility of use. Thankfully. BE

*John Luff is vice president of business development for AZCAR.*

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| Telecast Fiber Systems Inc. | 135 | 508-754-4858 | telecast-fiber.com |
| Telex | 25 | 800-392-3497 | telex.com |
| Teranex | 96 | 407-858-6000 | teranex.com |
| VideoFrame | 132,160 | 530-477-2000 | videoframesystems.com |
| VideoTek, Inc. | 17,127 | 800-800-5719 | videotek.com |
| WCMH | 163 | | |
| Wheatstone Corporation | IFC | 252-638-7000 | wheatstone.com |
| Winsted Corporation | 57 | 800-447-2257 | winsted.com |
| Wohler Techologies | 80, 92,104 | 888-5-wohler | wohler.com |
| 360 Systems | 141 | 818-991-0360 | 360systems.com |

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# Deliver it not...

BY PAUL MCGOLDRICK

So, we have passed the magic date when our nation's DTV rollout was supposed to be complete, and we are a quarter of the way there in terms of the number of stations on-air. None of us is really surprised by that, and we know too that the FCC currently lacks either the means or intention of punishing anybody over it. But without terrestrial delivery systems in place, DTV will be a reality only for people in the larger metropolitan areas and for those who receive DTV over satellite or cable.

The UK has the highest percentage of viewers watching digital signals (39 percent) on the three delivery systems available to them: cable, satellite and terrestrial. The vast majority of those 39 percent are subscribers to BSkyB (which has long since turned off its analog signals.) Of the cable viewers, many of whom would not be able to tell you whether they were receiving digital signals or not, most are heavily committed to the system because it is also used as their primary telephony link to the outside world. That leaves a large percentage of the population who could be turned to DTV on a terrestrial system.

Two of the commercial TV conglomerates in the UK – Granada and Carlton – decided that they could woo viewers with an easy-to-use terrestrial delivery system provided they could offer killer content (which, like in the United States, really means sports.) The ONdigital Channel was launched with a $135 million ad campaign and a massive party at Crystal Palace, which is the site of the main TV antennas for London and almost synonymous for TV to the British. This launch (November 1998) was exactly a month after Sky Digital was launched. But there was a difference. ON's set-top boxes had problems – if you could get one – and the power levels allowed by the government for the little terrestrial transmission "cells" were totally inadequate.

The situation left viewers on one side of a street being able to receive a reasonable signal while on the other side of the street there would be nothing. The BBC's terrestrial cells, however, operating at about ten times the power levels, worked just fine for 99 percent of viewers.

The Christmas market of 1998 was missed, and the ad campaign fizzled. Heads rolled, lawsuits flew around and then the European Union stepped in with a killer decision. Brussels decided that ONdigital's arrangements involving Sky television were monopolistic and overnight BSkyB became foe instead of partner. STBs became free issue from Sky and, of course, ON had to respond. But Sky has spent upwards of $5 billion on their systems and Rupert Murdoch is an unrelenting competitor who doesn't understand losing.

ON spent $470 million on the exclusive rights to the Nationwide League soccer events and then threw away the little brand name it had developed by renaming itself ITV Digital. So in this case content was obtained – good educational stuff for the daytime viewers and things like soccer, The Carlton Cinema and The Food Network for prime time – but the delivery system was completely flawed. It was untested and really was sold to Carlton/Granada as a bill of goods by the British government during a banquet at Hampton Court. The power levels were chosen so as to prevent interference to other services and were inadequate as the company failed to completely validate the STB they were going to use. They moved too fast and too expensively.

Where is ITV Digital today? The black boxes have nothing to receive, 1700 jobs are gone, 800,000 screens are blank, and the company is shuttered and is in "administration," which is a quaint British way of describing a bankruptcy where accountants are left to find buyers for the whole or the bits and pieces.

**There can be no chance in the foreseeable future of turning off analog signals unless something is done.**

We don't yet have this situation in the United States, but we could well have it if we don't find a way to get terrestrial DTV in place in very short order. There can be no chance in the foreseeable future of turning off analog signals unless something is done. All the stations that agreed to go digital, most with a free new channel, must be brought to book in some way. The FCC must learn that it is the only body that can set a real date – not a target – and enforce DTV installation even at the cost of pulling licenses from the noncompliant. It will force the sale of weaker stations, but that is going to happen anyway – let's hasten it along so we can enjoy the content. BE

*Paul McGoldrick is a freelance industry consultant based on the West Coast.*

SEND Send questions and comments to: paul_mcgoldrick@primediabusiness.com


LEITCH®
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istribution Amplifiers • Master Clock Driver • Sync Pulses • Optical Interfaces and more...

# INPUT / OUTPUT COLOR KEY

— — — — —Fiber

— — — — —High Definition

— — — — —Data

— — — — —Reference Signal

— — — — —Analog Video NTSC / PAL

— — — — —Analog Video GBR / YPbPr

— — — — —Analog Audio

— — — — —Analog Audio 2 Channels

— — — — —Analog Audio 4 Channels

— — — — —Digital Video SDI 525 / 625

— — — — —AES Digital Audio — 110 ohm

— — — — —AES Digital Audio 2 Channels — 110 ohm

— — — — —AES Digital Audio 4 Channels — 110 ohm

— — — — —AES Digital Audio — 75 ohm

— — — — —Digital Video SDI 525 / 625 with Multiplexed Audio

## Providing Maximum Flexibility to Meet any Infrastructure Requirement

### *Television - Production - Satellite - Cable - Telecom*

- **Extensive Range**
- **Protected Investment**
- **Proven Performance**
- **Compelling Value**

Leitch is the leading provider of infrastructure platforms. We understand through our 30 years of experience that customer requirements vary greatly. This drives the need for design flexibility and therefore we offer multiple platforms to meet the needs of any infrastructure requirement. Each of our platforms addresses specific and unique requirements, and are deployed globally in a wide variety of facilities. Backed by a history of proven performance, the widest range of customer needs are met through our family of platform choices - NEO™, Genesis™ and 6800™.

### NEO - Premier Modular Platform for Evolving Technology

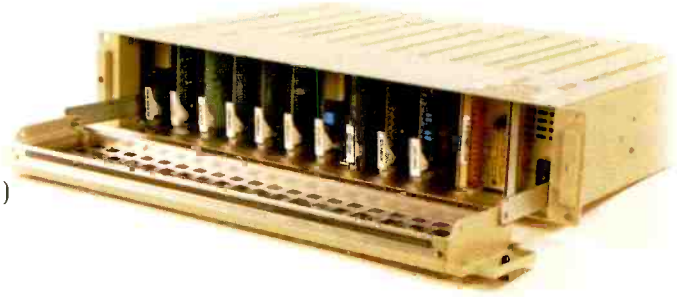
- Maximum functionality for analog, digital and high-definition content
- Offers fast and easy adaptation of evolving standards and technology
- Advanced and extensive control and monitoring capabilities

### Genesis - Exceptional Balance of Advanced Functionality, Control Capability and Value

- Offers the widest array of functions and electrical-optical connectivity
- Proven performance with a large installed base worldwide
- Extensive control and monitoring capabilities

### 6800 - World Leader in Installations, Exceptional Value and High-Quality Processing

- Ideal for "set and forget" applications
- World's largest installed base of a modular platform (original "Digital Glue")
- Supports all core video processing and distribution requirements



All Leitch platforms are backed by superior service and support to customers worldwide. Please visit http://www.leitch.com/support/services.

This guide provides all the necessary information to ensure you are running on a winning platform. Only Leitch can deliver on that commitment — backed by 30 years of delivering industry-leading, high-quality infrastructure for professional video and audio facilities. Leitch is uniquely able to leverage our corporate strength, experience and scope to protect our customer's investment.

INFRASTRUCTURE PLATFORMS FOR ANALOG - DIGITAL - HD

# FAST FIND



## NEO

**SYNCHRONIZER - Simplicity**



**SYNCHRONIZER**



**VIDEO**



**AUDIO**



**MONITORING & DISTRIBUTION**



**ROUTING SWITCHERS**



**REFERENCE**



**SYNCHRONIZER - Combo Cards**



## GENESIS

**VIDEO**

## 6800/7000



## DPS575

Leitch's innovative **Command Control System™(CCS)** provides real-time, distributed, open and scalable access to Leitch and third-party devices on a network using standard protocols (TCP, SNMP, HTML, serial, etc.).

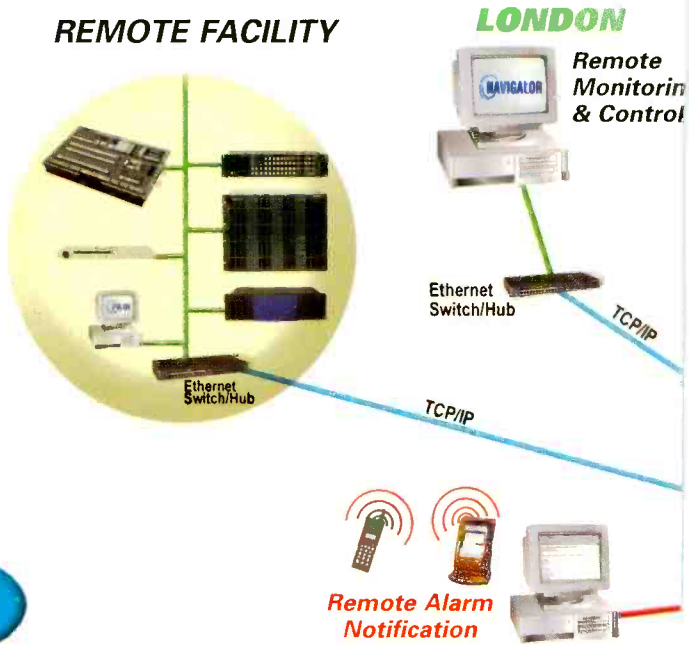
CCS applications like Pilot™ and Navigator™ (another application currently under development, allowing user-defined graphics) provide the tools you need to configure, control, monitor, secure access, and navigate to CCS-enabled and third-party equipment on your network, regardless of the network topology.

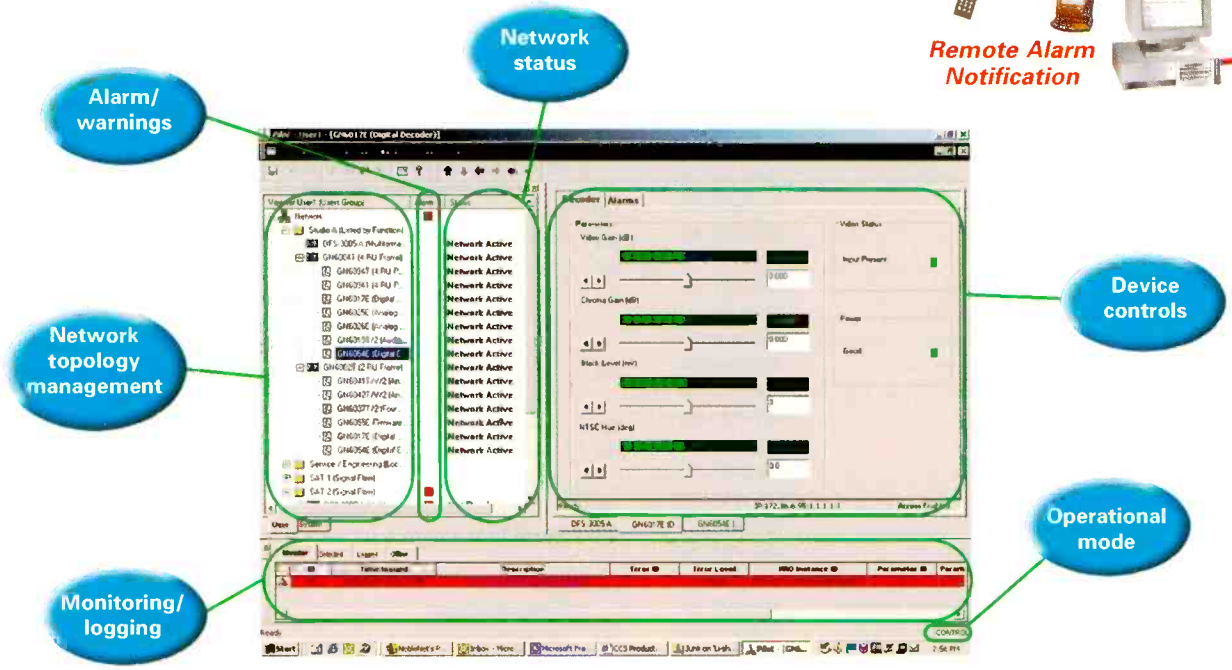
Also available for control and monitoring of CCS-enabled devices are local and remote control panels. As remote control panels use IP-based communications over Ethernet, they can be located adjacent to the equipment being controlled or remotely over LAN, MAN or WAN connections.

A simple ASCII protocol is also available and allows communications over RS-232/422 or Ethernet (IP Sockets or Telnet).

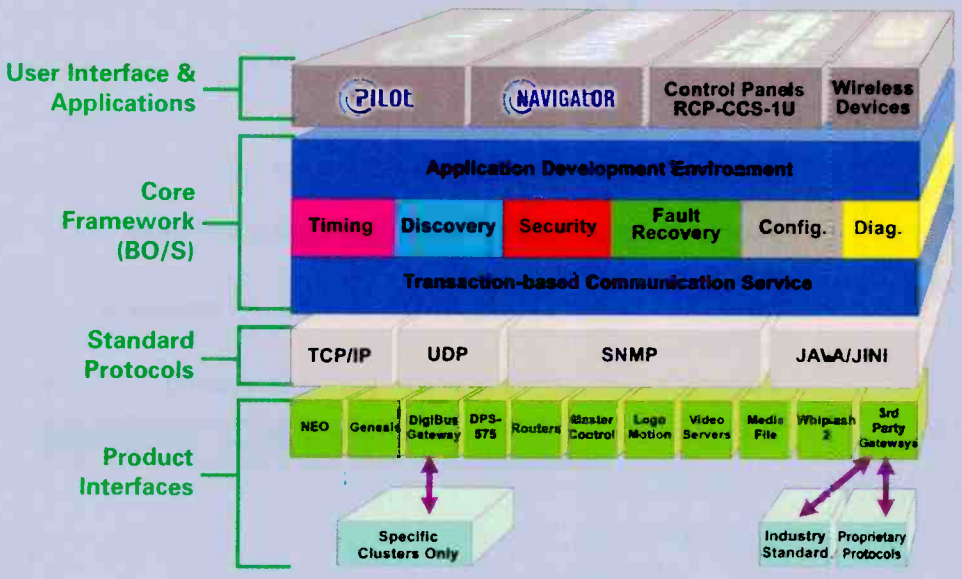
## Pilot™

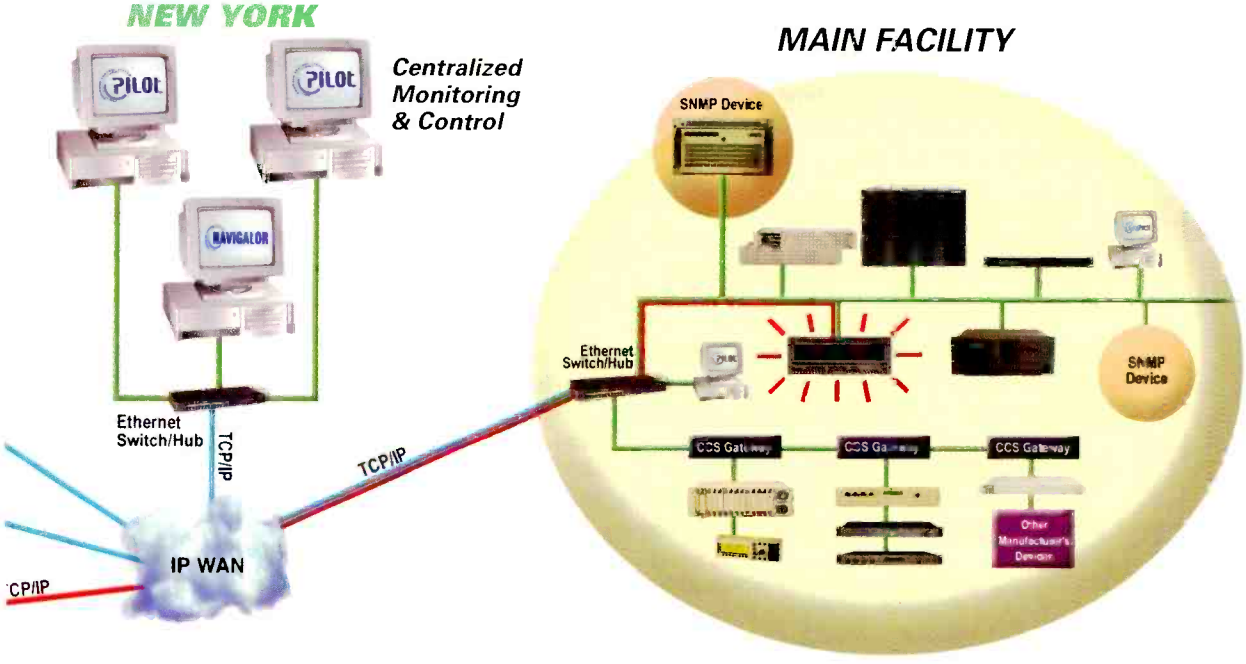
Pilot, the flagship product of CCS is a revolutionary real-time software application containing all the tools you need to configure, control, monitor and secure access to Leitch and third-party equipment on your network. No matter how geographically dispersed your equipment, across the room or across the globe, Pilot allows you to centrally control and monitor your network of devices over a local- or wide-area network.

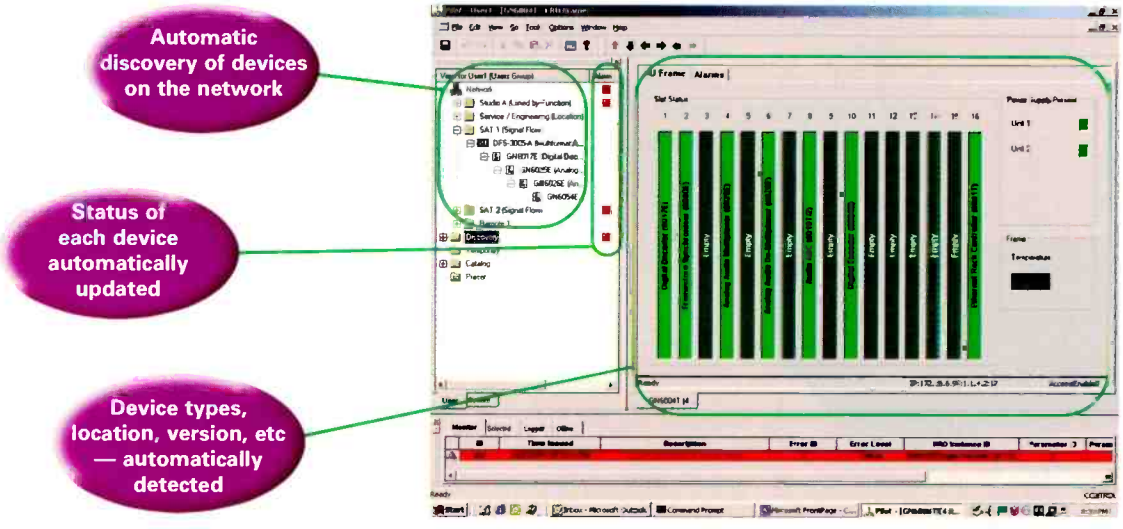


## Command Control System Architecture



# NEO™ Premier Modular Platform for Evolving Technology

- **Maximum functionality for analog, digital and high-definition content**
- **Offers fast and easy adaptation of evolving standards and technology**
- **Advanced and extensive control and monitoring capabilities**

The NEO platform is designed to meet increasingly demanding networked processing requirements, providing products for all present and future industry standards including HD. NEO offers the best video and audio performance, as well as high functionality per product for denser packaging.

We drew from our experience with previous platforms and added the very latest technology to design a complete range of solutions that meets the requirements of professional facilities today, while ensuring that all future technologies and product innovations can be implemented quickly.

NEO is an advanced and innovative infrastructure architecture that accommodates routing, distribution, and clock and signal reference products, along with an extensive range of interface, conversion, synchronization and compression solutions for all analog, digital, standard-definition and high-definition systems.

NEO allows for worldwide control and monitoring, to meet all operational and monitoring needs. Products can be controlled from the card edge, a control panel mounted on the frame, or a remote, rack-mountable control panel, as well as over Ethernet using Pilot™, Navigator™ or third-party control software. Any NEO product can be plugged into a frame and immediately controlled from the card edge using a highly intuitive control interface. On the control network, new products can be automatically discovered and made available to users running Pilot or from control panels.

NEO is easy to install, maintain and upgrade and offers many unique features:

- NEOSCOPE™ provides a visual display of the video being processed through the module on the card edge, allowing for quick confirmation of signal presence from input to output.
- DejaView™ allows a spare module to be plugged in if a product should fail, and the status of the settings can be either those of the newly installed module or those of the failed module.
- Designed with no thermal or power restrictions, NEO provides a high level of comfort when configuring frames, products and racks.
- NEO's Single-Module Simplicity Products truly provide the industry's most highly integrated functionality into single products resulting in more functions within less rack space.

# Exceptional Balance of Advanced Functionality, Control Capability and Value

Genesis™

- **Offers the widest array of functions and electrical-optical connectivity**
- **Proven performance with a large installed base worldwide**
- **Extensive control and monitoring capabilities**

Revolutionary design concepts within this product line have helped Genesis evolve into the most functionally developed, intelligent infrastructure platform within the industry.

Genesis demonstrates its operational sophistication through its support of a broad range of product functionality. Capabilities include support of enhanced audio and video processing; multi-channel audio; both electrical and optical interfaces; audio and video monitoring products; and analog, digital and optical signal formats.

Genesis also features fully redundant power systems to ensure absolute reliability and stability of signal paths and provides a comprehensive set of signal controls, ensuring that the user is able to process any incoming signal to guarantee the best possible "on-air" quality.

When it comes to control and monitoring, Genesis is one of the most highly developed platforms available. The platform is fully integrated into CCS™ (Leitch's network communications system), with control available by PC-based applications (Pilot™), network control panels, dedicated control panels and card edge. Genesis-based facilities are able to scale from single-frame projects to large, multi-frame, multiple-location projects.

Genesis is a competitively priced product range offering a good entry point for customers who are interested in a platform capable of supporting network communications (remote control). Users have the choice of initially receiving the products with only local control, but can subsequently upgrade their systems with minimal price considerations and grow the functional utility of their existing investment. When comparing price and overall capabilities, Genesis delivers overwhelming value, making this platform an intelligent choice.

# 6800 7000

# World Leader in Installations, Exceptional Value and High-Quality Processing

- **Ideal for "set and forget" applications**
- **World's largest installed base of a modular platform (original "Digital Glue")**
- **Supports all core video processing and distribution requirements**

The Leitch 6800/7000 series Digital Glue™ modular system was designed as an economical, reliable platform with a broad range of quality interface and conversion functionality best suited for applications requiring minimal on-board control.

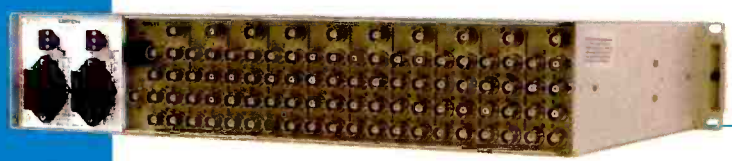
The 6800/7000 series offers a whole host of modules to satisfy today's diverse needs. The series is highly flexible and provides a complete line-up of products from analog and digital distribution amplifiers to digital routers, plus...

- Analog to Digital Converters
- Digital to Analog Converters
- Encoders / Decoders
- Frame Synchronizers
- Line Delay / Synchronizers
- Audio Muxes and De-muxes
- Monitoring Converters
- Logo Generators & Keyers
- Test Signal Generators

Factors that make the 6800/7000 series platform appealing include the ease of installation and operations, which in turn reduces time and costs for our customers.

The many choices of 6800/7000 frames that are available provide for the ability to accommodate up to 10 functional cards, plus power redundancy. Many modules have card edge control enabling functional and feature adjustments, but the series is largely intended for a "set and forget" mode of operation. In addition, the 6800 series has visual status indicators and contact closure outputs for critical monitoring capability. Leitch continues to expand the 6800/ 7000 range with new cards possessing improved performance and features.

The Leitch 6800/7000 Digital Glue series modular system is all about high value, quality and flexibility. Combine these facts with Leitch's reputable worldwide service and support, and it is not surprising that the 6800/7000 series is the world's most popular platform choice.



ezHD
On Air Package

# Easy Integrated HD Solution

Standard Definition

Upconverted HD


Branded HD


Component analog for monitoring

Leitch brings you ezHD™— the easy and fast way to transition to HDTV today. Upconversion, logo insertion and monitoring are three indispensable components to your successful transition. Only one package has it all.

## UPCONVERT

The ezHD™ package begins with Leitch's high-quality Juno HDTV upconverter, which uses motion-adaptive conversion to virtually eliminate artifacts. Juno's powerful noise reduction further enhances signal quality, and its sophisticated filters provide aspect ratio conversion. Auto film detection ensures optimum resolution.

## LOCAL BRANDING

For local branding of your upconverted signal, ezHD™ also includes Leitch's HDTV logo generator and inserter. You can store multiple logos for linear keying with user-selectable logo positioning and transparency.

## MONITOR HD

Rounding out ezHD™ is an HDTV digital-to-analog converter for monitoring your signal before ATSC encoding. The ezHD™ package allows you the opportunity to further upgrade your facility with the following products:

- **HD frame synchronizers**
- **HD test signal generators**
- **HD A/D converters**
- **HD distribution amplifiers**

**Other Leitch HD products include:**

- **Opus master control**
- **Integrator 16x16 & 32x32 HD routers**
- **Prophecy 12x2 HD router**
- **Test, slide, DARS & HD reference generator**
- **AES (4) digital audio embedder and de-embedder**
- **HDTV to SDTV monitoring downconverter and DA**
- **Coaxial/fiber optic conversion**

*Quality high definition packages that can be customized.*

HDTV

NEO™

AVS-3901-B

# SDI/AES Synchronizer Processor

- SDI video input with two processed video outputs
- Two AES channels (balanced) input and output
- DARS input
- Genlock reference input with loop through
- Internal audio processing amplifier (gain, swap, delay, invert, mix)
- Selectable 16 / 20 / 24-bit audio processing
- Audio re-sampling for 32-108kHz AES outputs, with bypass for data over AES operation (Diamond or Dolby-E)
- C, U & V bit transparency
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

AVS-3901-C

HD Version 2003

# SDI/AES Synchronizer Processor

- SDI video input with two processed video outputs
- Two AES channels (balanced) input and output
- DARS input
- Genlock reference input with loop through
- Internal audio processing amplifier (gain, swap, delay, invert, mix)
- Selectable 16 / 20 / 24-bit audio processing
- Audio re-sampling for 32-108kHz AES outputs, with bypass for data over AES operation (Diamond or Dolby-E)
- C, U & V bit transparency
- Command Control System (CCS) enabled:
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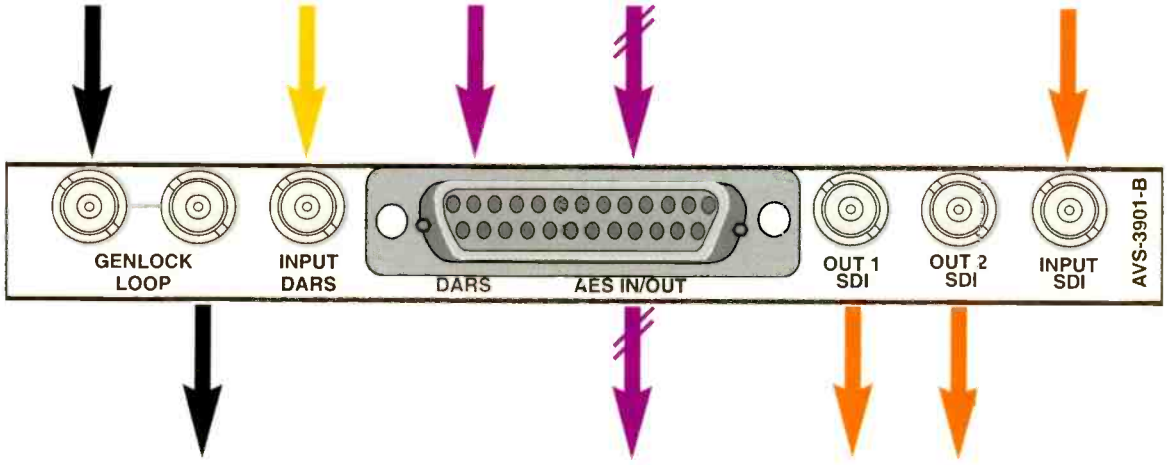
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

AVM-3901-A

# SDI/Analog Audio Synchronizer Processor

- SDI video input with two processed video outputs
- 4 channel analog audio input
- DARS input
- Genlock reference input with loop through
- Internal audio processing amplifier (gain, swap, delay, invert, mix)
- Selectable 16 / 20 / 24-bit audio processing
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system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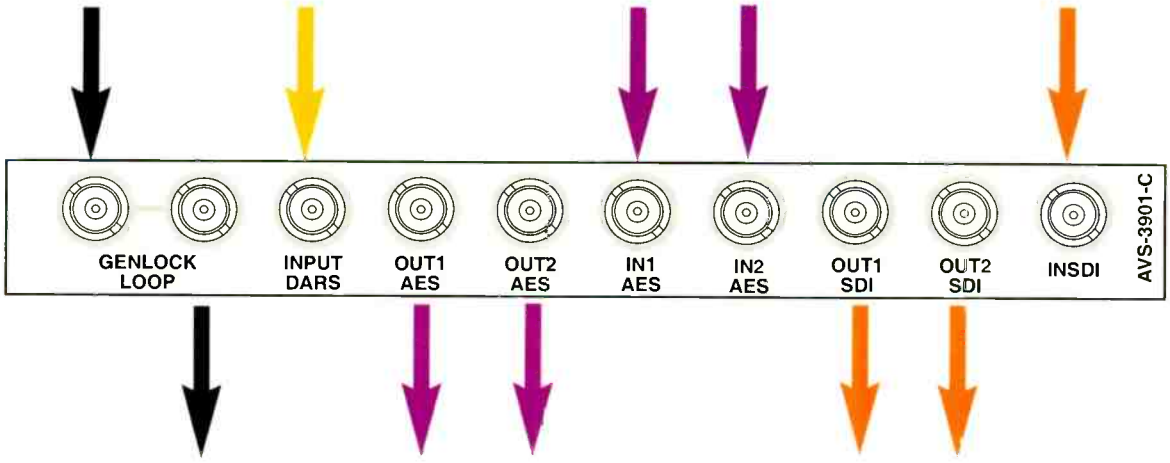
AES IN/OUT
OUT 1
SDI
OUT 2
SDI
INPUT
SDI
AVS-3901-B


GENLOCK
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OUT2
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IN1
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IN2
AES
OUT1
SDI
OUT2
SDI
INSDI
AVS-3901-C


GENLOCK
LOOP
INPUT
DARS
DARS IN
ANALOG AUDIO IN
OUT1
SDI
OUT2
SDI
INPUT
SDI
AVM-3901-A

NEO™

AVM-3901-B

Available Fall 2002

## SDI/AES Synchronizer Processor & Multiplexer

- SDI video input with two processed outputs
- Two AES input channels with two AES output channels
- DARS input
- Genlock reference input with loop through
- Internal audio processing amplifier (gain, swap, delay, invert, mix)
- Selectable 16 / 20 / 24-bit audio processing
- Audio re-sampling for 32-108kHz AES outputs, with bypass for data over AES operation
- C, U & V bit transparency
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

AVM-3901-C

HD Version 2003

Available Fall 2002

## SDI/AES Synchronizer Processor & Multiplexer

- SDI video input with two processed outputs
- Two AES input channels with two AES output channels
- DARS input
- Genlock reference input with loop through
- Internal audio processing amplifier (gain, swap, delay, invert, mix)
- Selectable 16 / 20 / 24-bit audio processing
- Audio re-sampling for 32-108kHz AES outputs, with bypass for data over AES operation
- C, U & V bit transparency
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

AVM-3901-B4

## SDI/AES Synchronizer Processor & Multiplexer

- SDI video input with two processed outputs
- Four AES channels input
- DARS input
- Genlock reference input with loop through
- Internal audio processing amplifier (gain, swap, delay, invert, mix)
- Selectable 16 / 20 / 24-bit audio processing
- Audio re-sampling for 32-108kHz AES outputs, with bypass for data over AES operation
- C, U & V bit transparency
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
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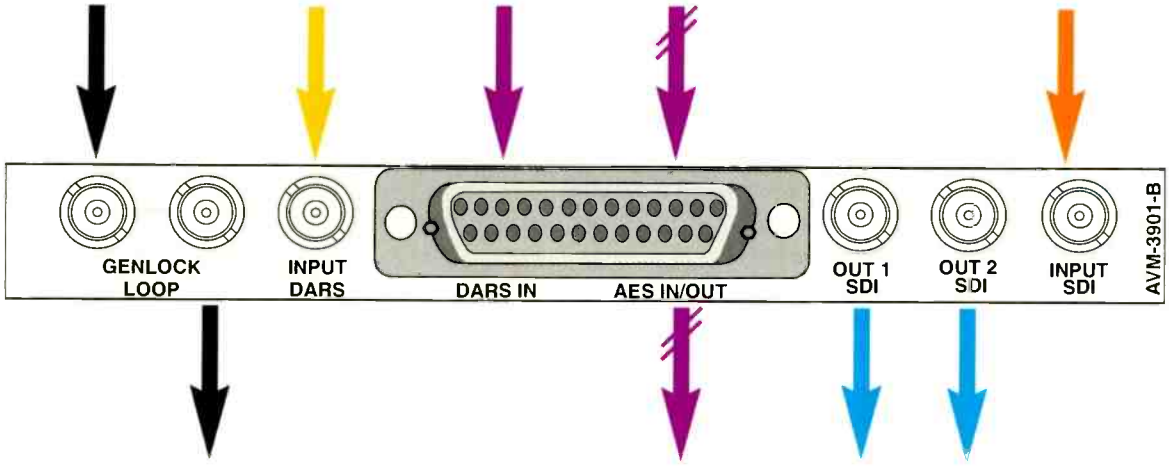
GENLOCK
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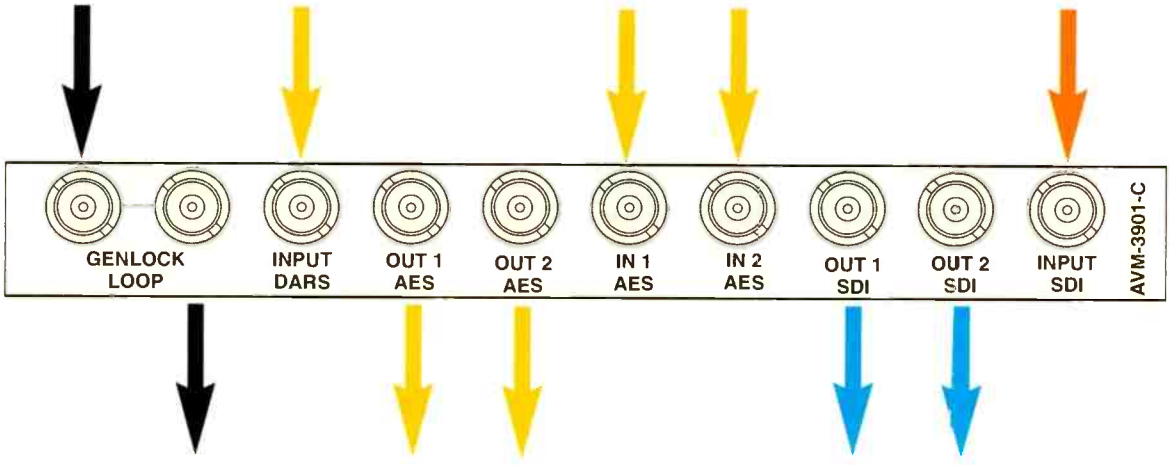
OUT 1
SDI
OUT 2
SDI
INPUT
SDI
AVM-3901-B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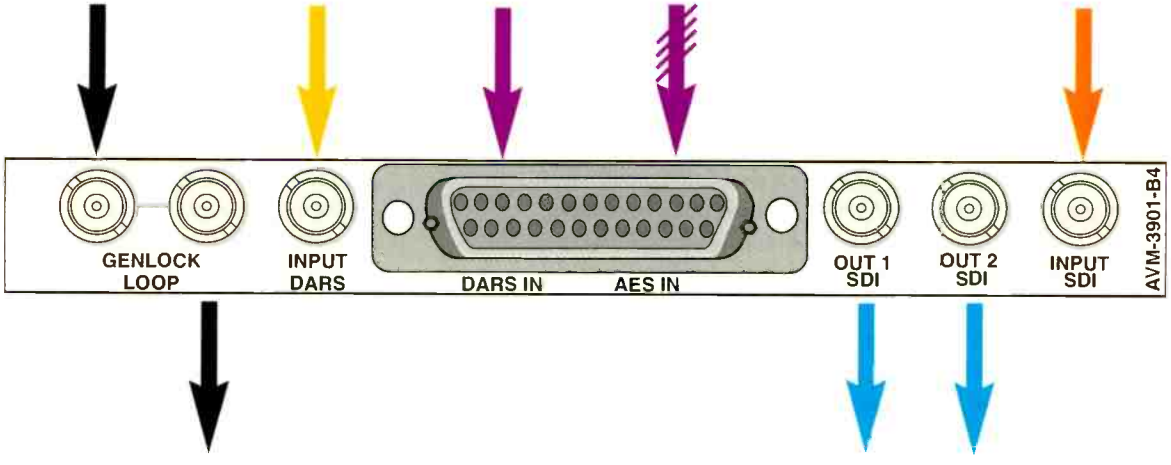
SDI
AVM-3901-C


GENLOCK
LOOP
INPUT
DARS
DARS IN
AES IN
OUT 1
SDI
OUT 2
SDI
INPUT
SDI
AVM-3901-B4

NEO™

AVM-3901-C4

HD Version 2003

# SDI/AES Synchronizer Processor & Multiplexer

- SDI video input with two processed outputs
- Four AES channels input
- DARS input
- Genlock reference input with loop through
- Internal audio processing amplifier (gain, swap, delay, invert, mix)
- Selectable 16 / 20 / 24-bit audio processing
- Audio re-sampling for 32-108kHz AES outputs, with bypass for data over AES operation
- C, U & V bit transparency
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

AVD-3901-B4/C4

HD Version 2003

*Available Fall 2002*

# SDI/AES Synchronizer Processor & Demultiplexer

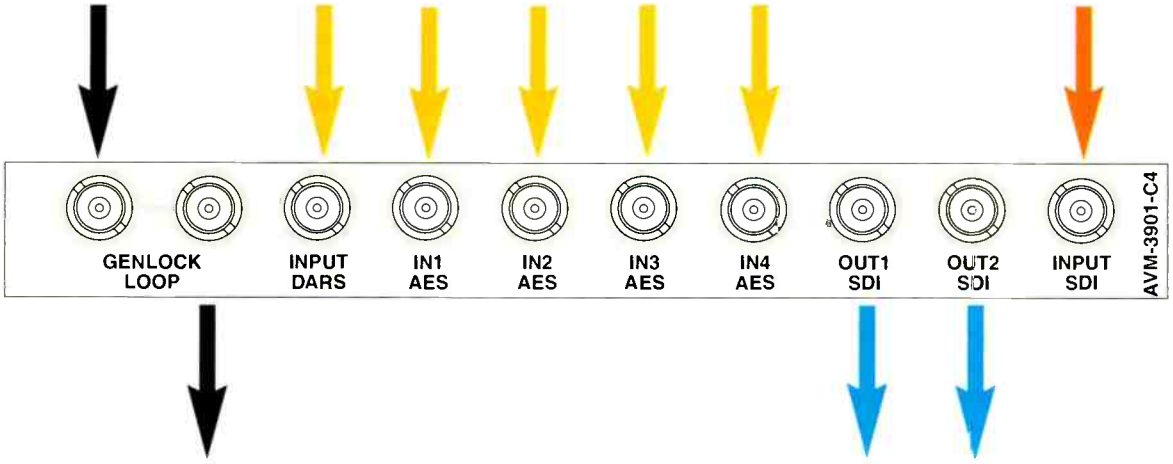
- SDI video input with two processed outputs
- Four AES output channels
- DARS input
- Genlock reference input with loop through
- Internal audio processing amplifier (gain, swap, delay, invert, mix)
- Selectable 16 / 20 / 24-bit audio processing
- Audio re-sampling for 32-108kHz AES outputs, with bypass for data over AES operation
- C, U & V bit transparency
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

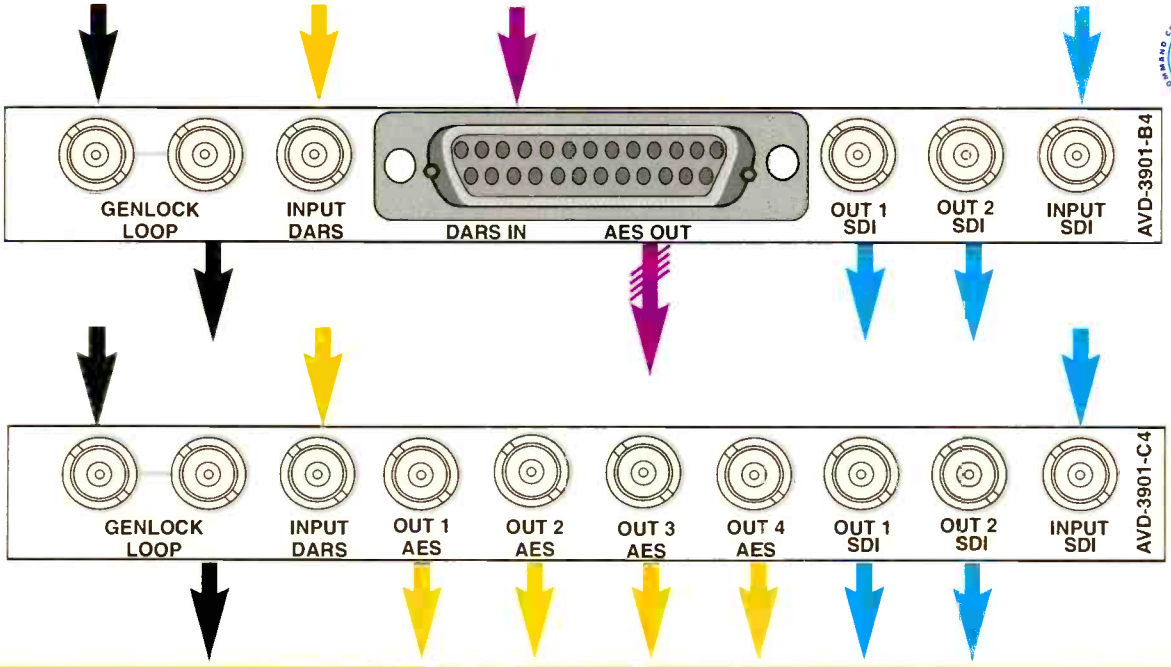
DAS-3901

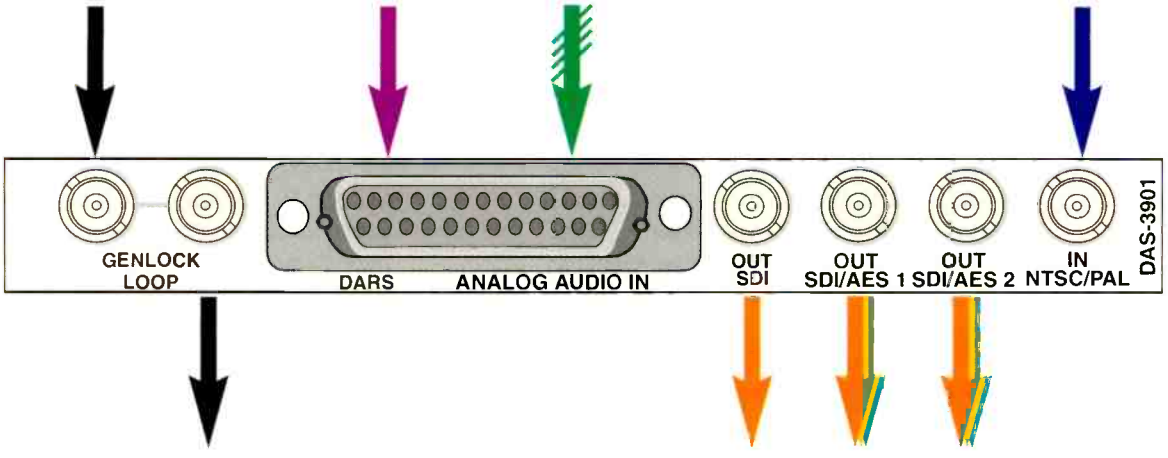
*Available September 2002*

# NTSC/PAL to SDI and AES Synchronizer/ Processor & Multiplexer

- NTSC/PAL-B/PAL-M and 4 channel analog audio input
- SDI with embedded audio and 2 AES outputs
- 12-bit fully adaptive frame/field/3 line/notch color decoding, synchronization, noise reduction, processing amplifier with clipping (hue, chroma, video, setup controls) for video input
- Selectable 16 / 20 / 24-bit A to D, synchronization, delay and processing amplifier (gain, swap, delay, invert, mix) for audio input
- Audio embedder built-in
- Genlock and DARS input
- Built-in color bar generator and audio test generator
- Excellent noise immunity
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote contro panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protoc
- DejaView intelligent settings recovery syster


GENLOCK LOOP
INPUT DARS
IN1 AES
IN2 AES
IN3 AES
IN4 AES
OUT1 SDI
OUT2 SDI
INPUT SDI
AVM-3901-C4


GENLOCK LOOP
INPUT DARS
DARS IN
AES OUT
OUT 1 SDI
OUT 2 SDI
INPUT SDI
AVD-3901-B4
GENLOCK LOOP
INPUT DARS
OUT 1 AES
OUT 2 AES
OUT 3 AES
OUT 4 AES
OUT 1 SDI
OUT 2 SDI
INPUT SDI
AVD-3901-C4


GENLOCK LOOP
DARS
ANALOG AUDIO IN
OUT SDI
OUT SDI/AES 1
OUT SDI/AES 2
IN NTSC/PAL
DAS-3901

NEO™

HD Version 2003

Available Fall 2002

# VFS-3901 SDI Frame Synchronizer

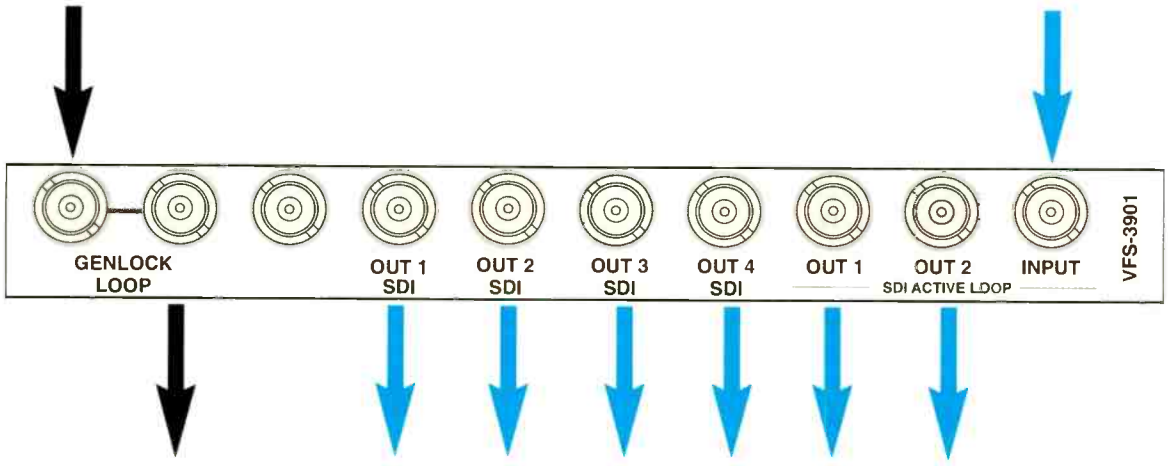
- 10-bit processing
- Input Signals
  - Serial digital SMPTE 259M
  - Genlock
- Output Signals
  - Two reclocked original serial digital SMPTE 259M input
  - Four synchronized serial digital SMPTE 259M
- Input standard 525/625 operation auto-detect or user-forced
- Input EDH detect and pass through to output
- Delay mode
- On-board black burst genlock circuit
- Transparent to embedded audio and data
- User-selectable genlock input lock
- Internal test signal generator
- User selectable EDH reinsertion on / off
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

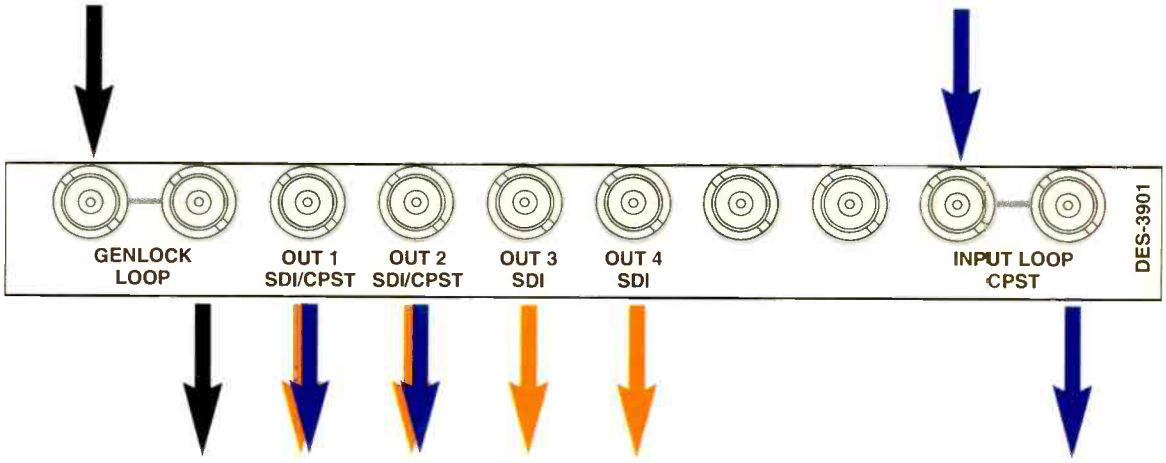
# DES-3901 NTSC/PAL to SDI Color Decoder/Synchronizer

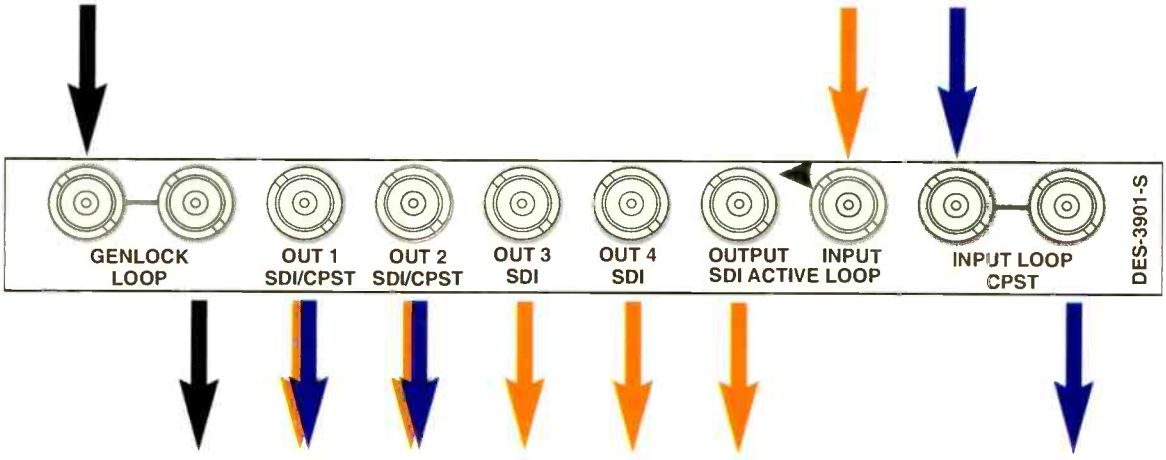
- NEOSCOPE card edge video monitoring
- A to D 12-bit input processing
- Input standard auto detect supporting NTSC / PAL-B / PAL-M
- User-selectable adaptive comb filter (Frame, Field, 3 line adaptive and notch)
- Hanover bar suppressor for PAL signals (On / Off)
- Input noise immunity and input video soft clipping
- 2 dedicated outputs with embedded EDH
- 2 user-selectable outputs (SDI with embedded EDH or composite analog monitoring)
- Composite monitoring, offering two outputs
- VBI selection (normal, simple, bypass, delete)
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

# DES-3901-S NTSC/PAL to SDI Color Decoder/Synchronizer (bypass)

- NEOSCOPE card edge video monitoring
- A to D 12-bit input processing
- Input standard auto detect supporting NTSC / PAL-B / PAL-M
- User-selectable adaptive comb filter (Frame, Field, 3 line adaptive and notch)
- SDI input with color decode bypass and video processing amplifier
- Hanover bar suppressor for PAL signals (On / Off)
- Input noise immunity and input video soft clipping
- 2 dedicated outputs with embedded EDH
- 2 user selectable outputs (SDI with embedded (EDH or composite analog monitoring)
- Composite monitoring, offering two outputs
- VBI selection (normal, simple, bypass, delete)
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system


GENLOCK
LOOP
OUT 1
SDI
OUT 2
SDI
OUT 3
SDI
OUT 4
SDI
OUT 1
OUT 2
SDI ACTIVE LOOP
INPUT
VFS-3901


GENLOCK
LOOP
OUT 1
SDI/CPST
OUT 2
SDI/CPST
OUT 3
SDI
OUT 4
SDI
INPUT LOOP
CPST
DES-3901


GENLOCK
LOOP
OUT 1
SDI/CPST
OUT 2
SDI/CPST
OUT 3
SDI
OUT 4
SDI
OUTPUT
SDI ACTIVE
INPUT
LOOP
INPUT LOOP
CPST
DES-3901-S

NEO™

## DNS-3901

# Color Decoder/Synchronizer/Noise Reducer

- NEOSCOPE card edge video monitoring
- A to D 12-bit input processing
- Noise reduction removes impulse and random noise
- Input standard auto detect supporting NTSC / PAL-B / PAL-M
- User-selectable adaptive comb filter (Frame, field, 3 line adaptive and notch)
- Hanover bar suppressor for PAL signals (On / Off)
- Input noise immunity and input video soft clipping
- 2 dedicated SDI outputs with embedded EDH
- 2 user-selectable outputs:
  - SDI output with embedded EDH, or
  - Composite analog monitoring
- Composite monitoring, offering two outputs
- VBI selection (normal, simple, bypass, delete)
- Shadowed / restored parameter settings when changing video standards
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

## DNS-3901-S

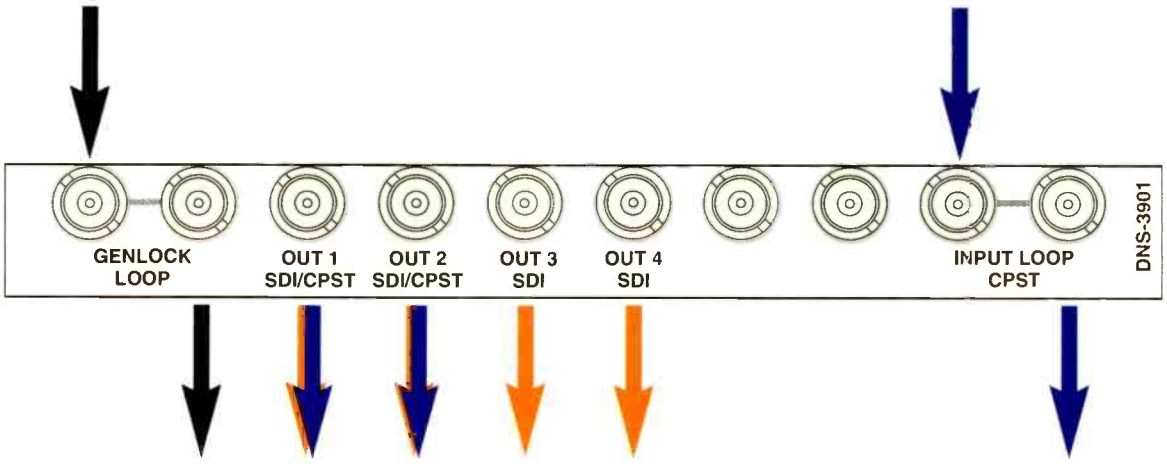
# Color Decoder/Synchronizer/Noise Reducer

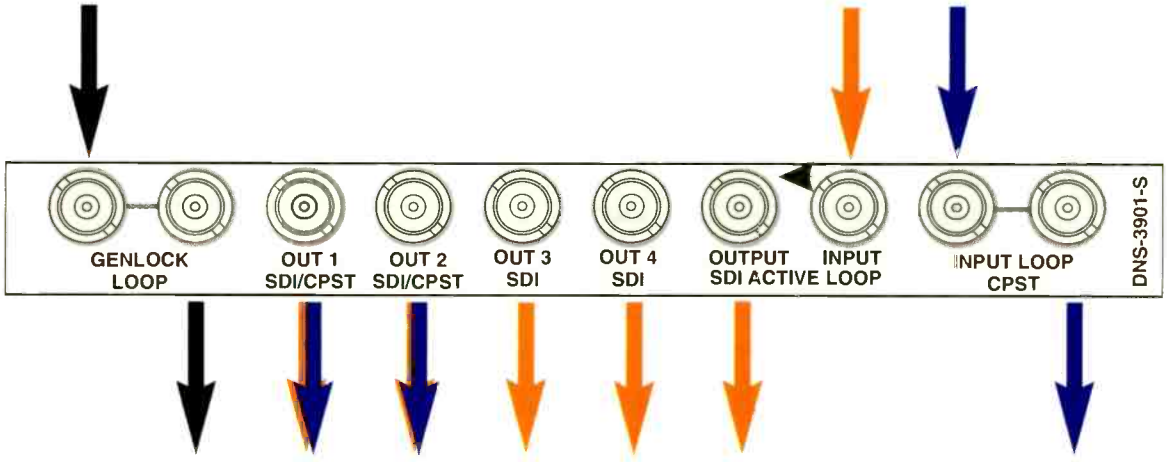
- NEOSCOPE card edge video monitoring
- A to D 12-bit input processing
- Noise reduction removes impulse and random noise
- Input standard auto detect supporting NTSC / PAL-B / PAL-M
- User-selectable adaptive comb filter (Frame, field, 3 line adaptive and notch)
- SDI input with color decode bypass
- Hanover bar suppressor for PAL signals (On / Off)
- Input noise immunity and input video soft clipping
- 2 dedicated SDI outputs with embedded EDH
- 2 user-selectable outputs:
  - SDI output with embedded EDH, or
  - Composite analog monitoring
- Composite monitoring, offering two outputs
- VBI selection (normal, simple, bypass, delete)
- Shadowed / restored parameter settings when changing video standards
- Outputs TTL I/O delay pulse to synchronize downstream audio cards
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocc
- DejaView intelligent settings recovery system

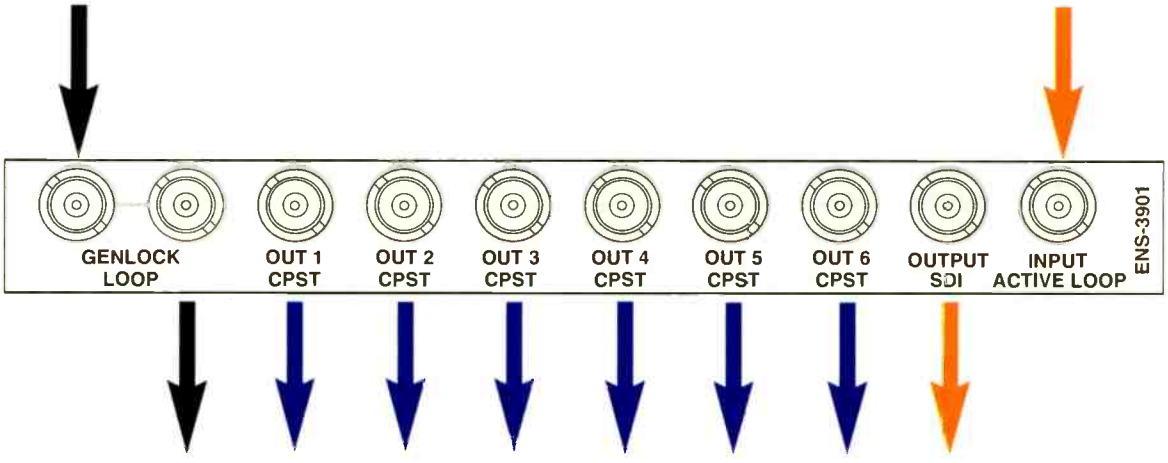
## ENS-3901

# SDI to NTSC/PAL Color Encoder/Synchronizer

- Outputs offering 6 composite analog outputs, NTSC / PAL-B / PAL-M
- One re-clocked SDI output
- 12-bit signal processing
- EDH detection and reporting
- User adjustable level controls: Luminance, Chrominance, Black
- Vertical blanking field/line/mode control
- Timing controls: vertical, horizontal, fine SC (from genlock)
- Cross color reduction and aperture control (2 dimensional)
- Input auto mode detect supporting 525/625
- External genlock user selectable: H-lock, chroma lock or auto mode
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocc
- DejaView intelligent settings recovery system


GENLOCK
LOOP
OUT 1
SDI/CPST
OUT 2
SDI/CPST
OUT 3
SDI
OUT 4
SDI
INPUT LOOP
CPST
DNS-3901


GENLOCK
LOOP
OUT 1
SDI/CPST
OUT 2
SDI/CPST
OUT 3
SDI
OUT 4
SDI
OUTPUT
SDI ACTIVE
INPUT
LOOP
INPUT LOOP
CPST
DNS-3901-S


GENLOCK
LOOP
OUT 1
CPST
OUT 2
CPST
OUT 3
CPST
OUT 4
CPST
OUT 5
CPST
OUT 6
CPST
OUTPUT
SDI
INPUT
ACTIVE LOOP
ENS-3901

NEO™

## AS-3901-B

# Audio Synchronizer/Delay and Processor

*Available Fall 2002*

- Digital audio AES (2) input and output
- Tracks to video synchronizer products
- Full audio processing (gain, channel swap, invert, delay, mix)
- DARS input
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

## AS-3901-C

# Audio Synchronizer/Delay and Processor

*Available Fall 2002*

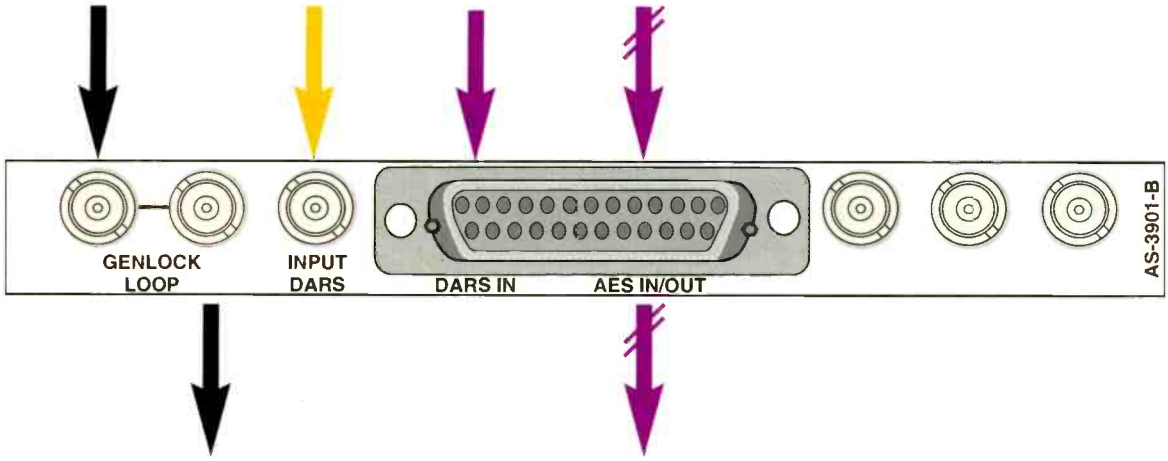
- Digital audio AES (2) input and output
- Tracks to video synchronizer products
- Full audio processing (gain, channel swap, invert, delay, mix)
- DARS input
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote panels, RS232/422 or Ethernet (IP)
  - I/F with 3rd party equipment and applications through simple, public API
- DejaView intelligent settings recovery system

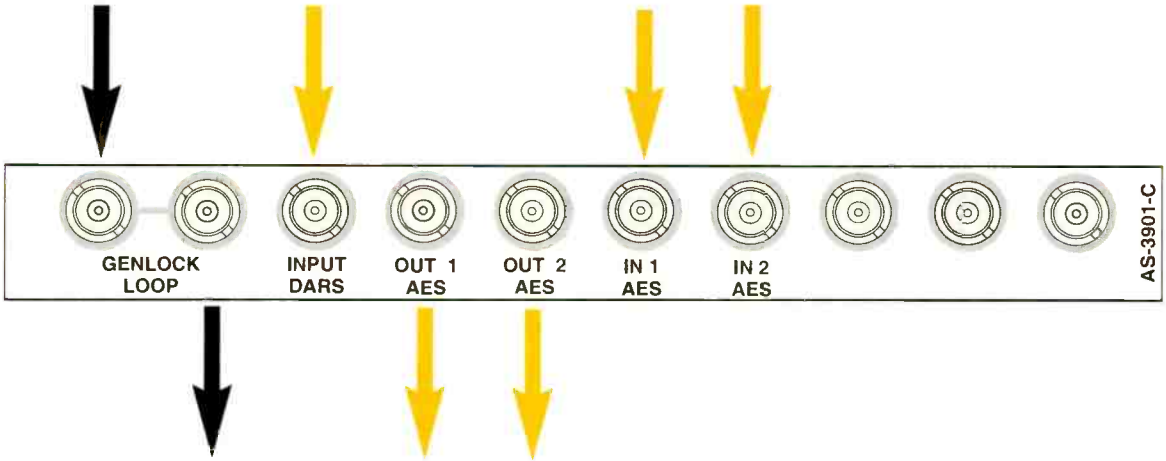
## AS-3901-AD

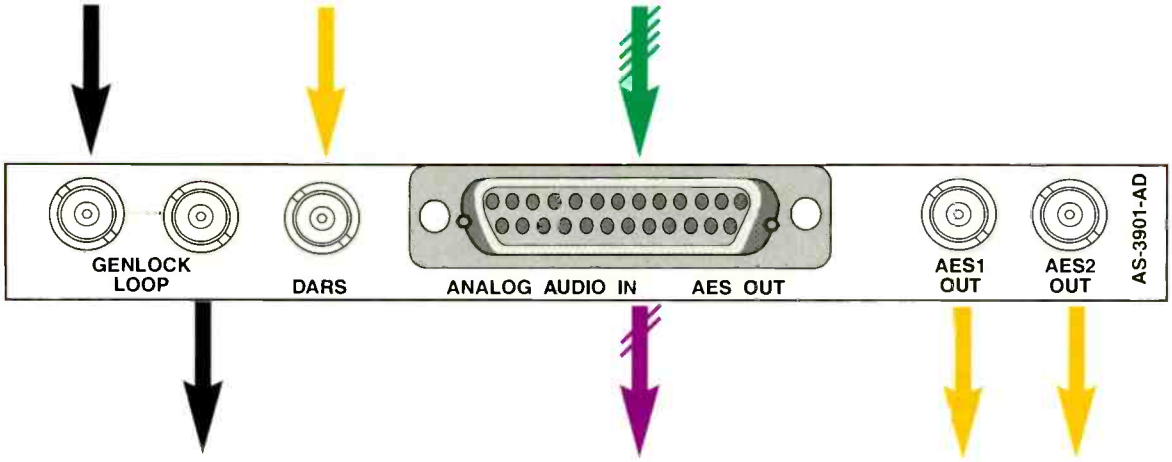
# Audio Synchronizer/Delay and Processor

*Available Fall 2002*

- 4 channel analog to 2 AES digital audio
- Tracks to video synchronizer products
- Full audio processing (gain, channel swap, invert, delay, mix)
- Both balanced and unbalanced outputs
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system


GENLOCK
LOOP
INPUT
DARS
DARS IN
AES IN/OUT
AS-3901-B


GENLOCK
LOOP
INPUT
DARS
OUT 1
AES
OUT 2
AES
IN 1
AES
IN 2
AES
AS-3901-C


GENLOCK
LOOP
DARS
ANALOG AUDIO IN
AES OUT
AES1
OUT
AES2
OUT
AS-3901-AD

NEO™

# AS-3901-DA

## Audio Synchronizer/Delay and Processor

*Available Fall 2002*

- 2 AES digital to 4 channel analog audio
- Tracks to video synchronizer products
- Full audio processing (gain, channel swap, invert, delay, mix)
- Selectable balanced or unbalanced AES inputs
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

# MSA-3901-A

## Audio Synchronizer/Delay Processor and Multiplexer

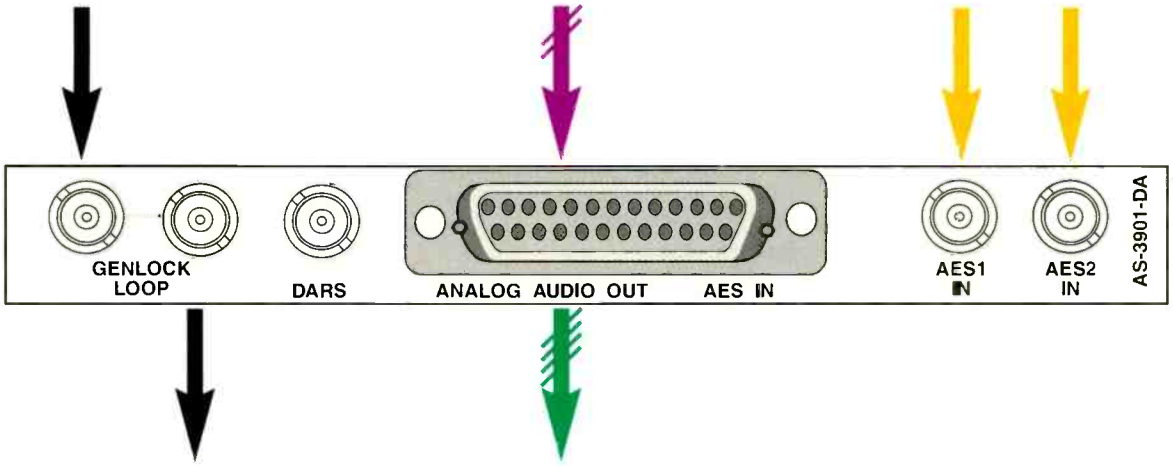
- SD video input, 2 processed outputs
- 4 channel analog audio input
- Genlock reference input with loop through
- Internal audio processing amplifier (gain, swap, delay, invert, mix)
- Selectable 16 / 20 / 24-bit audio processing
- Audio re-sampling for 32-108kHz AES inputs, with bypass for data over AES operation
- C, U & V bit transparency
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

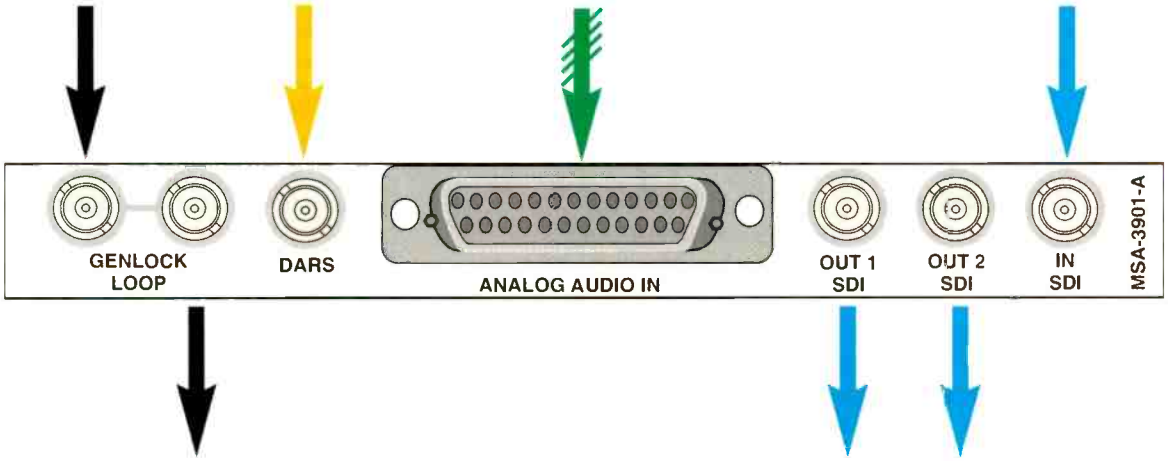
# MSA-3901-B

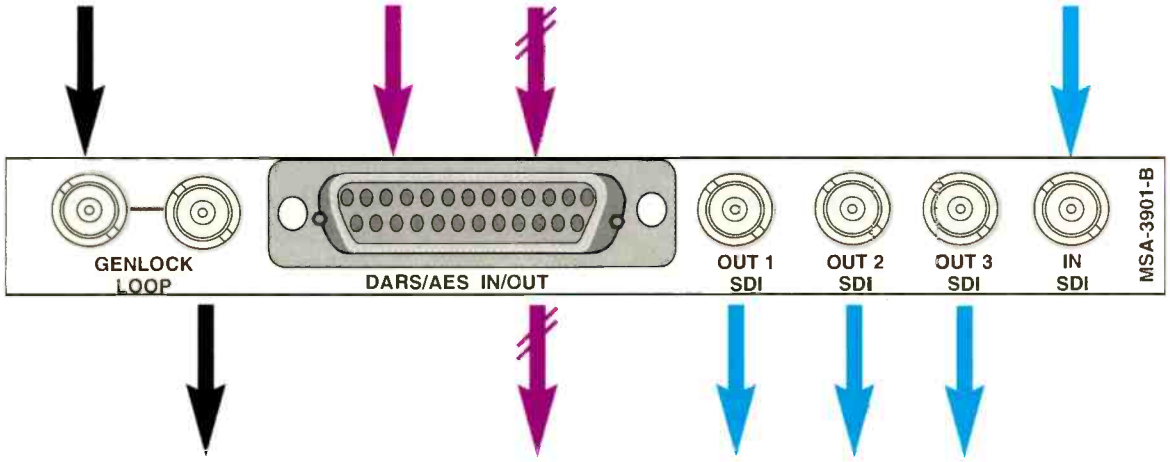
## Audio Synchronizer/Delay Processor and Multiplexer

*Available Fall 2002*

- SD video input, 3 processed outputs with multiplexed audio
- 2 AES inputs with processed outputs
- DARS input
- Genlock reference input with loop through
- Internal audio processing amplifier (gain, swap, delay, invert, mix)
- Selectable 16 / 20 / 24-bit audio processing
- Audio re-sampling for 32-108kHz AES inputs, with bypass for data over AES operation
- C, U & V bit transparency
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system


GENLOCK
LOOP
DARS
ANALOG AUDIO OUT
AES IN
AES1
IN
AES2
IN
AS-3901-DA


GENLOCK
LOOP
DARS
ANALOG AUDIO IN
OUT 1
SDI
OUT 2
SDI
IN
SDI
MSA-3901-A


GENLOCK
LOOP
DARS/AES IN/OUT
OUT 1
SDI
OUT 2
SDI
OUT 3
SDI
IN
SDI
MSA-3901-B

NEO™

## MSA-3901-C

# Audio Synchronizer/Delay Processor and Multiplexer

**Available Fall 2002**

- SD video input, 2 processed outputs with multiplexed audio
- 2 AES inputs with processed outputs
- DARS input
- Genlock reference input with loop through
- Internal audio processing amplifier (gain, swap, delay, invert, mix)
- Selectable 16 / 20 / 24-bit audio processing
- Audio re-sampling for 32-108kHz AES inputs, with bypass for data over AES operation
- C, U & V bit transparency
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

## MSA-3901-B4

# Audio Synchronizer/Delay Processor and Multiplexer

**Available Fall 2002**

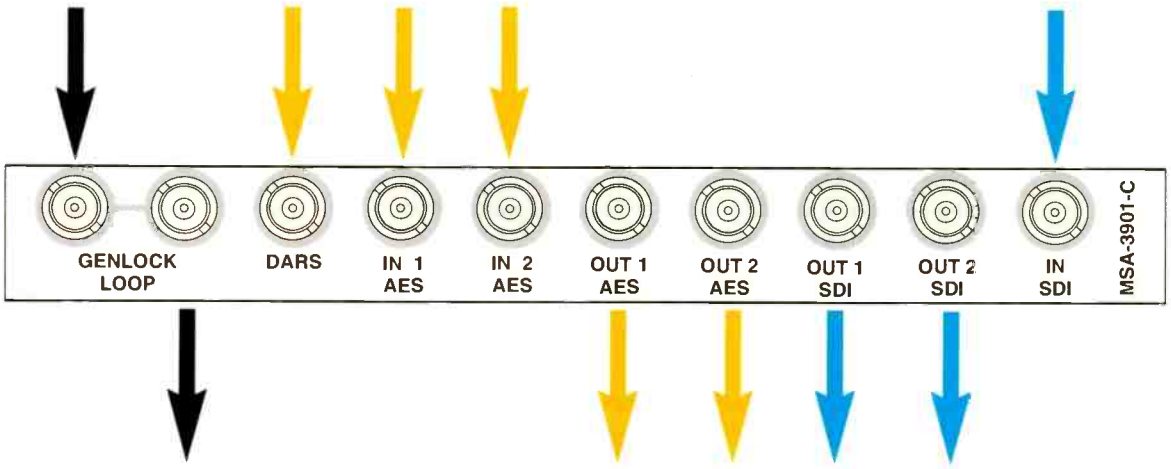
- SD video input, 3 processed outputs with multiplexed audio
- Digital audio (4 AES) input
- DARS input
- Genlock reference input with loop through
- Internal audio processing amplifier (gain, swap, delay, invert, mix)
- Selectable 16 / 20 / 24-bit audio processing
- Audio re-sampling for 32-108kHz AES inputs, with bypass for data over AES operation
- C, U & V bit transparency
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

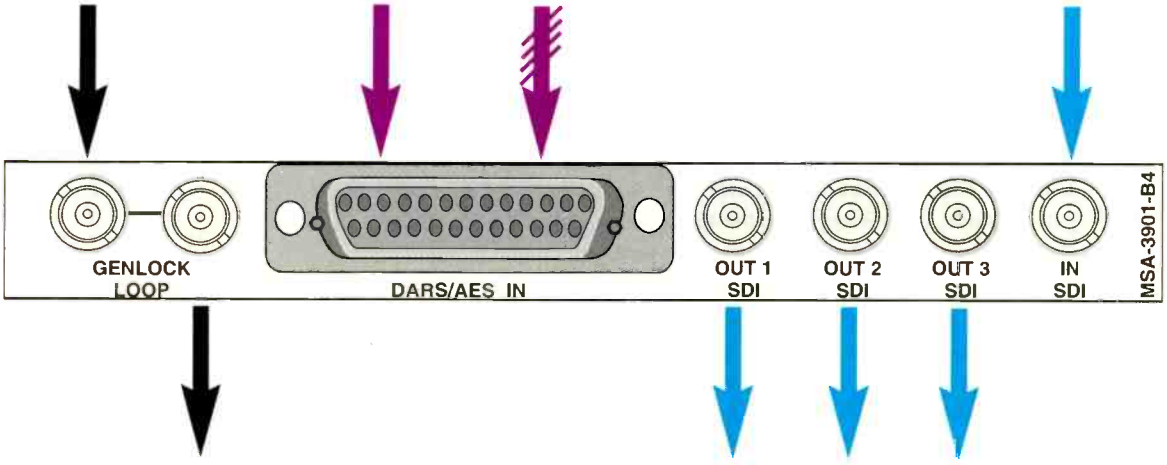
## MSA-3901-C4

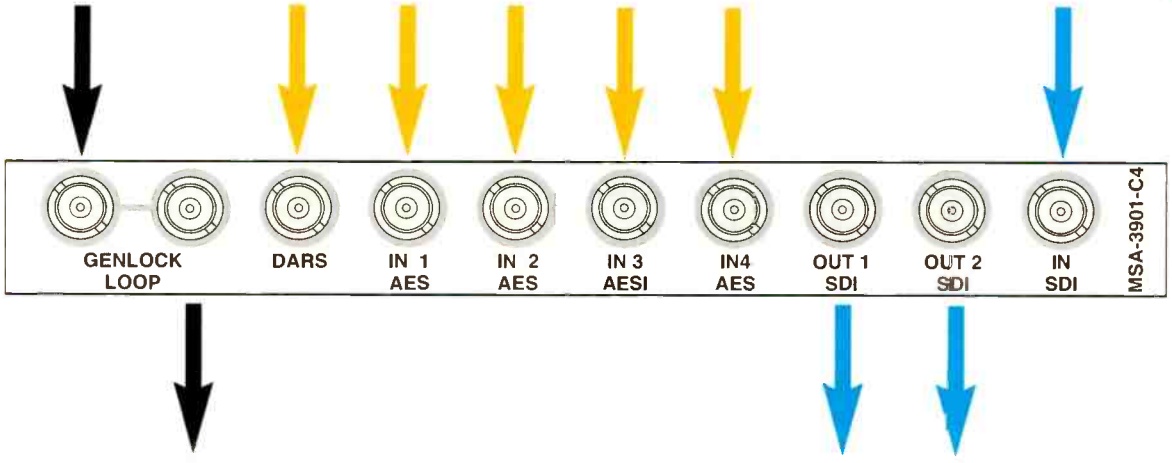
# Audio Synchronizer/Delay Processor and Multiplexer

**Available Fall 2002**

- SD video input, 2 processed outputs
- Digital audio (4 AES) input
- DARS input
- Genlock reference input with loop through
- Internal audio processing amplifier (gain, swap, delay, invert, mix)
- Selectable 16 / 20 / 24-bit audio processing
- Audio re-sampling for 32-108kHz AES inputs, with bypass for data over AES operation
- C, U & V bit transparency
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system


GENLOCK LOOP
DARS
IN 1 AES
IN 2 AES
OUT 1 AES
OUT 2 AES
OUT 1 SDI
OUT 2 SDI
IN SDI
MSA-3901-C


GENLOCK LOOP
DARS/AES IN
OUT 1 SDI
OUT 2 SDI
OUT 3 SDI
IN SDI
MSA-3901-B4


GENLOCK LOOP
DARS
IN 1 AES
IN 2 AES
IN 3 AESI
IN4 AES
OUT 1 SDI
OUT 2 SDI
IN SDI
MSA-3901-C4

NEO™

DSA-3901-A

# Audio Synchronizer/Delay Processor and Demultiplexer

- SDI video input, 3 outputs
- Selectable 16 / 20 / 24-bit audio processing
- 4 channel analog output
- Audio processing amplifier (gain, swap, delay, invert, mix)
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

DSA-3901-B4

# Audio Synchronizer/Delay Processor and Demultiplexer

*Available Fall 2002*

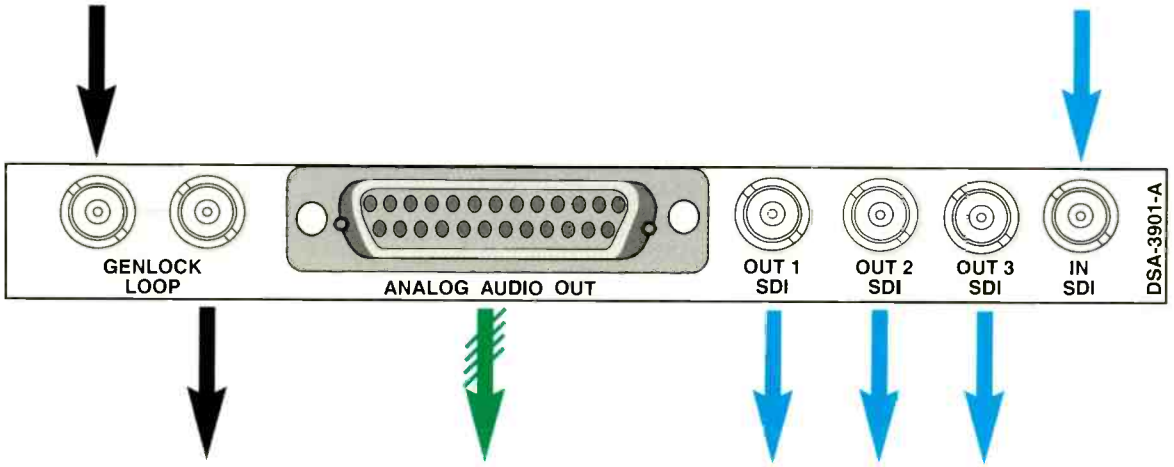
- SDI video input, 2 outputs
- Selectable 16 / 20 / 24-bit audio processing
- 4 AES digital audio outputs
- Audio processing amplifier (gain, swap, delay, invert, mix)
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

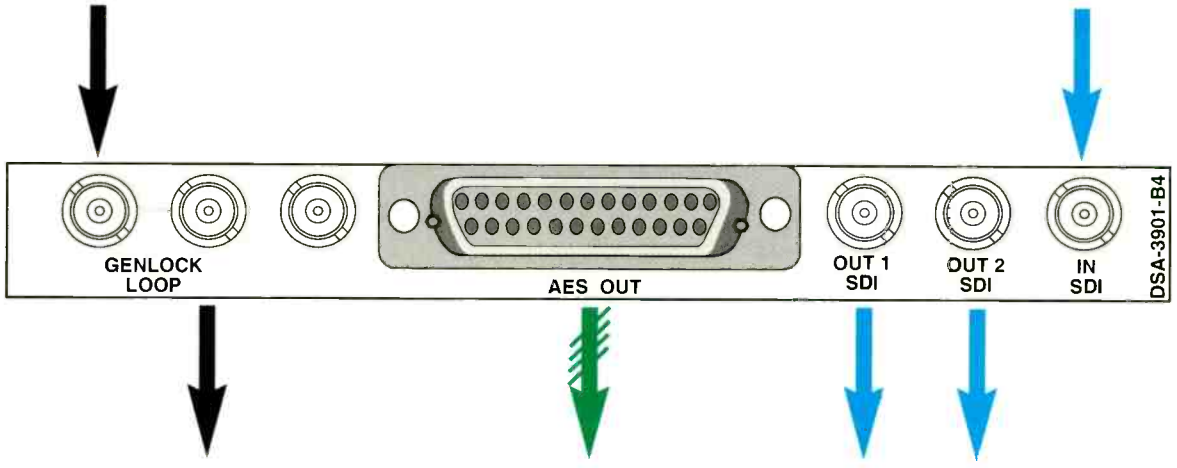
DSA-3901-C4

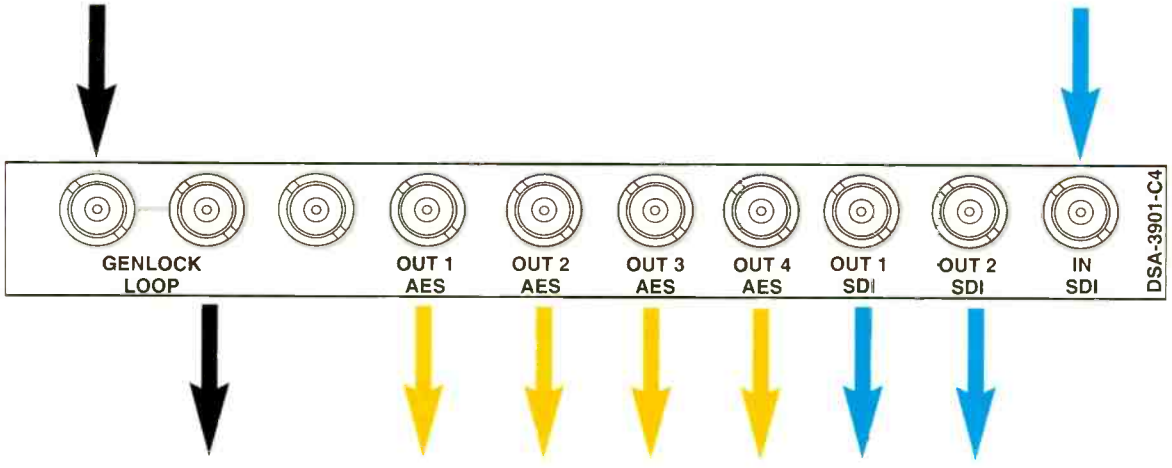
# Audio Synchronizer/Delay Processor and Demultiplexer

*Available Fall 2002*

- SDI video input, 2 outputs
- Selectable 16 / 20 / 24-bit audio processing
- 2 AES inputs with processed outputs
- Audio processing amplifier (gain, swap, delay, invert, mix)
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system


GENLOCK
LOOP
ANALOG AUDIO OUT
OUT 1
SDI
OUT 2
SDI
OUT 3
SDI
IN
SDI
DSA-3901-A


GENLOCK
LOOP
AES OUT
OUT 1
SDI
OUT 2
SDI
IN
SDI
DSA-3901-B4


GENLOCK
LOOP
OUT 1
AES
OUT 2
AES
OUT 3
AES
OUT 4
AES
OUT 1
SDI
OUT 2
SDI
IN
SDI
DSA-3901-C4

NEO™

## DEC-3901

# NTSC/PAL Analog Composite to SDI Digital Component

- NEOSCOPE card edge video monitoring
- A to D 12-bit input processing
- Input standard auto detect supporting NTSC/PAL-B/PAL-M
- User-selectable adaptive comb filter (Frame, Field, 3 line adaptive and notch)
- Hanover bar suppressor for PAL signals (On / Off)
- Input noise immunity and input video soft clipping
- 4 SDI outputs with embedded EDH
- VBI selection (normal, simple, bypass, delete)
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

## ADC-3901

HD Version 2003

# GBR, YPbPr Analog Component Video to SDI

*Available Fall 2002*

- 10-bit high quality video conversion to SDI 270Mb/s
- Looping inputs: YPbPr, RGBS
- SMPTE, EBU, MII, Betacam standard levels
- 525, 625 line rates
- Output signal type
- 12-bit video processing
- EDH inserted at output
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

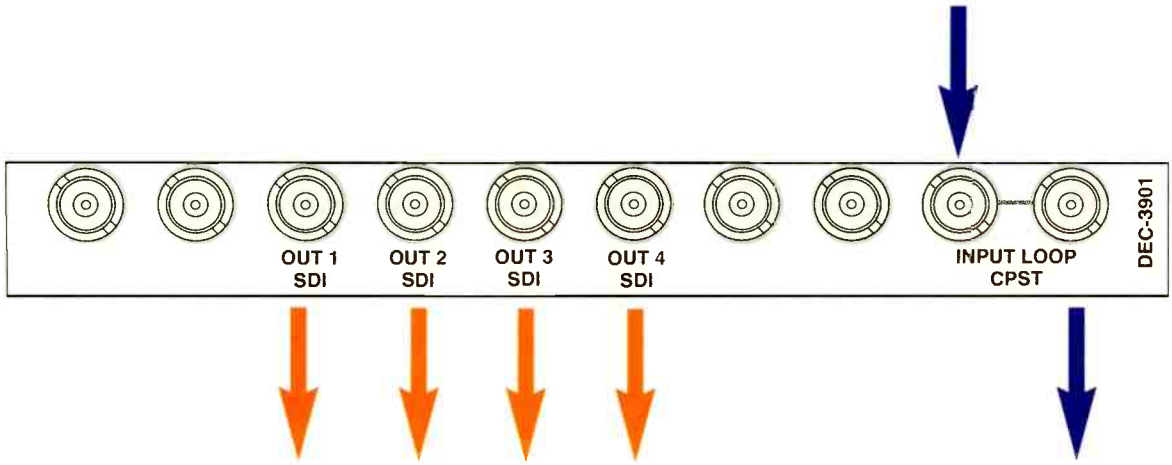
## DAC-3901

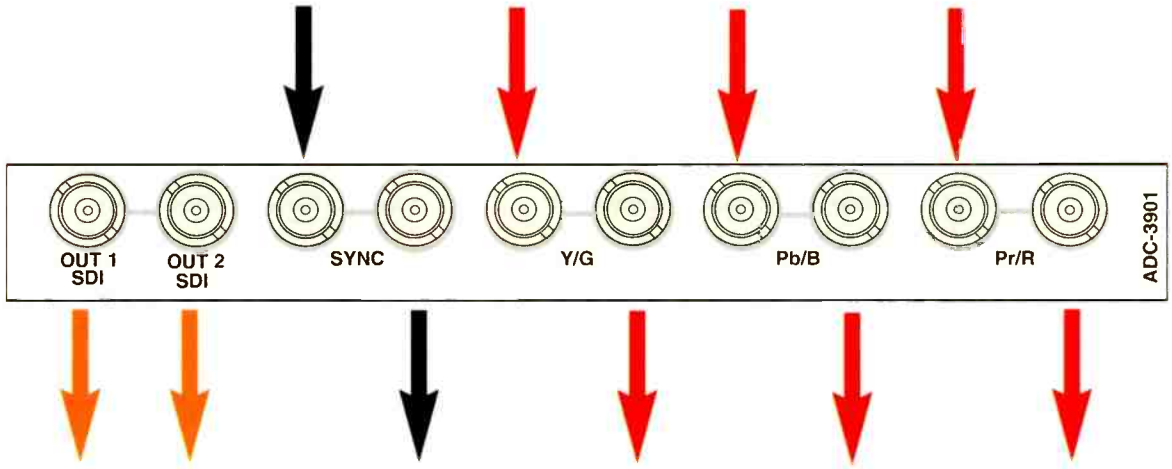
HD Version 2003

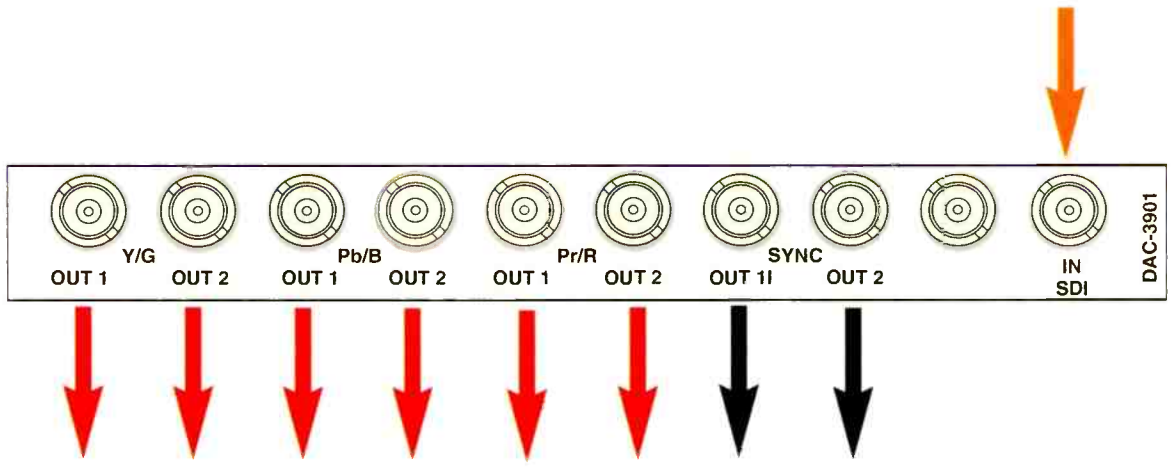
# SDI Digital Component to GBR, YPbPr Analog Component

*Available Fall 2002*

- Input signal types: SMPTE 259M, 300m cable recovery at input
- Two sets of analog component Y/G, Pb/B, Pr/R outputs
- Levels for SMPTE, EBU, MII, Betacam
- Line rates for 525, 625
- 12-bit video processing
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system


OUT 1
SDI
OUT 2
SDI
OUT 3
SDI
OUT 4
SDI
INPUT LOOP
CPST
DEC-3901


OUT 1
SDI
OUT 2
SDI
SYNC
Y/G
Pb/B
Pr/R
ADC-3901


Y/G
OUT 1
OUT 2
Pb/B
OUT 1
OUT 2
Pr/R
OUT 1
OUT 2
SYNC
OUT 1I
OUT 2
IN
SDI
DAC-3901

NEO™

## ARC-3901 SDI Aspect Ratio Converter

*Available Fall 2002*

- Standard aspect ratios: 4:3, 14:9, 16:9 and 21:9 to 4:3, 14:9, 16:9 and 21:9
- Custom aspect ratios
- SDI input and output
- 10-bit processing
- Video Index and WSS, handling and insertion
- Relay bypass upon loss of power, or module failure
- VANC and HANC passed transparently
- 8 user and factory store
- Null-processing mode
- GPI outputs for signal loss, module fail and Video Index/WWS reporting
- GPI inputs for recall of pre-set set-ups and VI Control
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

## ARC-3902 SDI Aspect Ratio Converter

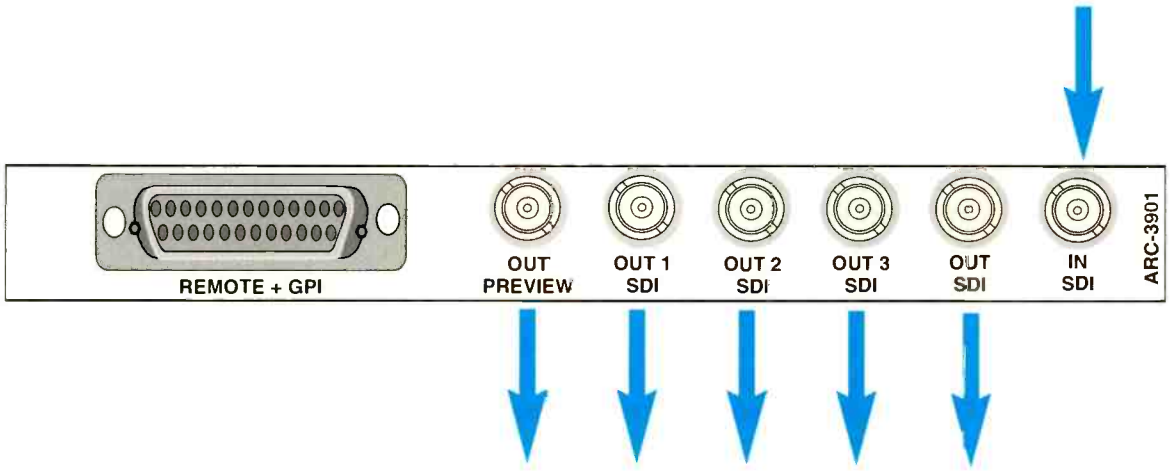
*Available Fall 2002*

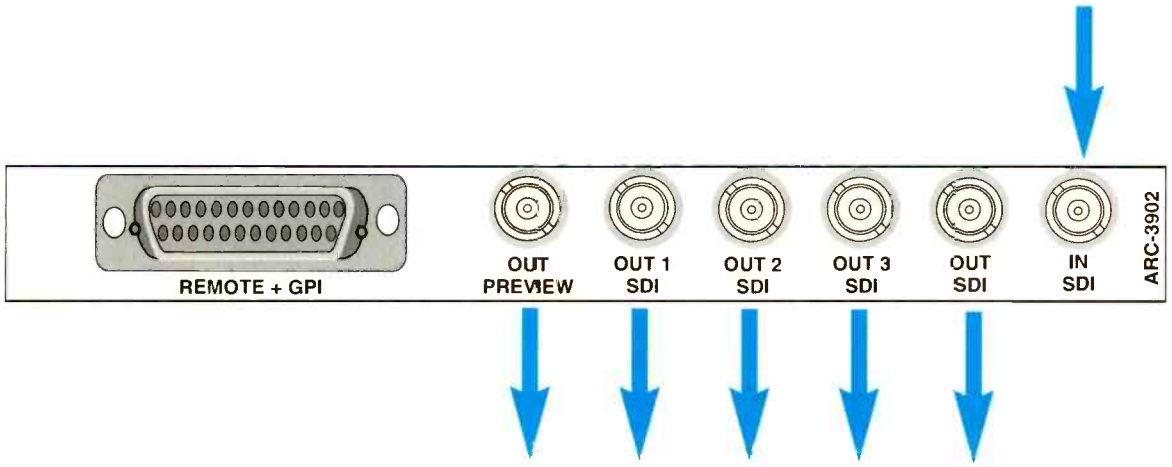
- Standard aspect ratios: 4:3, 14:9, 16:9 and 21:9 to 4:3, 14:9, 16:9 and 21:9
- SDI input and output
- 10-bit processing
- Video Index and WSS, handling and insertion
- Relay bypass upon loss of power, or module failure
- VANC and HANC passed transparently
- 8 user and factory store
- Null-processing mode
- GPI outputs for signal loss, module fail and Video Index/WWS reporting
- GPI inputs for recall of pre-set set-ups and VI Control
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

## ADC-3981 4 CH BAL Analog to 2 AES COAX / 2 AES BAL Digital

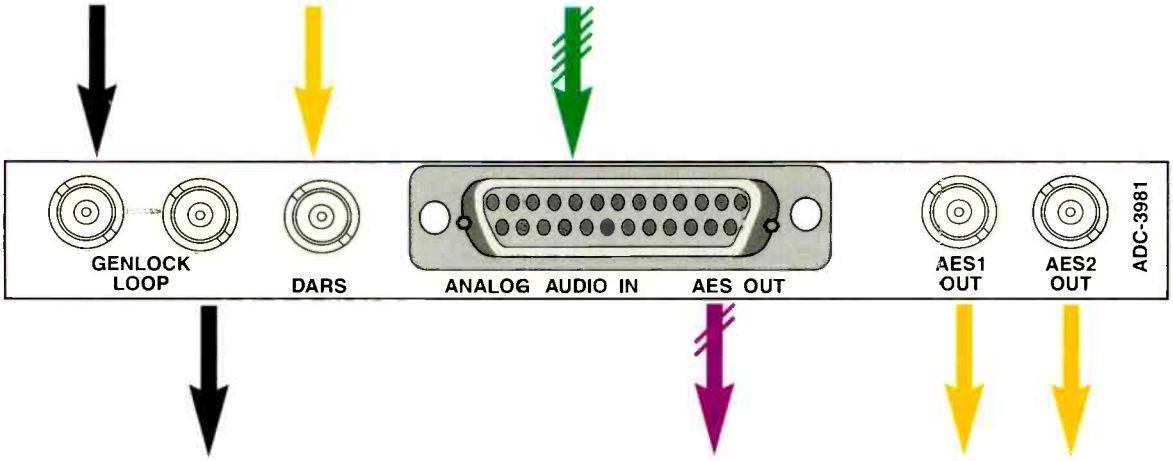
*Available Fall 2002*

- 96kHz capable
- 24-bit processing
- Four balanced analog audio inputs
- 2 AES-75 and 2 AES-110 outputs
- Channel Invert, Channel Swap, Gain
- Reference input (DARS/Color Black)
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system


REMOTE + GPI
OUT PREVIEW
OUT 1 SDI
OUT 2 SDI
OUT 3 SDI
OUT SDI
IN SDI
ARC-3901


REMOTE + GPI
OUT PREVIEW
OUT 1 SDI
OUT 2 SDI
OUT 3 SDI
OUT SDI
IN SDI
ARC-3902




GENLOCK LOOP
DARS
ANALOG AUDIO IN
AES OUT
AES1 OUT
AES2 OUT
ADC-3981

NEO™

## DAC-3981

# 2 AES COAX / 2 AES BAL to 4 CH BAL Analog Audio

*Available Fall 2002*

- 32 / 44.1 / 48 / 96 kHz sampling capable
- Input signal types: 2 AES-75 or 2 AES-110
- Four balanced analog audio outputs (4 ch. or 2 x 2ch.)
- De-emphasis on/off selectable
- Peak / silence indication
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

## MXA-3901-A

# 4 Analog to SDI MUX

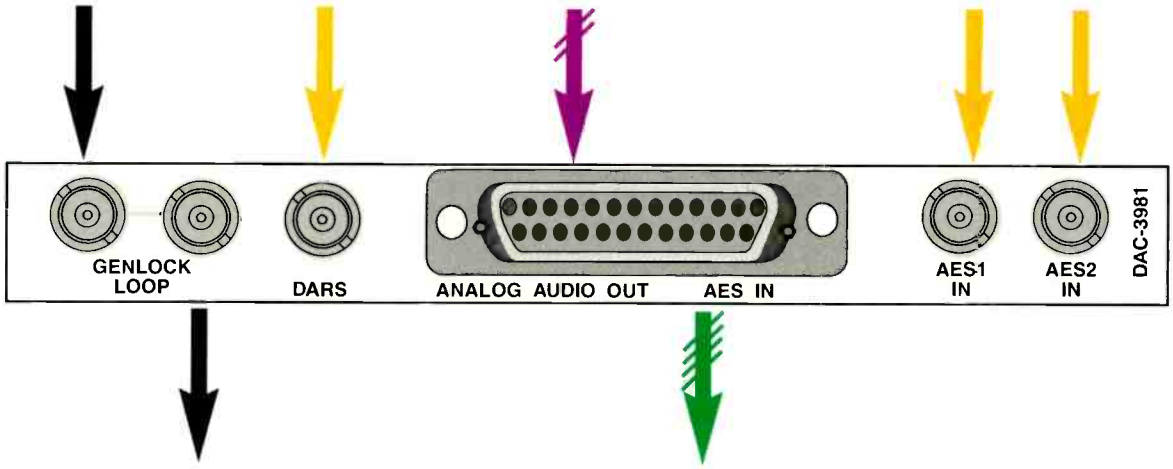
- SDI video input, 2 outputs
- Analog audio multiplexing into SDI
- Balanced 4 channel analog audio
- Audio processing amplifier included (gain, swap, invert, mix)
- Selectable 16 / 20 / 24-bit audio processing
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

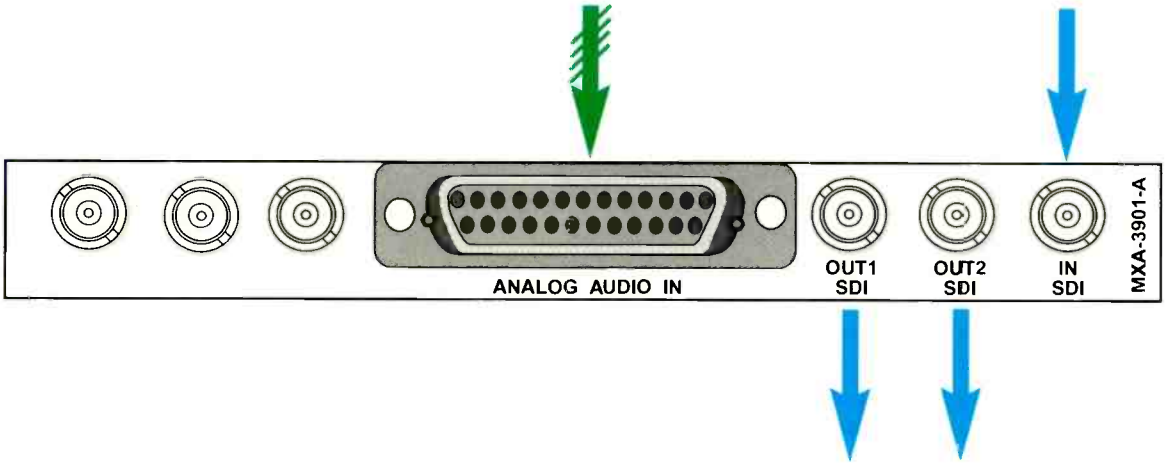
## MXA-3901-B

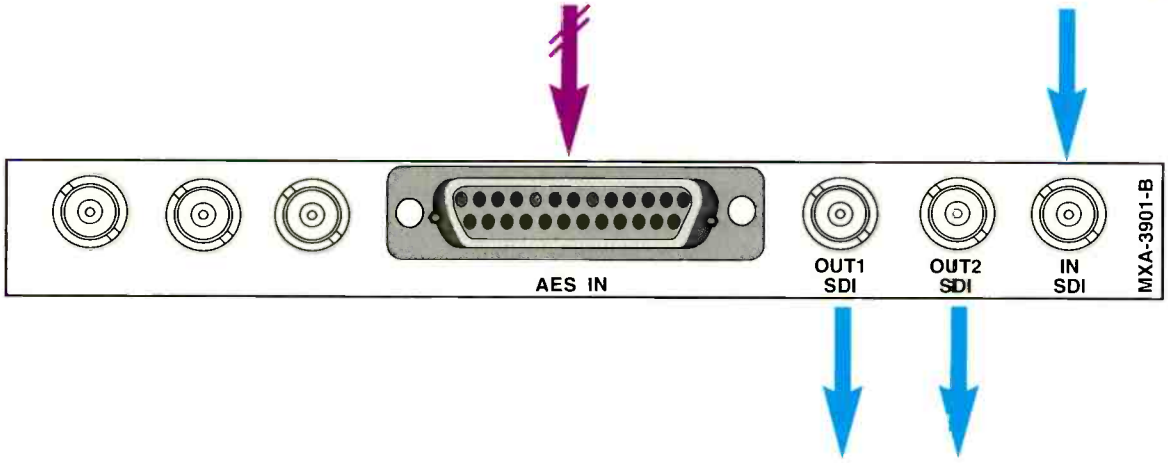
# 2 AES Digital Audio to SDI MUX

*Available Fall 2002*

- SDI video input, 2 outputs
- Digital audio multiplexing into SDI
- Balanced AES 2 channels
- Audio processing amplifier included (gain, swap, invert, mix)
- Selectable 16 / 20 / 24-bit audio processing
- Passes compressed audio data, ie: Diamond, DOLBY-E
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system


GENLOCK
LOOP
DARS
ANALOG AUDIO OUT
AES IN
AES1
IN
AES2
IN
DAC-3981


ANALOG AUDIO IN
OUT1
SDI
OUT2
SDI
IN
SDI
MXA-3901-A


AES IN
OUT1
SDI
OUT2
SDI
IN
SDI
MXA-3901-B

NEO™

## MXA-3901-C

# 2 AES Digital Audio to SDI MUX

*Available Fall 2002*

- SDI video input, 2 outputs
- Digital audio multiplexing into SDI
- Unbalanced AES version 2 channels
- Audio processing amplifier included (gain, swap, invert, mix)
- Selectable 16 / 20 / 24-bit audio processing
- Passes compressed audio data, ie: Diamond, DOLBY-E,
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

## MXA-3901-B4

# 4 AES Digital Audio to SDI MUX

*Available Fall 2002*

- SDI video input, 2 outputs
- Digital audio multiplexing into SDI
- Unbalanced AES version 4 channels
- Audio processing amplifier included (gain, swap, invert, mix)
- Selectable 16 / 20 / 24-bit audio processing
- Passes compressed audio data, ie: Diamond, DOLBY-E, (digital versions only)
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

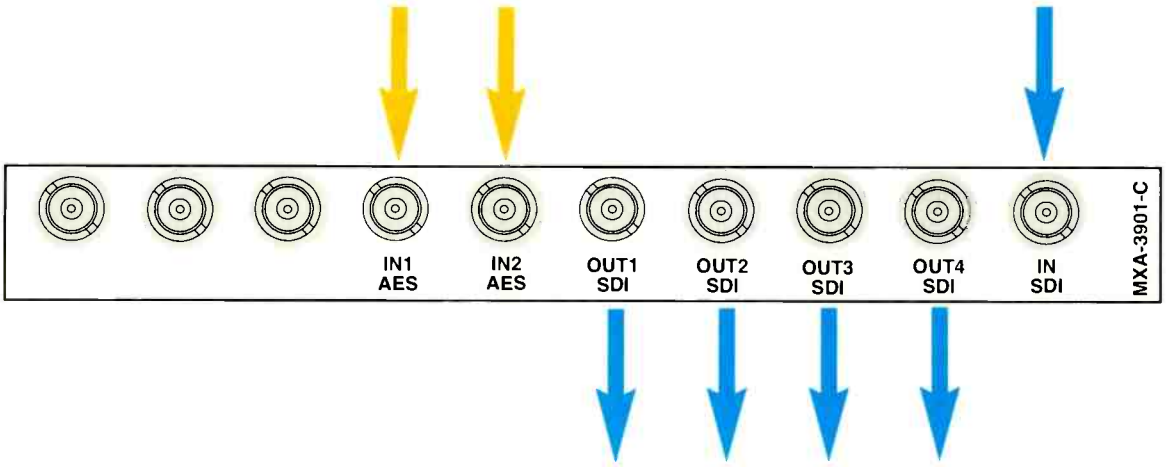
## MXA-3901-C4

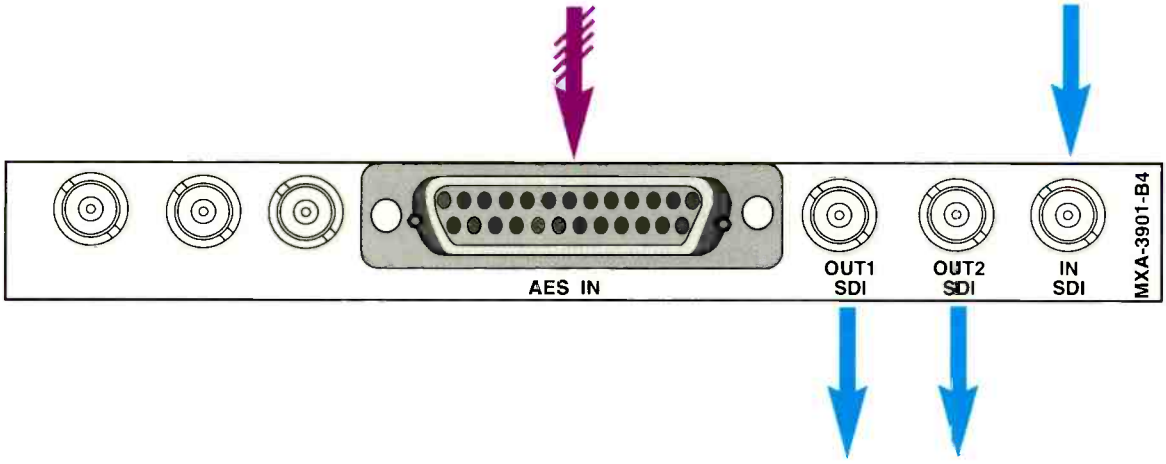
HD Version 2003

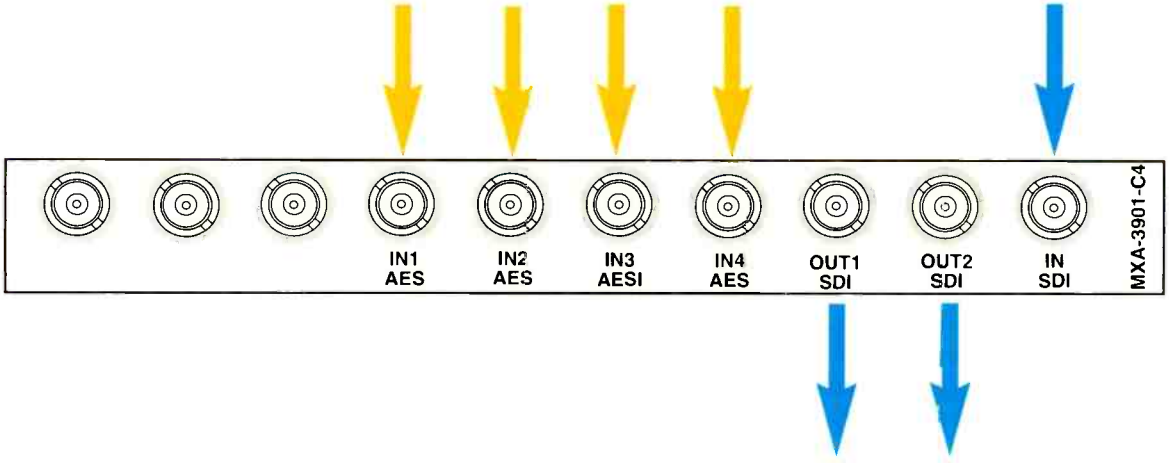
# AES Digital Audio to SDI MUX

*Available Fall 2002*

- SDI video input, 2 outputs
- Unbalanced AES version 4 channels
- Audio processing amplifier included (gain, swap, invert, mix)
- Selectable 16 / 20 / 24-bit audio processing
- Passes compressed audio data, ie: Diamond, DOLBY-E, (digital versions only)
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system


IN1
AES
IN2
AES
OUT1
SDI
OUT2
SDI
OUT3
SDI
OUT4
SDI
IN
SDI
MXA-3901-C


AES IN
OUT1
SDI
OUT2
SDI
IN
SDI
MXA-3901-B4


IN1
AES
IN2
AES
IN3
AESI
IN4
AES
OUT1
SDI
OUT2
SDI
IN
SDI
MXA-3901-C4

NEO™

## DMX-3901-A

# SDI Demux to 4 Analog Audio

- SDI video in, 2 outputs
- Analog audio output, 4 channels
- Audio processing amplifier included (gain, swap, invert, mix)
- Selectable 16 / 20 / 24-bit audio processing
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

## DMX-3901-B

# SDI Demux to 2 AES Digital Audio

*Available Fall 2002*

- SDI video input, 2 outputs
- Digital audio output, 2 AES channels
- Selectable 16 / 20 / 24-bit audio processing
- Passes compressed audio data, ie: APT-X, DOLBY-E, AC-3
- Audio processing amplifier included (gain, swap, invert, mix)
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

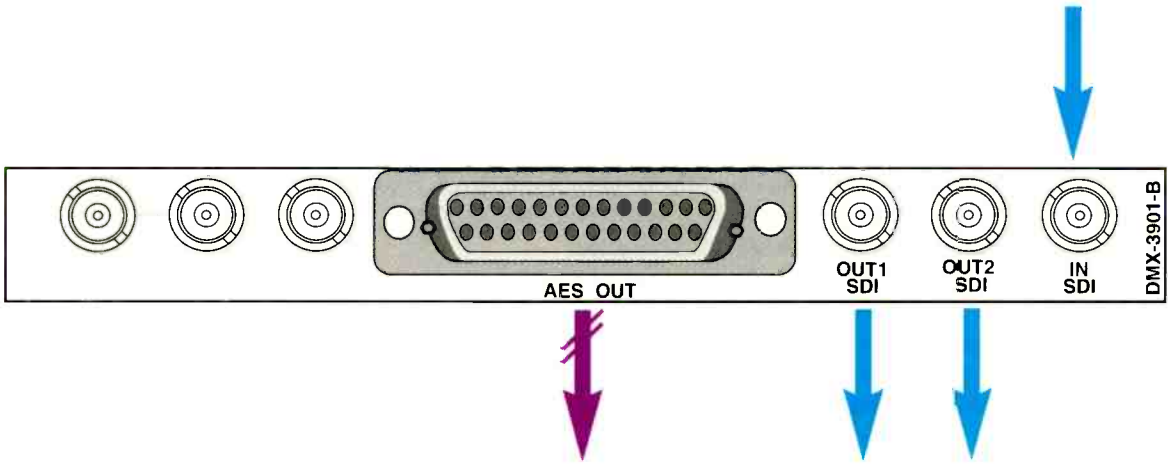
## DMX-3901-C

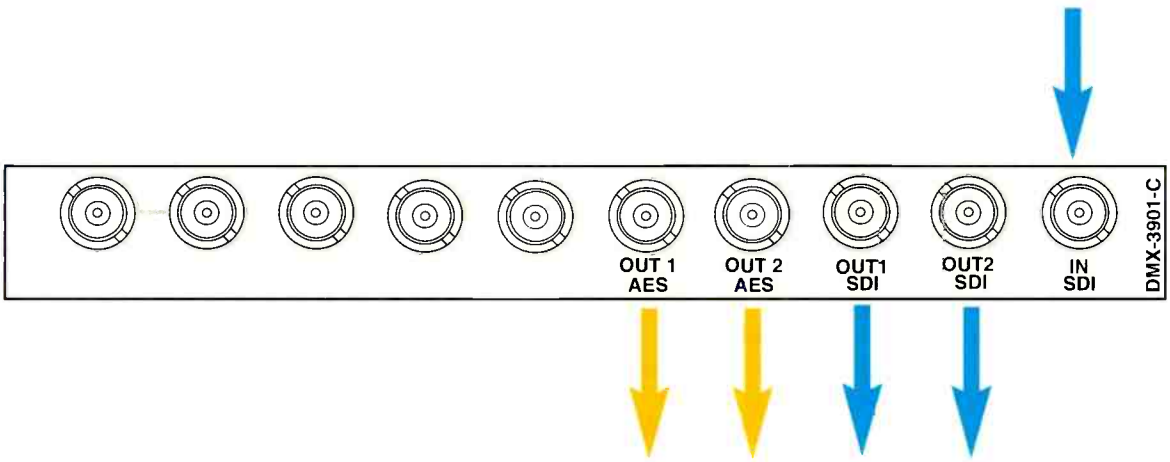
# SDI Demux to 2 AES Digital Audio

*Available Fall 2002*

- SDI video input, 2 outputs
- Digital audio output, 2 AES channels
- Audio processing amplifier included (gain, swap, invert, mix)
- Selectable 16 / 20 / 24-bit audio processing
- Passes compressed audio data, ie: APT-X, DOLBY-E, AC-3
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system


ANALOG AUDIO OUT
OUT1 SDI
OUT2 SDI
IN SDI
DMX-3901-A


AES OUT
OUT1 SDI
OUT2 SDI
IN SDI
DMX-3901-B


OUT 1 AES
OUT 2 AES
OUT1 SDI
OUT2 SDI
IN SDI
DMX-3901-C

NEO™

DMX-3901-B4

# SDI Demux to 4 Analog or 2 or 4 AES Digital Audio

- SDI video input, 2 outputs
- Digital audio output, 4 AES channels
- Selectable 16 / 20 / 24-bit audio processing
- Audio processing amplifier included (gain, swap, invert, mix)
- Passes compressed audio data, ie: APT-X, DOLBY-E, AC-3
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

DMX-3901-C4

HD Version 2003

# SDI Demux to 4 AES Digital Audio

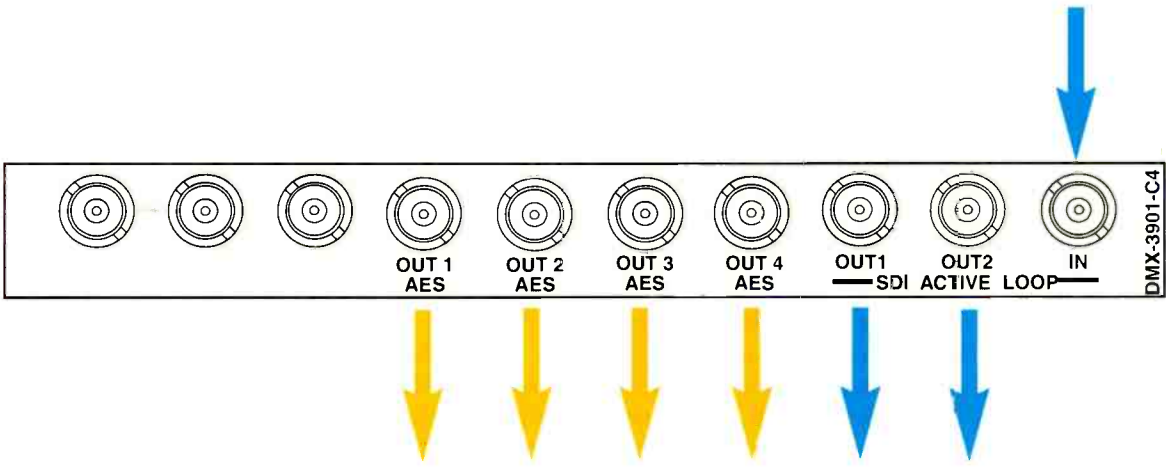
- SDI video input, 2 outputs
- Digital audio output, 4 AES channels
- Selectable 16 / 20 / 24-bit audio processing
- Audio processing amplifier included (gain, swap, invert, mix)
- Passes compressed audio data, ie: APT-X, DOLBY-E, AC-3
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

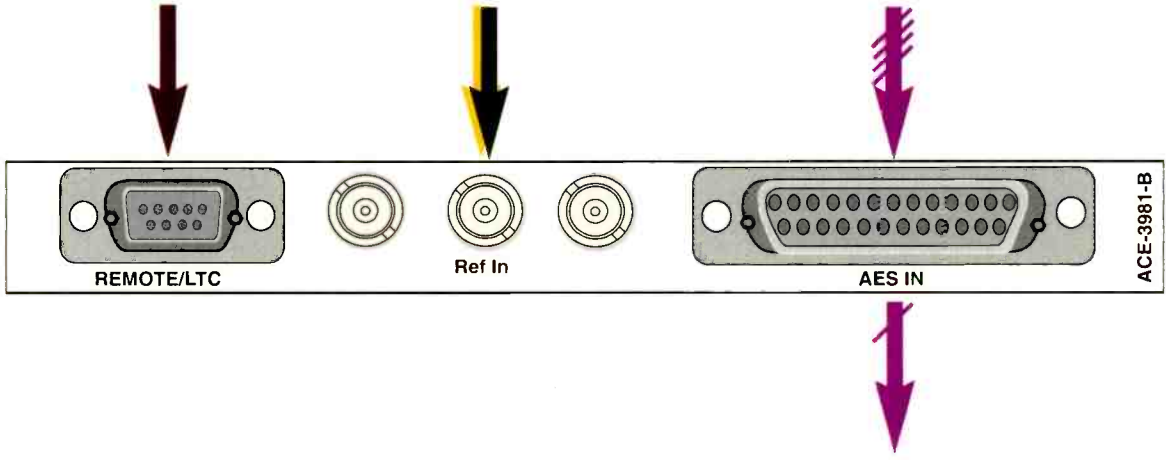
ACE-3981-B

# Diamond Audio Compression Encoder 4 to 1 AES

- Handling of asynchronous AES audio
- Handling of 24-96 kHz AES audio
- Bypass for linear operation
- 4 x AES inputs (Balanced)
- 1 x Black and Burst Composite Video/AES Audio ref input (selectable)
- 1 x RS485 Metadata input
- 1 x Compressed AES input and output
- 1 x LTC input
- Selectable encoding e.g. 16/20/24-bit accuracy, 16/20/24-bit transport
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system


BALANCED AES OUTPUT
OUT1
SDI
OUT2
ACTIVE LOOP
IN
DMX-3901-B4


OUT 1
AES
OUT 2
AES
OUT 3
AES
OUT 4
AES
OUT1
SDI
OUT2
ACTIVE LOOP
IN
DMX-3901-C4


REMOTE/LTC
Ref In
AES IN
ACE-3981-B

NEO™

ACE-3981-C

# Diamond Audio Compression Encoder 4 to 1 AES

- Handling of asynchronous AES audio
- Handling of 24-96 kHz AES audio
- Bypass for linear operation
- 4 x AES inputs (balanced or unbalanced)
- 1 x Black and Burst Composite Video/AES Audio ref input (selectable)
- 1 x RS485 Metadata input
- 1 x Compressed AES input and output
- 1 x LTC input
- Selectable encoding e.g. 16/20/24-bit accuracy, 16/20/24-bit transport
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

ACD-3981-B

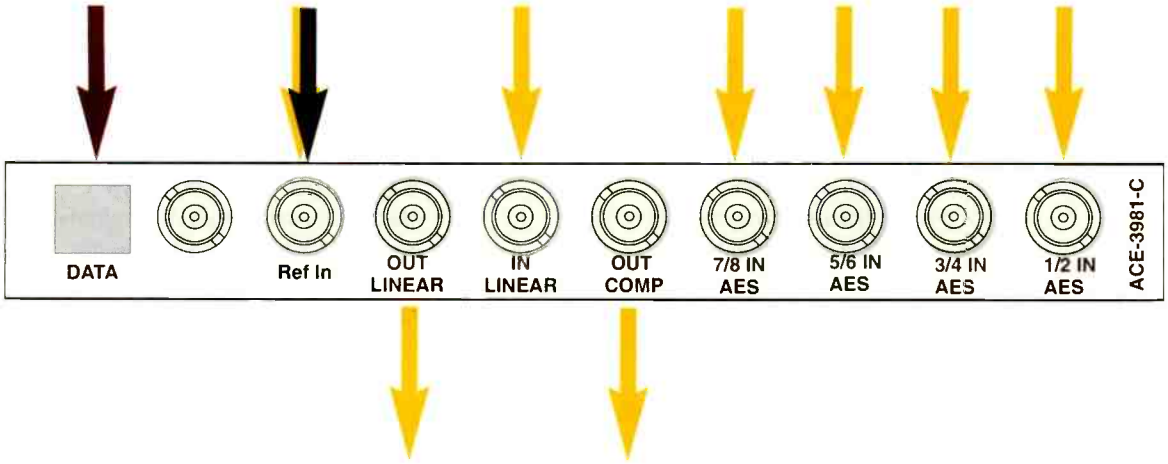
# Diamond Audio Compression Decoder 1 to 4 AES

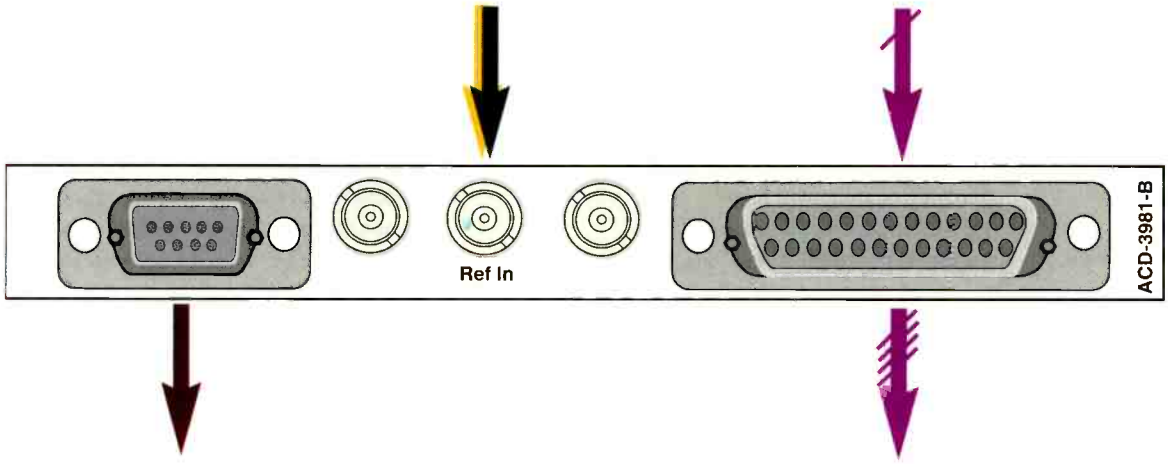
- Bypass for linear operation
- 4 x AES outputs (balanced or unbalanced)
- 1 x compressed AES input
- 1 x RS485 Metadata output
- 1 x LTC output
- Autodetect of compressed input format
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol

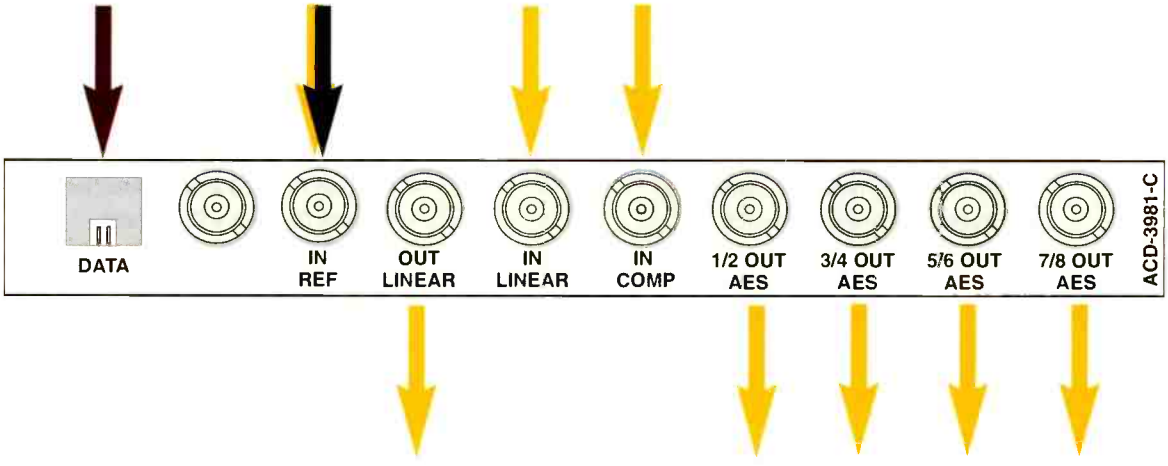
ACD-3981-C

# Diamond Audio Compression Decoder 1 to 4 AES

- Bypass for linear operation
- 4 x AES outputs (balanced or unbalanced)
- 1 x compressed AES input
- 1 x RS485 Metadata output
- 1 x LTC output
- Autodetect of compressed input format
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol


DATA
Ref In
OUT LINEAR
IN LINEAR
OUT COMP
7/8 IN AES
5/6 IN AES
3/4 IN AES
1/2 IN AES
ACE-3981-C


Ref In
ACD-3981-B


DATA
IN REF
OUT LINEAR
IN LINEAR
IN COMP
1/2 OUT AES
3/4 OUT AES
5/6 OUT AES
7/8 OUT AES
ACD-3981-C

NEO™

AME-3981-B

# Diamond Audio Compression with Multiplexer

- NEOSCOPE card edge video monitoring
- Handling of asynchronous AES audio
- Handling of 24 to 96kHz AES audio
- Bypass for linear operation
- 4 x AES inputs (balanced)
- 1 x Black and Burst Composite Video/AES Audio ref input (selectable)
- 1 x RS485 Metadata input
- SDI output with multiplexed compressed audio
- 1 x LTC input
- Selectable encoding e.g. 16/20/24-bit accuracy, 16/20/24 bit transport
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol

AME-3981-C

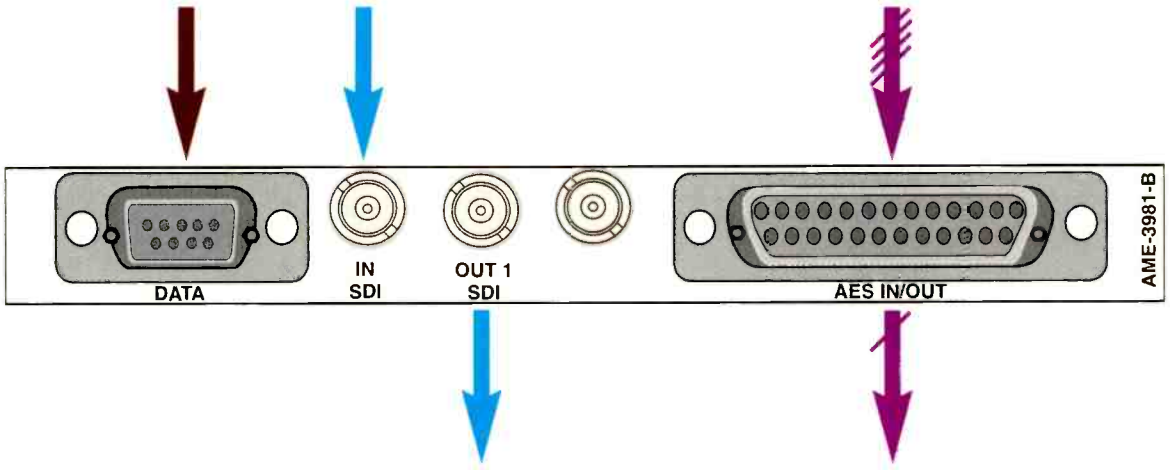
# Diamond Audio Compression with Multiplexer

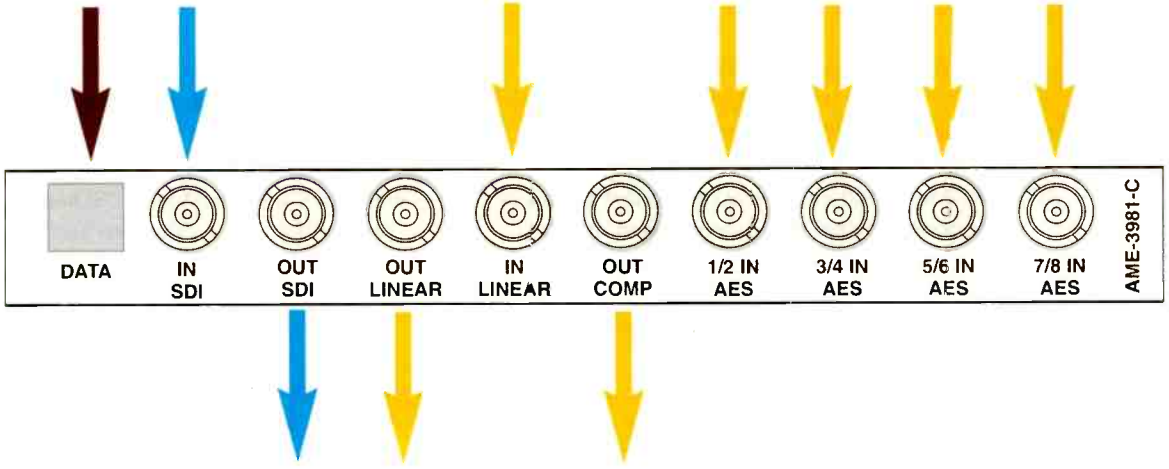
- NEOSCOPE card edge video monitoring
- Handling of asynchronous AES audio
- Handling of 24 to 96kHz AES audio
- Bypass for linear operation
- 4 x AES inputs (unbalanced)
- 1 x Black and Burst Composite Video/AES Audio ref input (selectable)
- 1 x RS485 Metadata input
- SDI output with multiplexed compressed audio
- 1 x LTC input
- Selectable encoding e.g. 16/20/24-bit accuracy, 16/20/24-bit transport
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol

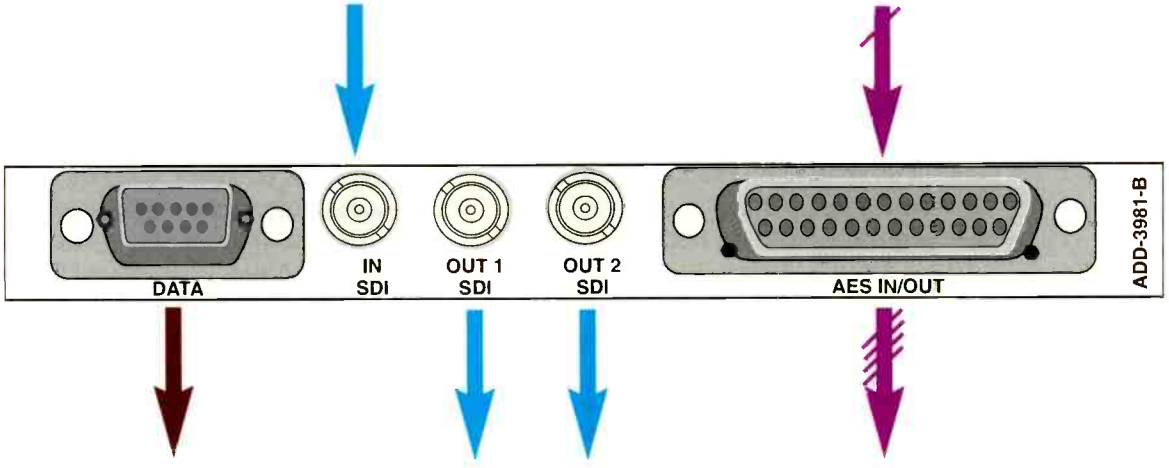
ADD-3981-B

# Diamond Audio Compression with Demultiplexer

- NEOSCOPE card edge video monitoring
- Ability to be remotely controlled
- Bypass for linear operation
- 4 x AES outputs (balanced)
- 1 x compressed AES input
- 1 x RS485 Metadata output
- 1 x LTC output
- Autodetect of compressed input format
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol


DATA
IN
SDI
OUT 1
SDI
AES IN/OUT
AME-3981-B


DATA
IN
SDI
OUT
SDI
OUT
LINEAR
IN
LINEAR
OUT
COMP
1/2 IN
AES
3/4 IN
AES
5/6 IN
AES
7/8 IN
AES
AME-3981-C


DATA
IN
SDI
OUT 1
SDI
OUT 2
SDI
AES IN/OUT
ADD-3981-B

NEO™

ADD-3981-C

# Diamond Audio Compression with Demultiplexer

- NEOSCOPE card edge video monitoring
- Ability to be remotely controlled
- Bypass for linear operation
- 4 x AES outputs (unbalanced)
- 1 x compressed AES input
- 1 x RS485 Metadata output
- 1 x LTC output
- Autodetect of compressed input format
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
    - System Discovery/Diagnostics
    - Local/Remote Control, Configuration, Monitoring and Secure Access
    - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
    - Interface with 3rd party equipment and applications through simple, ASCII protocol

VSM-3901

HD Version 2003

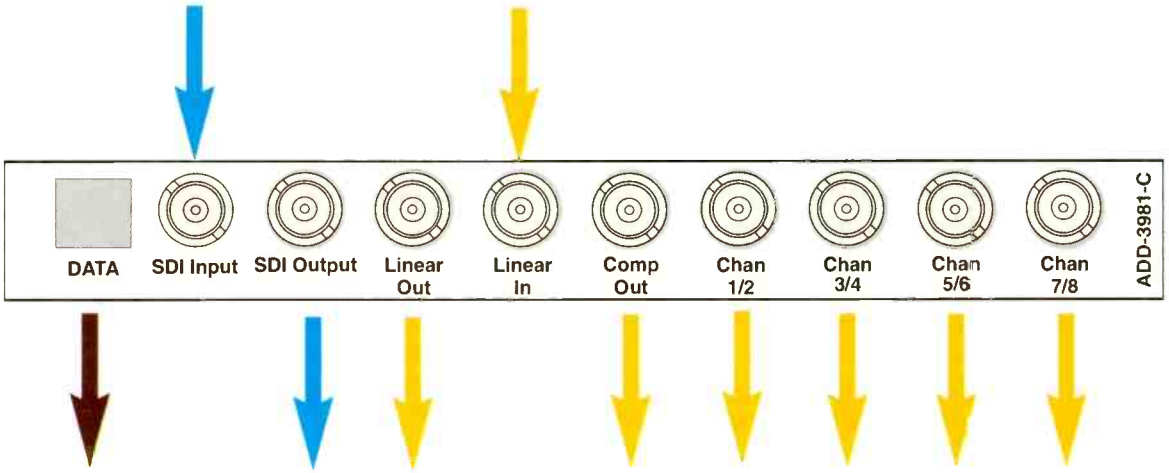
# SDI DA and NTSC, PAL, GBR, YPbPr, YC Monitoring

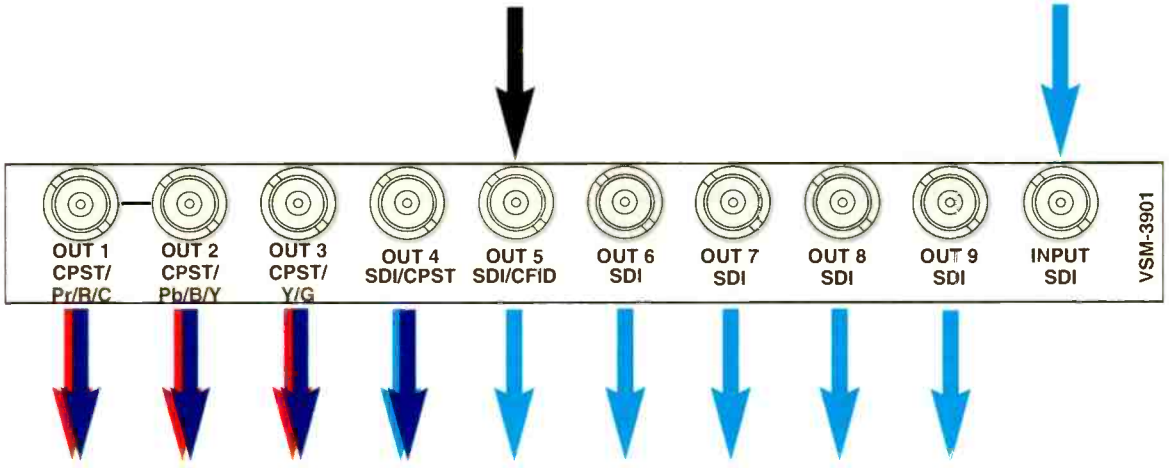
- 10-bit signal processing path
- Up to 6 re-clocked equalized 4:2:2 serial outputs
- Up to 4 NTSC/PAL-B analog composite color outputs or 1 component (GBR/Y, Pb, Pr/YC)
- Ideal for monitoring serial component signals in composite or/and component analog monitors
- Standard mode select (525 or 625) vertical blanking pass/delete, chroma on/off, setup on/off, burst on/off and chroma filter bandwidth select
- Input standard manual/auto detect supporting NTSC/PAL-B
- Offering input signal indicators/alarms of: input standard, error detection and power regulation
- Ideal for monitoring serial component signals in composite and/or component analog monitors
- Encoded outputs suitable for dubbing (10-bits)
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

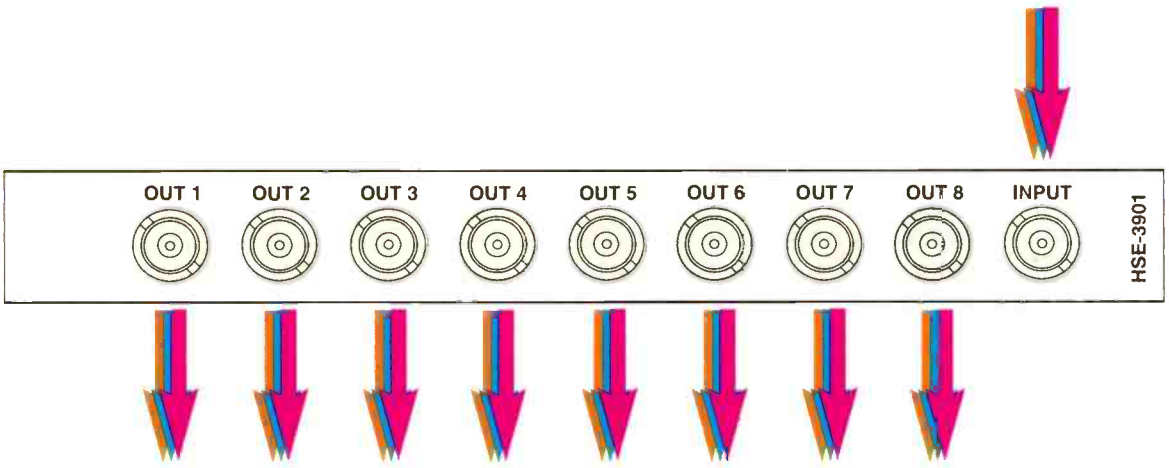
HSE-3901

# SDI and HD-SDI DA

- Input signal types: SMPTE 259M, 292M, 344M
- Single-ended differential Input
- Auto EQ for 300m (983ft.) for 270 Mb/s and 150m (483ft.) for 1.485Gb/s
- Auto reclocking at 1.5Gb/s, 143Mb/s, 177Mb/s, 270Mb/s, 360Mb/s and 540Mb/s
- Force Standard
- Auto bypass if unable to lock at the above rates
- DVB-ASI compatible (outputs 2, 4, 6, 8)
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Provides the following settings reports capabilities
  - Input signal absence
  - Data rate
  - Automatic bypass for non-SMPTE data rates
- DejaView intelligent settings recovery system


DATA
SDI Input
SDI Output
Linear Out
Linear In
Comp Out
Chan 1/2
Chan 3/4
Chan 5/6
Chan 7/8
ADD-3981-C


OUT 1 CPST/ Pr/R/C
OUT 2 CPST/ Pb/B/Y
OUT 3 CPST/ Y/G
OUT 4 SDI/CPST
OUT 5 SDI/CFID
OUT 6 SDI
OUT 7 SDI
OUT 8 SDI
OUT 9 SDI
INPUT SDI
VSM-3901


OUT 1
OUT 2
OUT 3
OUT 4
OUT 5
OUT 6
OUT 7
OUT 8
INPUT
HSE-3901

NEO™

VSE-3901

## SDI DA

- Input signal types: SMPTE 259M, 344M, DVB-ASI
- Differential input, transformer coupled inputs and outputs
- 8 re-clocked and auto-equalized outputs
- Automatic or manual set of the reclock rate at 143 / 277/ 270 / 360 /540 Mb/s
- Automatic bypass if unable to lock at the above rates
- Forced bypass capability available
- ASI compliant (transformer coupled outputs, all correct polarity)
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
    - System Discovery/Diagnostics
    - Local/Remote Control, Configuration, Monitoring and Secure Access
    - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
    - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Provides real-time information on the following
  - Signal presence, reclock rate, bypass, regulator output
- DejaView intelligent settings recovery system

AES-3981-B

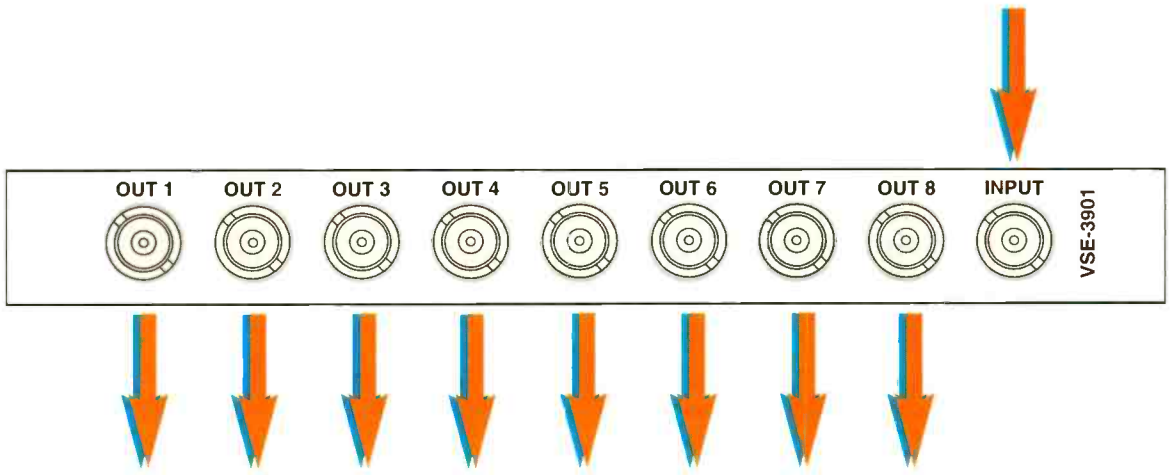
## AES Audio DA

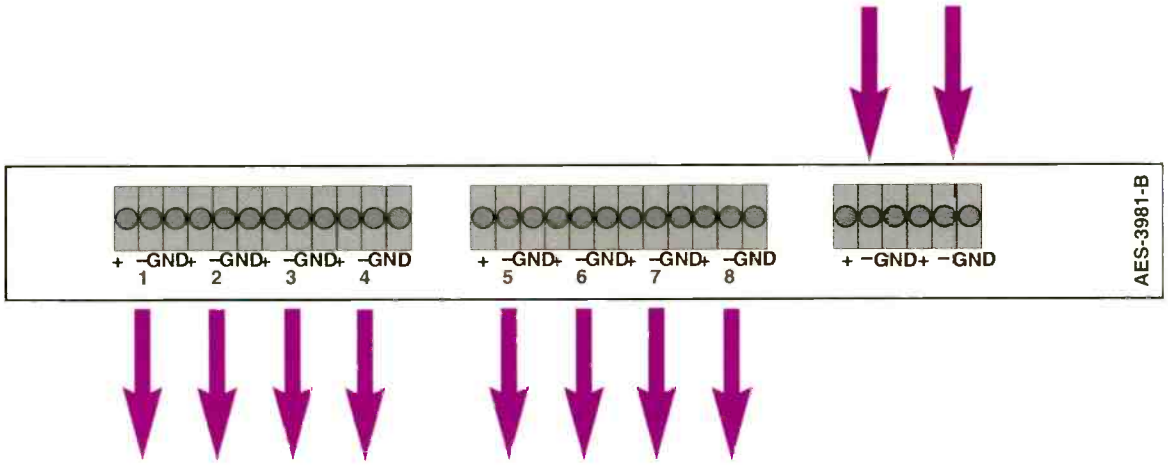
- Input signal type: AES 110 ohm interfaces
- Data only mode for compressed audio signals
- AES frame rates up to 96kHz
- 8 outputs
- Auto EQ, Auto re-clock up to 96kHz
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

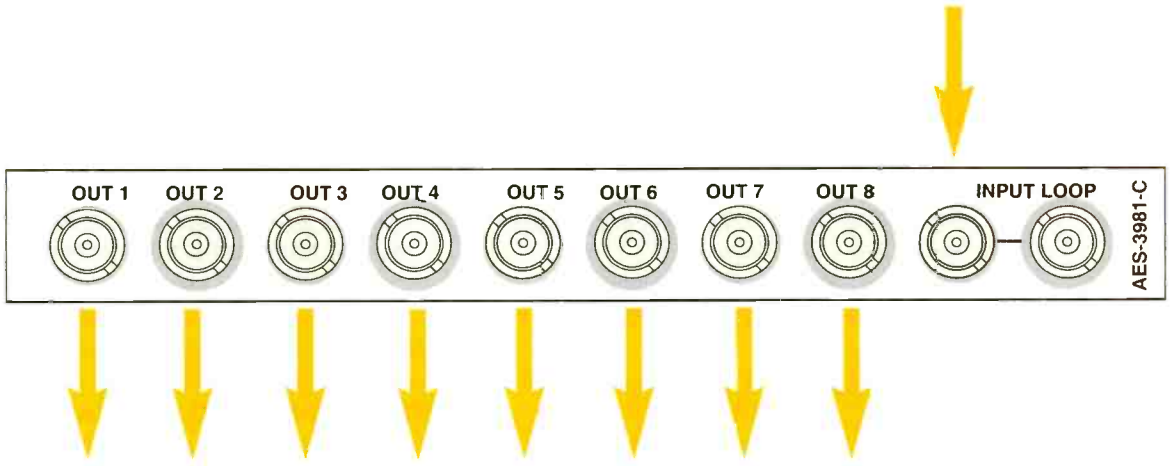
AES-3981-C

## AES Audio DA

- Input signal type: AES 75 ohm interfaces
- Data only mode for compressed audio signals
- AES frame rates up to 96kHz
- 8 outputs
- Auto EQ, Auto re-clock up to 96kHz
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system


OUT 1
OUT 2
OUT 3
OUT 4
OUT 5
OUT 6
OUT 7
OUT 8
INPUT
VSE-3901


+ –GND+ –GND+ –GND+ –GND
1 2 3 4
+ –GND+ –GND+ –GND+ –GND
5 6 7 8
+ –GND+ –GND
AES-3981-B


OUT 1
OUT 2
OUT 3
OUT 4
OUT 5
OUT 6
OUT 7
OUT 8
INPUT LOOP
AES-3981-C

NEO™

VEA-3901

## Analog Video DA

- Input signal type: passive looping 1Vp-p video
- 8 outputs
- Clamp off / soft / hard
- White clip, hard and soft
- AD / DC coupling (jumper selectable)
- Remote control of gain (-3 to +6dB)
- Remote control of EQ (300m)
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- SMPTE310M, E3 DS3 compatible
- DejaView intelligent settings recovery system

ADA-3981

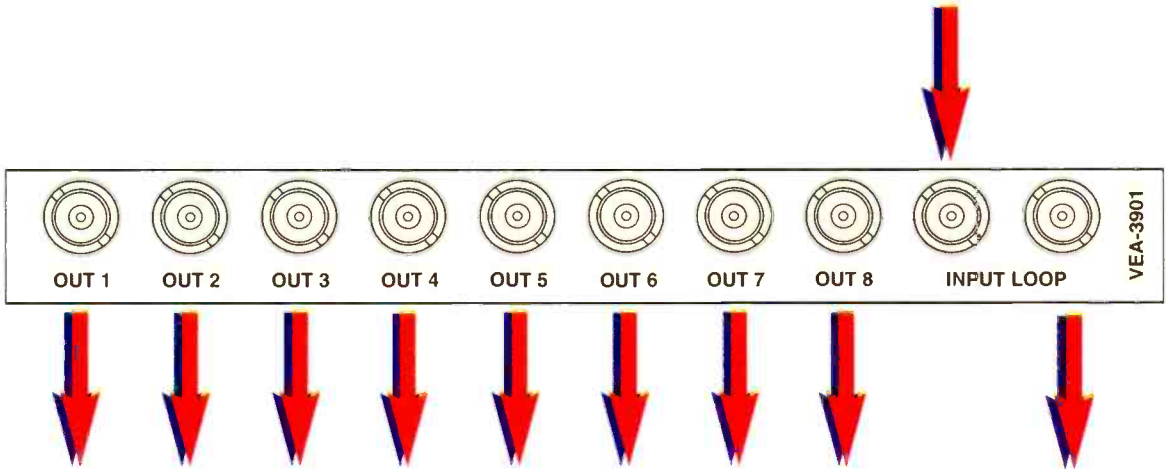
## Analog Audio DA

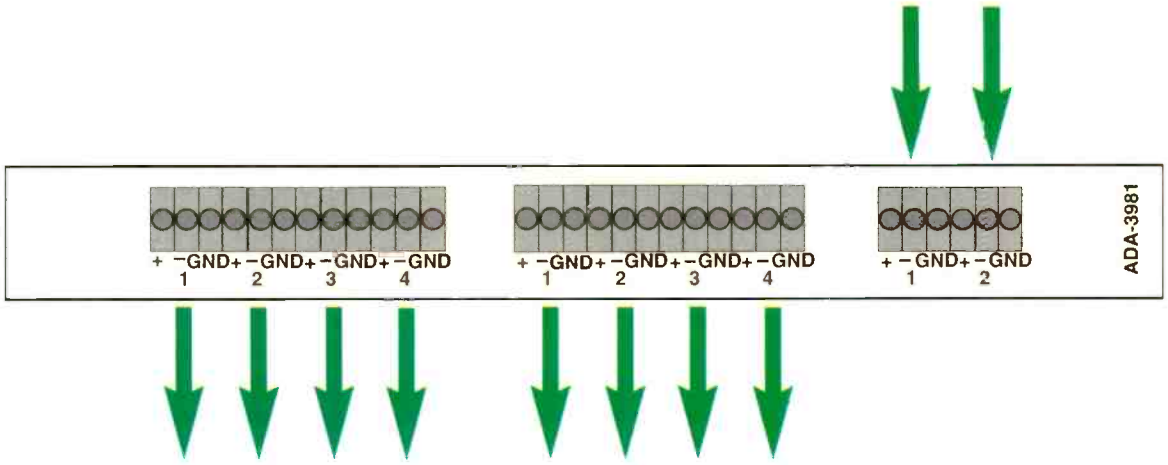
- 20-20kHz bandwidth
- Input signal type: balanced analog audio
- 1 in, 8 out (mono) or 2 in, 4 out (stereo)
- Plug-in style connectors (Weidmuller)
- Hi-impedance input >20K ohms
- +30dBu (66ohm), +24dBm (600ohm) maximum input level
- Gain range of –6 to +33dB
- Remote gain (.5dB steps), channel swap, mute
- Amplitude detect
- Channel swap and mute
- Left and right inputs can be summed to mono
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

NSM-8X1SHD

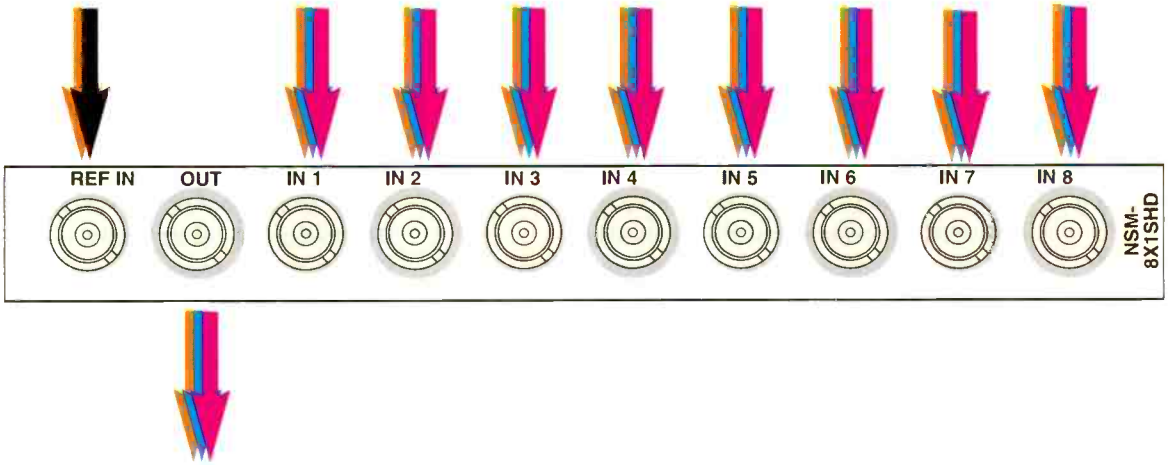
## 8x1 / SDI, HD-SDI Routing / Backup Switcher

- High quality HD/SDI Wideband Video routing with enhanced control and monitoring capabilities
- 8x1 switcher with auto detect switchover configuration
- Supported signal types (10 Mb/s to 1.5 Gb/s):
  - SMPTE 259 – 143, 177, 270, 360, and 540 Mb/s
  - SMPTE 292 – 1.485 Gb/s
- Deterministic – line accurate switching
- Reclock both SMPTE 259M and SMPTE 292M bit rates
- Bypass operation for signals at non-traditional video rates
- Auto equalize all inputs up to 1.5 Gb/s
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- NTSC/PAL/HD analog reference are acceptable for switching
- Signal processing (A/D, D/A, Frame Synchronize Distribution Amplifiers, etc.) functions and matr routing can be mixed in the same frame
- DejaView intelligent settings recovery system




## SWITCHERS ROUTING



NEO™

NSM-7X2SHD

# 7x2 / SDI, HD-SDI Routing

- High quality HD/SDI wideband video routing with enhanced control and monitoring capabilities
- 7x2 switcher configuration
- Supported signal types (10 Mb/s to 1.5 Gb/s):
  - SMPTE 259 – 143, 177, 270, 360, and 540 Mb/s
  - SMPTE 292 – 1.485 Gb/s
- Deterministic – line accurate switching
- Reclock both SMPTE 259M and SMPTE 292M bit rates
- Bypass operation for signals at non-traditional video rates
- Auto equalize all inputs up to 1.5 Gb/s
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- NTSC/PAL/HD analog reference are acceptable for switching
- Signal processing (A/D, D/A, frame synchronizers, distribution amplifiers, etc.) functions and matrix routing can be mixed in the same frame
- DejaView intelligent settings recovery system

NSM-8X1V

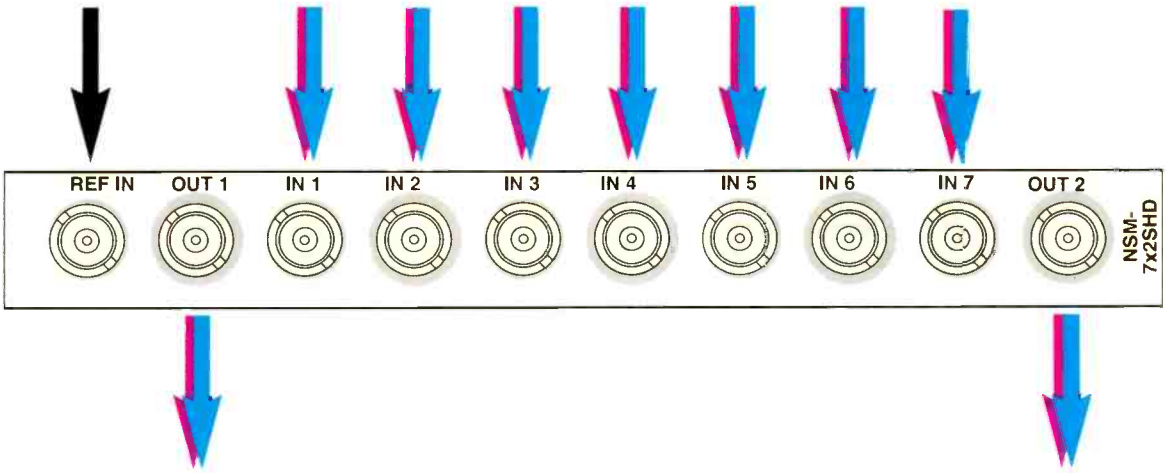
# 8x1 / Analog Video Routing / Backup Switcher

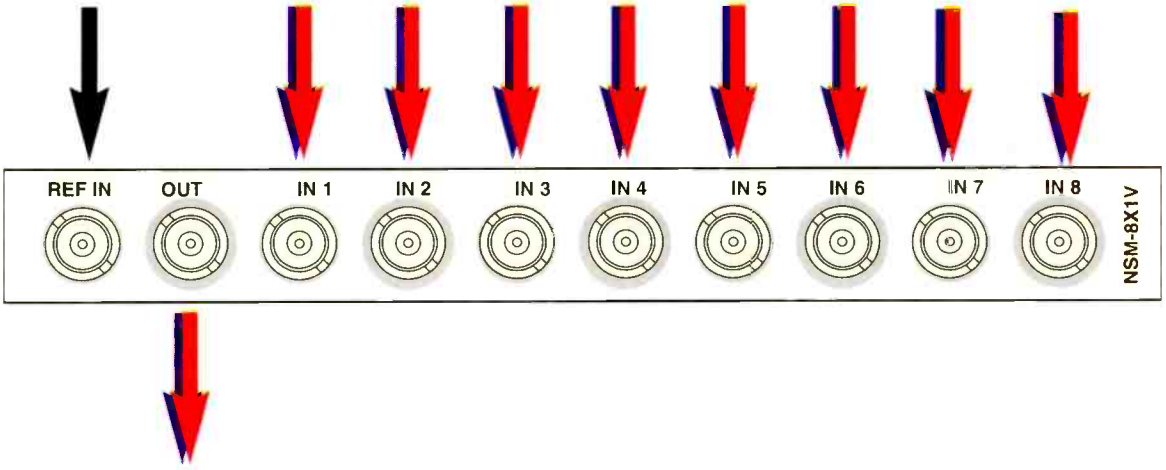
- High quality analog video routing with enhanced control and monitoring capabilities
- 8x1 switcher with auto detect switchover configuration
- Deterministic – line accurate switching
- BOS/Pilot integrated control capabilities
- NTSC/PAL analog reference are acceptable for switching
- Signal processing (A/D, D/A, frame synchronizers, distribution amplifiers, etc.) functions and matrix routing can be mixed in the same frame
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

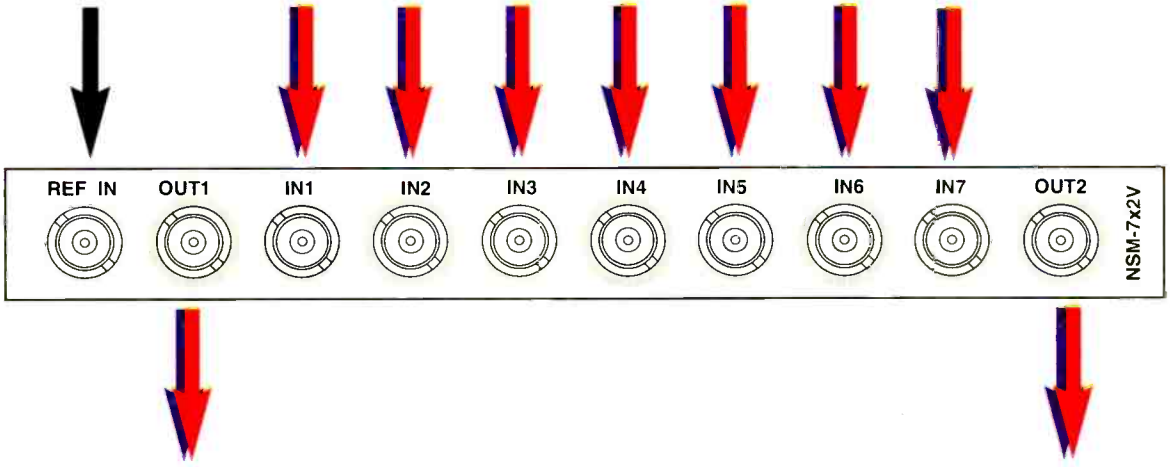
NSM-7X2V

# 7x2 / Analog Video Routing

- High quality analog video routing with enhanced control and monitoring capabilities
- 7x2 switcher configuration
- Deterministic – line accurate switching
- BOS/Pilot integrated control capabilities
- NTSC/PAL analog reference are acceptable for switching
- Signal processing (A/D, D/A, frame synchronizers, distribution amplifiers, etc.) functions and matrix routing can be mixed in the same frame
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system


REF IN
OUT 1
IN 1
IN 2
IN 3
IN 4
IN 5
IN 6
IN 7
OUT 2
NSM-7x2SHD


REF IN
OUT
IN 1
IN 2
IN 3
IN 4
IN 5
IN 6
IN 7
IN 8
NSM-8X1V


REF IN
OUT1
IN1
IN2
IN3
IN4
IN5
IN6
IN7
OUT2
NSM-7x2V

NSM-8X1AES-B

# 8x1 / AES Audio Routing / Backup Switcher

- High quality AES audio routing with enhanced control and monitoring capabilities
- 8x1 switcher with auto detect switchover configuration
- Supports these signal types:
  - AES3 – 30kHz - 100kHz frame rates
  - Any 50% duty cycle digital signal within the voltage and frequency range
- Relay bypass
- Provide basic system information such as sample rate, stream errors, and user data via the front edge control or remote software application
- Mix and match the other signal types in the same frame
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Signal processing (A/D, D/A, Frame Synchronizers, Distribution Amplifiers, etc.) functions and matrix routing can be mixed in the same frame
- DejaView intelligent settings recovery system

NSM-7X2AES-B

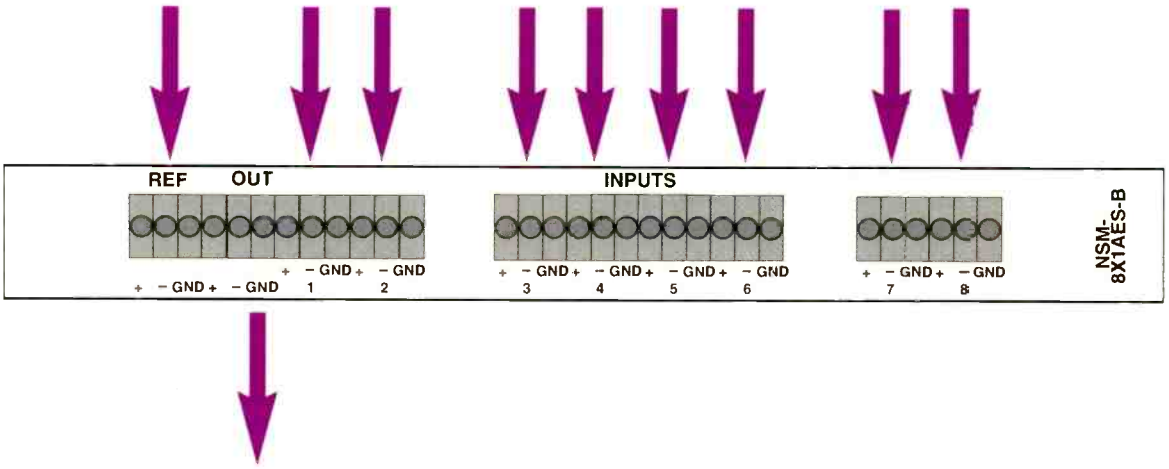
# 7x2 / AES Audio Routing

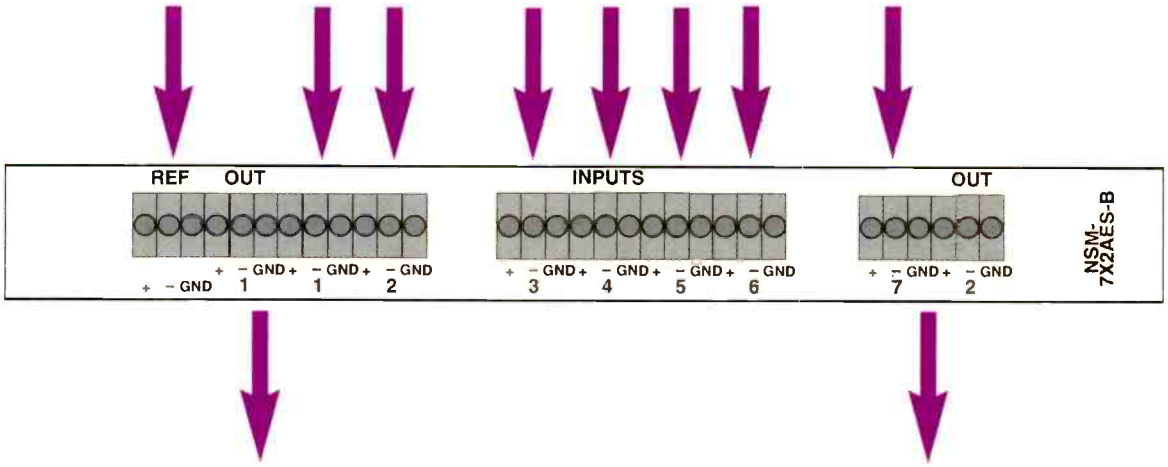
- High quality AES audio routing with enhanced control and monitoring capabilities
- 7x2 switcher configuration
- Supports these signal types:
  - AES3 – 30kHz - 100kHz frame rates
  - Any 50% duty cycle digital signal within the voltage and frequency range
- Relay bypass
- Provide basic system information such as sample rate, stream errors, and user data via the front edge control or remote software application
- Mix and match the other signal types in the same frame
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Signal processing (A/D, D/A, Frame Synchronizers, Distribution Amplifiers, etc.) functions and matrix routing can be mixed in the same frame
- DejaView intelligent settings recovery system

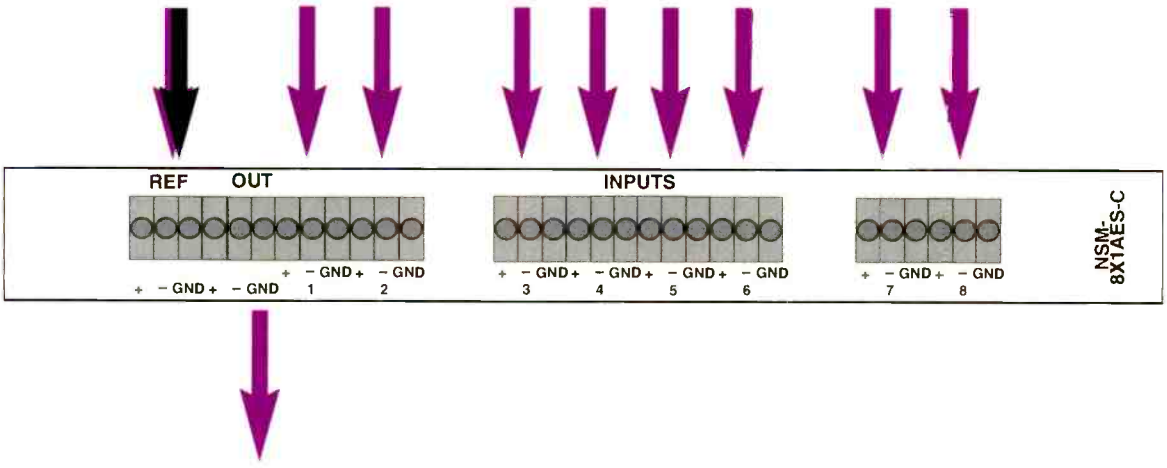
NSM-8X1AES-C

# 8x1 / AES Audio Routing / Backup Switcher

- High quality AES audio routing with enhanced control and monitoring capabilities
- 8x1 switcher with auto detect switchover configuration
- Supports these signal types:
  - AES3 – 30kHz - 100kHz frame rates
  - Any 50% duty cycle digital signal within the voltage and frequency range
- Relay bypass
- Provide basic system information such as sample rate, stream errors, and user data via the front edge control or remote software application
- Mix and match the other signal types in the same frame
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Signal processing (A/D, D/A, Frame Synchronizers, Distribution Amplifiers, etc.) functions and matrix routing can be mixed in the same frame
- DejaView intelligent settings recovery system


REF
OUT
INPUTS
+ – GND + – GND
+ – GND + – GND
1
2
3
4
5
6
7
8
NSM-
8X1AES-B


REF
OUT
INPUTS
OUT
+ – GND
1
1
2
3
4
5
6
7
2
NSM-
7X2AES-B


REF
OUT
INPUTS
+ – GND + – GND
+ – GND + – GND
1
2
3
4
5
6
7
8
NSM-
8X1AES-C

NEO™

NSM-7X2AES-C

# 7x2 / AES Audio Routing

- High quality AES audio routing with enhanced control and monitoring capabilities
- 8x1 switcher with auto detect switchover configuration or 7x2 switcher configuration
- Supports these signal types:
  - AES3 – 30kHz - 100kHz frame rates
  - Any 50% duty cycle digital signal within the voltage and frequency range
- Relay bypass
- Provide basic system information such as sample rate, stream errors, and user data via the front edge control or remote software application
- Mix and match the other signal types in the same frame
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Signal processing (A/D, D/A, frame synchronizers, distribution amplifiers, etc.) functions and matrix routing can be mixed in the same frame
- DejaView intelligent settings recovery system

NSM-8X1A2

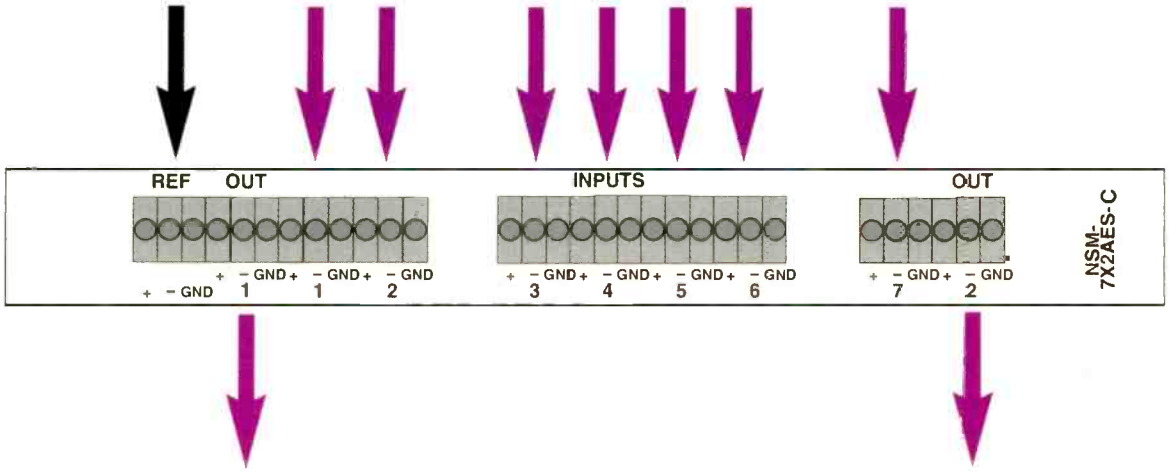
# Analog Audio Routing / Backup Switcher

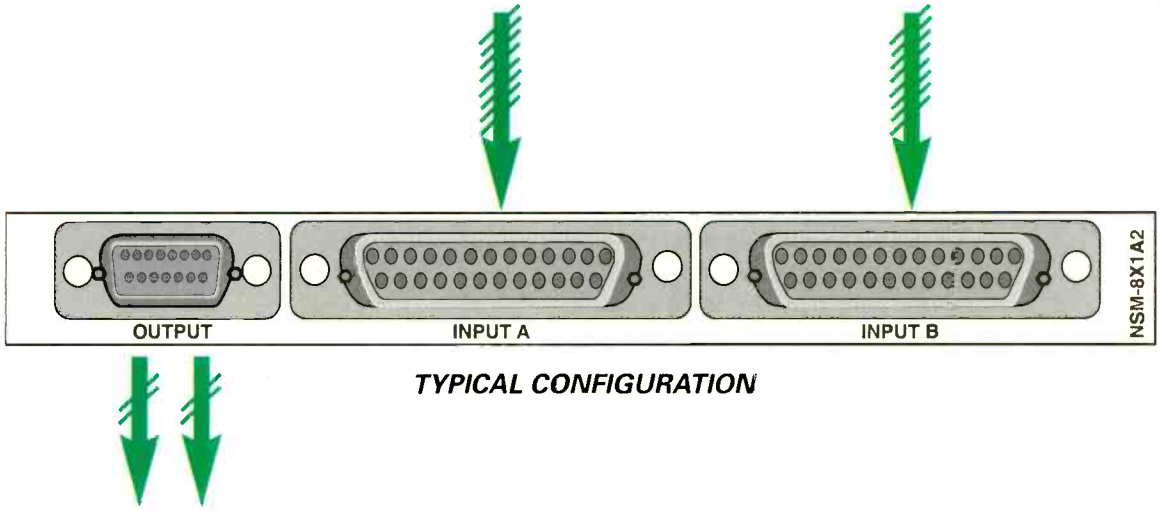
- High quality analog audio routing with enhanced control and monitoring capabilities
- Can be user configured for the following matrix sixes
  - 8x1 stereo with dual outputs (default)
  - Dual 4x1 stereo
  - Single stereo 8x2
  - Dual 8x2 mono
  - Single 16x4 mono
  - Dual 8x1 mono with dual outputs
  - Quad 4x1 mono
- Relay bypass and swap / sum capability
- Mix and match the other signal types in the same frame
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Signal processing (A/D, D/A, frame synchronizers, distribution amplifiers, etc.) functions and matrix routing can be mixed in the same frame
- DejaView intelligent settings recovery system

CSD-3901

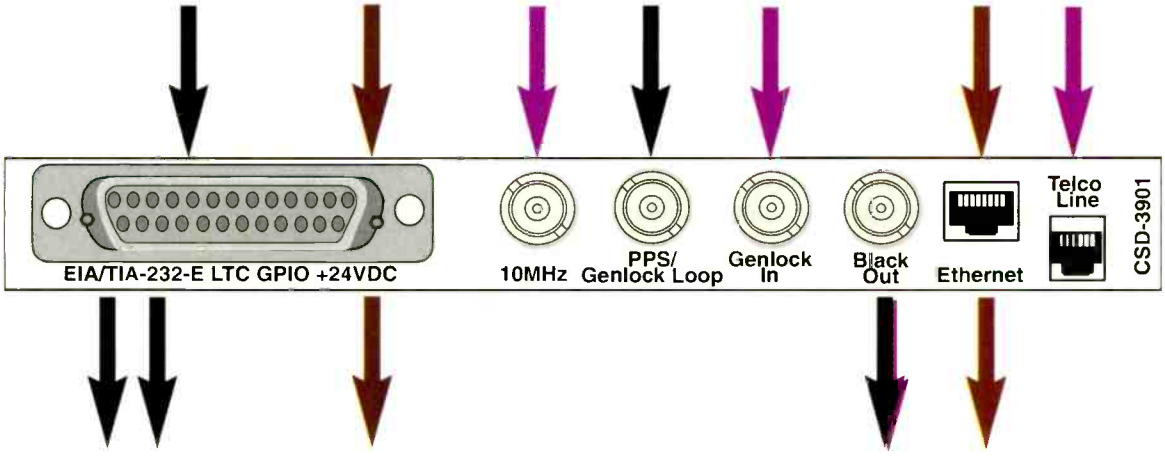
# Master Clock Driver

- Modular clock driver
- Card-edge control
- Optional menu driven front panel interface with TIME display
- GPS Interface for time reference (standard)
- Timecode input
- SMPTE/EBU drop frame or non-drop timecode (Time/Date)
- Programmable DST settings
- Built in modem for dial in/out
- Multiple timecode outputs each independently configurable for timecode (drop-non-drop, offsets)
- Ethernet port for supplying NTP (network time protocol)
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol




*TYPICAL CONFIGURATION*



NEO™

# GPI and Marker Beep Module

GPI-3901

- Front panel, menu driven operation
- Card edge control
- 2 LTC inputs. Supports simultaneous operation of drop and non-drop timecode
- 6 GPI outputs with programmable events. Events are programmable for time and date, duration and recurrence. Outputs are invertible
- 2 user configurable marker beep outputs
- 1 AES unbalanced marker beep output
- 1 AES unbalanced reference input
- Built-in speaker for monitoring beeps during setup.
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol

# IRIG-B Interface Module

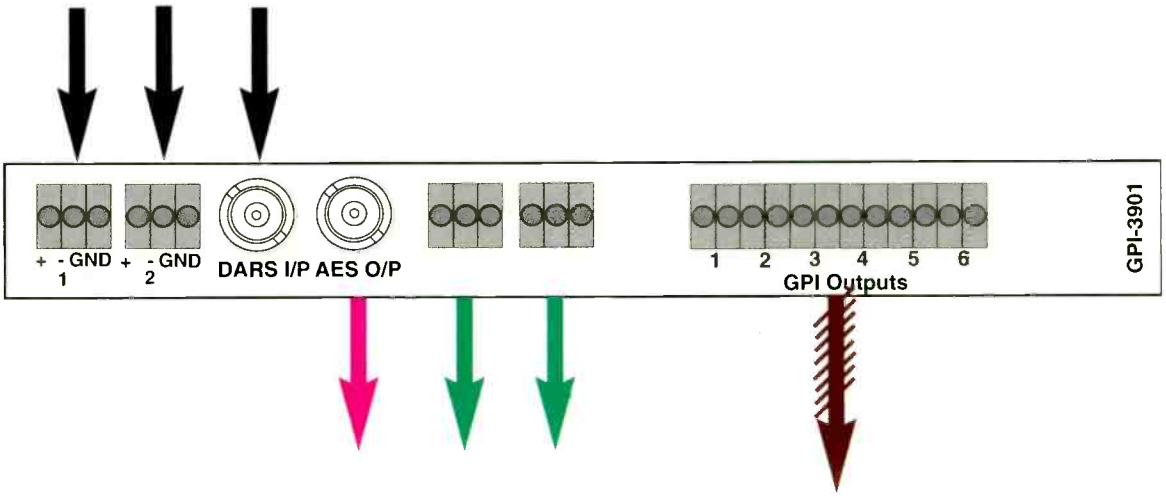
IRB-3901

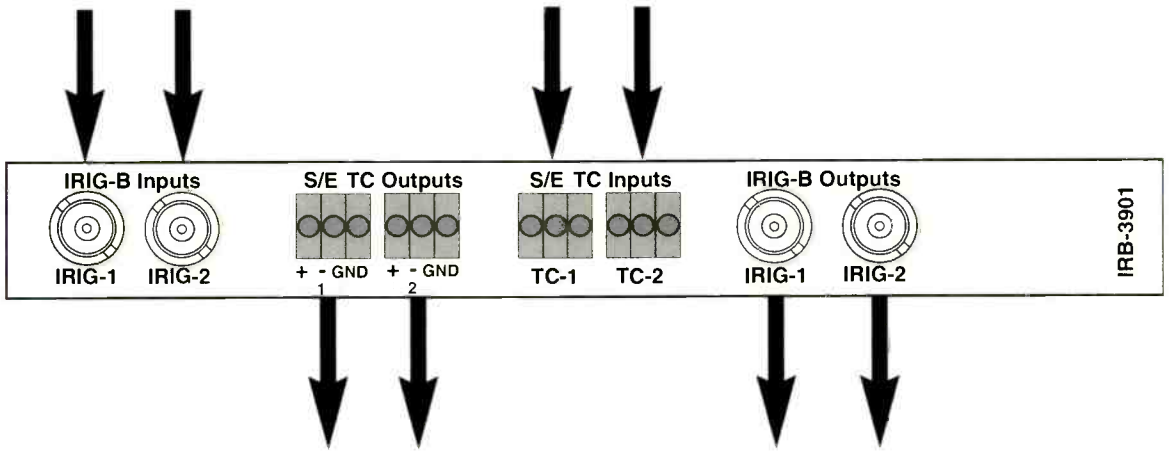
- Simultaneous conversion of IRIG-B to SMPTE/EBU timecode and SMPTE/EBU timecode to IRIG-B
- 2 IRIG-B inputs
- 2 IRG-B outputs
- 2 SMPTE/EBU timecode inputs
- 2 SMPTE/EBU timecode outputs
- Output locked to input timecode
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol

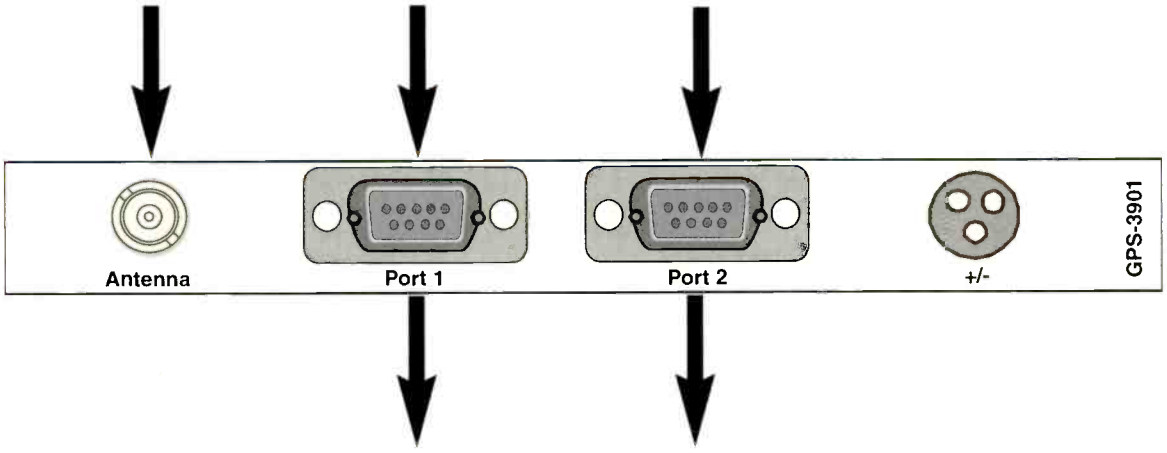
# GPS Receiver and Antenna

GPS-3901

- Compatible with CSD-3901 and CSD-5300
- GPS provides an accurate time reference available globally
- Separate antenna and receiver for mounting flexibility
- Accurate to 10ms


+ - GND 1
+ - GND 2
DARS I/P AES O/P
1 2 3 4 5 6
GPI Outputs
GPI-3901


IRIG-B Inputs
IRIG-1
IRIG-2
S/E TC Outputs
+ - GND 1
+ - GND 2
S/E TC Inputs
TC-1
TC-2
IRIG-B Outputs
IRIG-1
IRIG-2
IRB-3901


Antenna
Port 1
Port 2
+/-
GPS-3901

NEO™

# NTSC/PAL to SDI with 4 Channel Analog Audio Synchronizer / Processor / Multiplexer

**DEC-3901**
**AVM-3901-A**

- NEOSCOPE card edge video monitoring
- A to D 12-bit input processing
- Input standard auto detect supporting NTSC/PAL-B/PAL-M
- User-selectable adaptive comb filter (Frame, Field, 3 line adaptive and notch)
- Hanover bar suppressor for PAL signals (On / Off)
- Input noise immunity and input video soft clipping
- 4 SDI outputs with embedded EDH
- VBI selection (normal, simple, bypass, delete)
- Four analog channels input
- DARS input
- Genlock reference input with loop through
- Internal audio processing amplifier (gain, swap, invert, delay, mix)
- Selectable 16 / 20 / 24-bit audio processing
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

# NTSC/PAL to SDI with 4 Channel Analog Audio Synchronizer / Processor to 2 AES Digital Audi

**DES-3901**
**AS-3901-AD**

***Available Fall 2002***

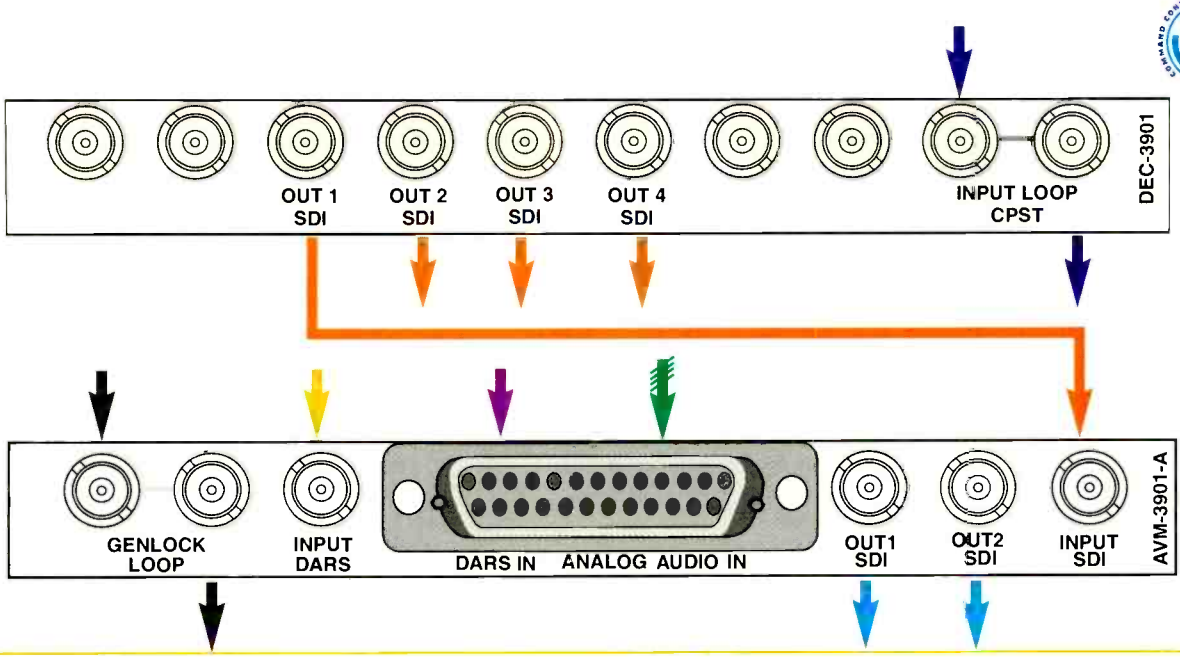
- NEOSCOPE card edge video monitoring
- A to D 12-bit input processing
- Input standard auto detect supporting NTSC / PAL-B / PAL-M
- User-selectable adaptive comb filter (Frame, field, 3 line adaptive and notch)
- Hanover bar suppressor for PAL signals (On / Off)
- Input noise immunity and input video soft clipping
- 2 user-selectable outputs (SDI with embedded EDH or composite analog monitoring)
- Composite monitoring, offering two outputs
- VBI selection (normal, simple, bypass, delete)
- Analog audio 4 channel input
- Tracks to video synchronizer products
- Full audio processing (gain, channel swap, invert, delay, mix)
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

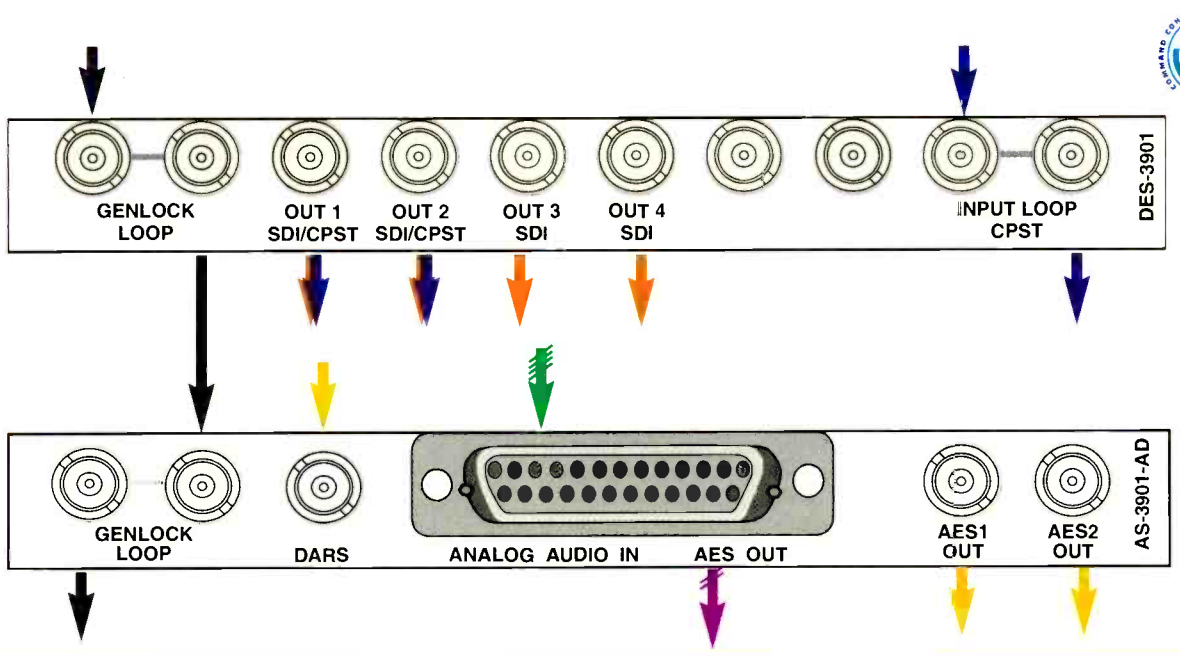
# NTSC/PAL to SDI with Color Decode Bypass, 4 Channel Analog to 2 AES Digital Audio Synchronizer / Processor

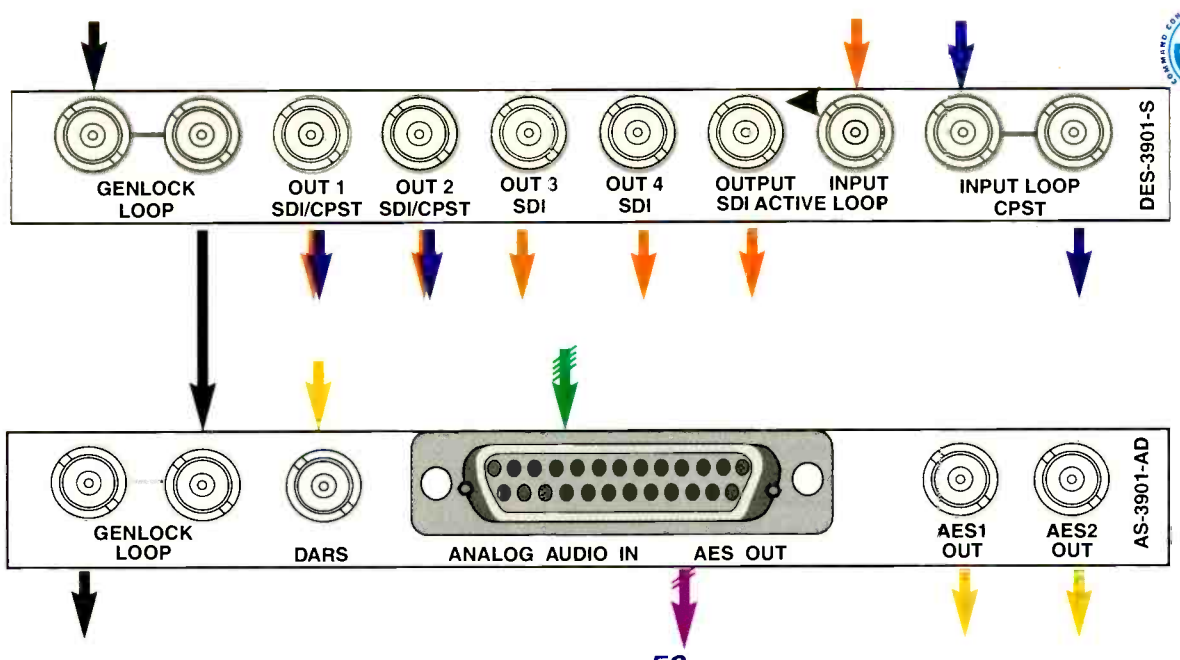
**DES-3901-S**
**AS-3901-AD**

***Available Fall 2002***

- NEOSCOPE card edge video monitoring
- A to D 12-bit input processing
- Input standard auto detect supporting NTSC / PAL-B / PAL-M
- User-selectable adaptive comb filter (Frame, field, 3 line adaptive and notch)
- SDI input with color decode bypass
- Hanover bar suppressor for PAL signals (On / Off)
- Input noise immunity and input video soft clipping
- 2 dedicated outputs with embedded EDH
- 2 user-selectable outputs (SDI with embedded EDH or composite analog monitoring)
- Composite monitoring, offering two outputs
- VBI selection (normal, simple, bypass, delete)
- 4 channel analog to AES digital audio
- Tracks to video synchronizer products
- Full audio processing (gain, channel swap, invert, delay, mix)
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system


OUT 1 SDI
OUT 2 SDI
OUT 3 SDI
OUT 4 SDI
INPUT LOOP CPST
DEC-3901
GENLOCK LOOP
INPUT DARS
DARS IN
ANALOG AUDIO IN
OUT1 SDI
OUT2 SDI
INPUT SDI
AVM-3901-A


GENLOCK LOOP
OUT 1 SDI/CPST
OUT 2 SDI/CPST
OUT 3 SDI
OUT 4 SDI
INPUT LOOP CPST
DES-3901
GENLOCK LOOP
DARS
ANALOG AUDIO IN
AES OUT
AES1 OUT
AES2 OUT
AS-3901-AD


GENLOCK LOOP
OUT 1 SDI/CPST
OUT 2 SDI/CPST
OUT 3 SDI
OUT 4 SDI
OUTPUT SDI ACTIVE
INPUT LOOP
INPUT LOOP CPST
DES-3901-S
GENLOCK LOOP
DARS
ANALOG AUDIO IN
AES OUT
AES1 OUT
AES2 OUT
AS-3901-AD

NEO™

## DES-3901 MSA-3901-A

# NTSC/PAL to SDI, 4 Channel Analog Audio Synchronizer / Processor / Multiplexer

- NEOSCOPE card edge video monitoring
- A to D 12-bit input processing
- Input standard auto detect supporting NTSC / PAL-B / PAL-M
- User-selectable adaptive comb filter (Frame, field, 3 line adaptive and notch)
- Hanover bar suppressor for PAL signals (On / Off)
- Input noise immunity and input video soft clipping
- 2 dedicated outputs with embedded EDH
- 2 user-selectable outputs (SDI with embedded EDH or composite analog monitoring)
- Composite monitoring, offering two outputs
- VBI selection (normal, simple, bypass, delete)
- 2 SDI processed outputs
- Analog audio 4 channel input
- DARS input
- Genlock reference input with loop through
- Internal audio processing amplifier (gain, swap, invert, delay, mix)
- Operation as an audio synchronizer or as an audio delay line
- Selectable 16 / 20 / 24-bit audio processing
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

## DES-3901-S MSA-3901-A

# NTSC/PAL to SDI, with Color Code Bypass and 4 Channel Analog Audio Synchronizer / Processor / Multiplexer

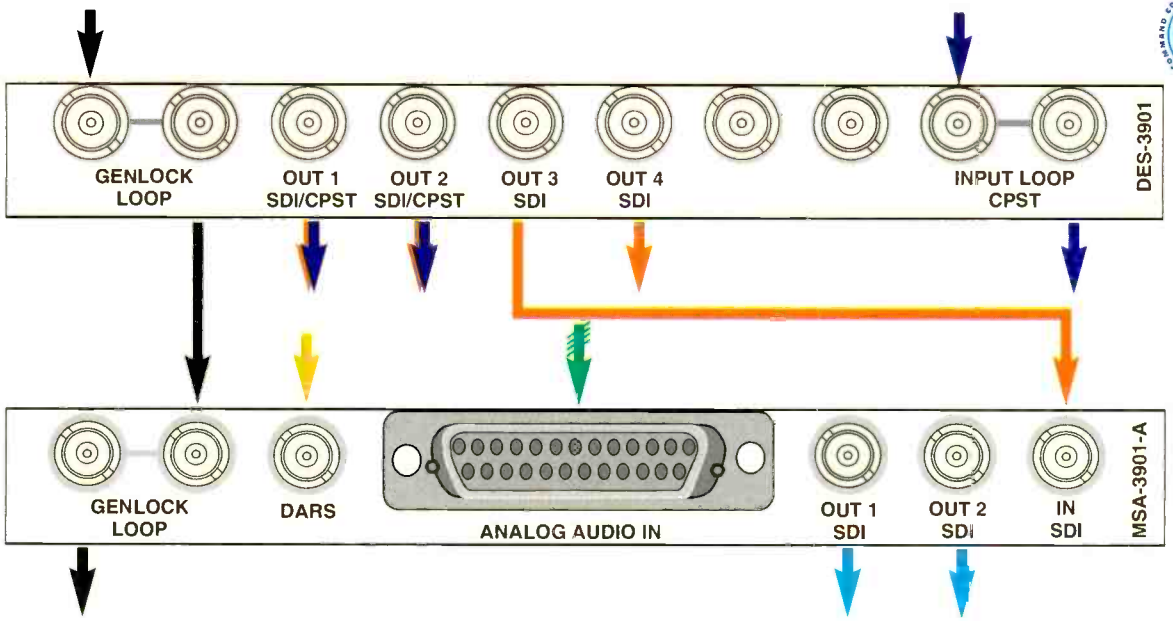
- NEOSCOPE card edge video monitoring
- A to D 12-bit input processing
- Input standard auto detect supporting NTSC/PAL-B/PAL-M
- User-selectable adaptive comb filter (Frame, field, 3 line adaptive and notch)
- Hanover bar suppressor for PAL signals (On / Off)
- Input noise immunity and input video soft clipping
- 2 SDI outputs with embedded EDH and processed
- VBI selection (normal, simple, bypass, delete)
- Analog audio 4 channel input
- Genlock reference input with loop through
- Internal audio processing amplifier (gain, swap, invert, delay, mix)
- Selectable 16 / 20 / 24-bit audio processing
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

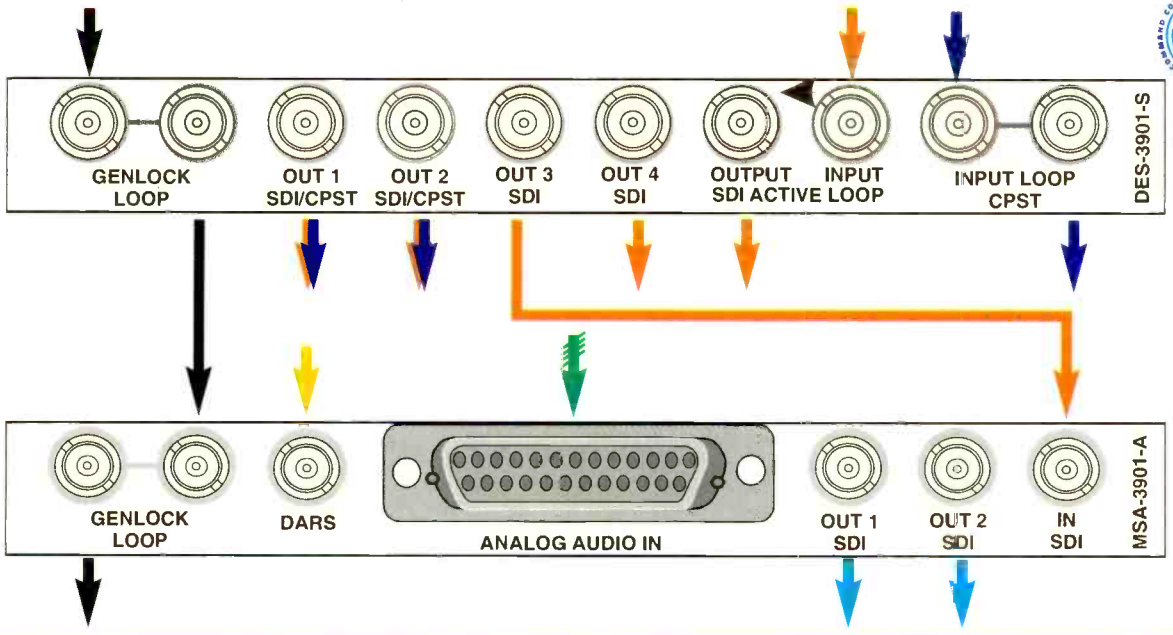
## DNS-3901 AS-3901-AD

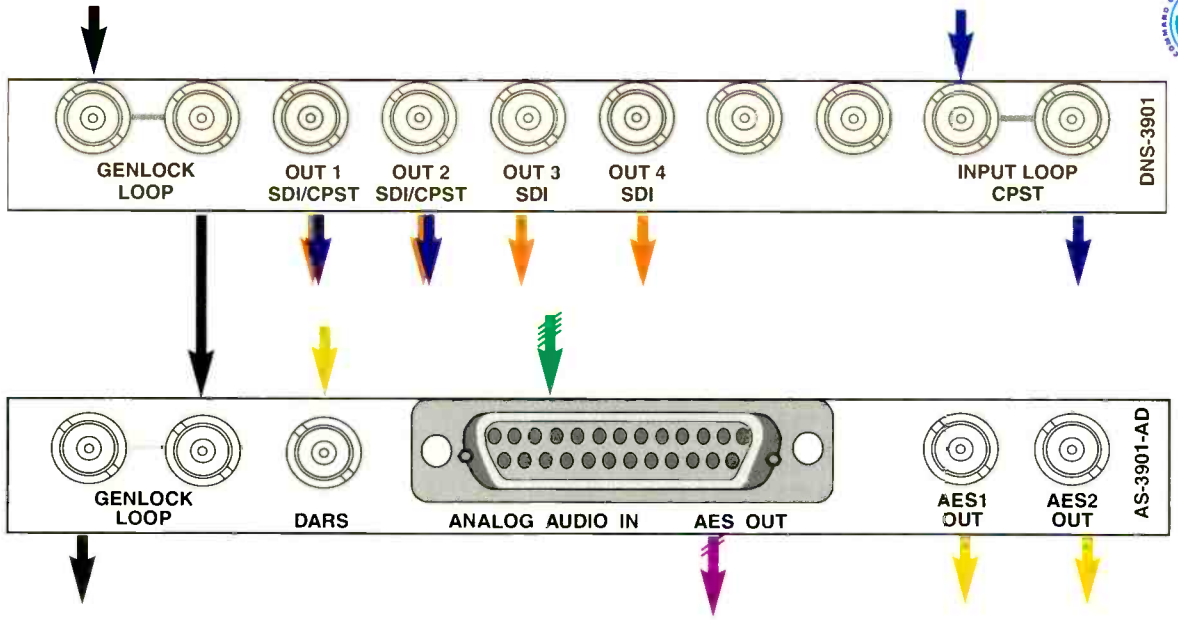
*Available Fall 2002*

# NTSC/PAL to SDI, with Noise Reduction, 4 Channel Analog to 2 AES Digital Audio Synchronizer / Processor

- NEOSCOPE card edge video monitoring
- A to D 12-bit input processing
- Noise reduction removes impulse and random noise
- Input standard auto detect supporting NTSC / PAL-B / PAL-M
- User-selectable adaptive comb filter (Frame, field, 3 line adaptive and notch)
- Hanover bar suppressor for PAL signals (On / Off)
- Input noise immunity and input video soft clipping
- 2 dedicated SDI outputs with embedded EDH
- 2 user-selectable outputs:
  - SDI output with embedded EDH, or
  - Composite analog monitoring
- Composite monitoring, offering two outputs
- VBI selection (normal, simple, bypass, delete)
- Shadowed / restored parameter settings when changing video standards
- 4 channel analog audio inputs
- Full audio processing (gain, channel swap, invert, delay, mix)
- Balanced and unbalanced AES (2) outputs
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applicatio through simple, ASCII protocol
- DejaView intelligent settings recovery system


GENLOCK LOOP
OUT 1 SDI/CPST
OUT 2 SDI/CPST
OUT 3 SDI
OUT 4 SDI
INPUT LOOP CPST
DES-3901
GENLOCK LOOP
DARS
ANALOG AUDIO IN
OUT 1 SDI
OUT 2 SDI
IN SDI
MSA-3901-A


GENLOCK LOOP
OUT 1 SDI/CPST
OUT 2 SDI/CPST
OUT 3 SDI
OUT 4 SDI
OUTPUT SDI ACTIVE
INPUT LOOP
INPUT LOOP CPST
DES-3901-S
GENLOCK LOOP
DARS
ANALOG AUDIO IN
OUT 1 SDI
OUT 2 SDI
IN SDI
MSA-3901-A


GENLOCK LOOP
OUT 1 SDI/CPST
OUT 2 SDI/CPST
OUT 3 SDI
OUT 4 SDI
INPUT LOOP CPST
DNS-3901
GENLOCK LOOP
DARS
ANALOG AUDIO IN
AES OUT
AES1 OUT
AES2 OUT
AS-3901-AD

NEO™

## DNS-3901-S AS-3901-AD

*Available Fall 2002*

# NTSC/PAL to SDI with Noise Reduction, Color Code Bypass, 4 Channel Analog to 2 AES Digital Audio Synchronizer / Processor

- NEOSCOPE card edge video monitoring
- A to D 12-bit input processing
- Noise reduction removes impulse and random noise
- Input standard auto detect supporting NTSC / PAL-B / PAL-M
- User-selectable adaptive comb filter (Frame, field, 3 line adaptive and notch)
- SDI input with color decode bypass
- Hanover bar suppressor for PAL signals (On / Off)
- Input noise immunity and input video soft clipping
- 2 dedicated SDI outputs with embedded EDH
- 2 user-selectable outputs:
  - SDI output with embedded EDH, or
  - Composite analog monitoring
- Composite monitoring, offering two outputs
- VBI selection (normal, simple, bypass, delete)
- Shadowed / restored parameter settings when changing video standards
- 4 channel analog audio inputs
- Full audio processing (gain, channel swap, invert, delay, mix)
- Balanced and unbalanced AES (2) outputs
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

## DNS-3901 MSA-3901-A

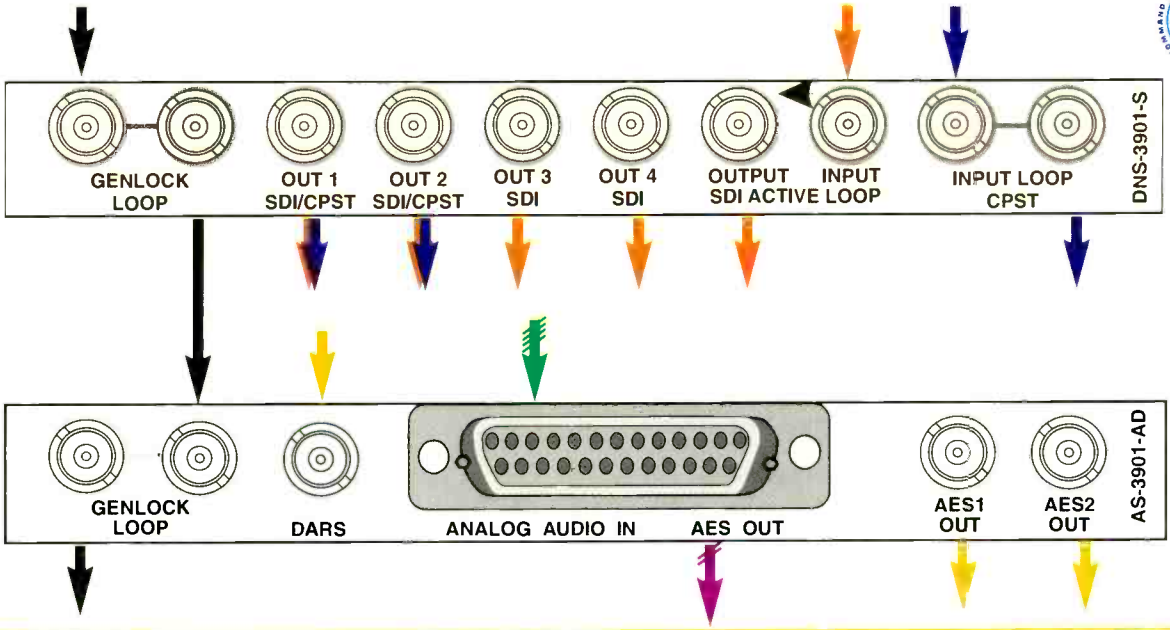
# NTSC/PAL to SDI with Noise Reduction, 4 Channel Analog Audio Synchronizer / Processor / Multiplexer

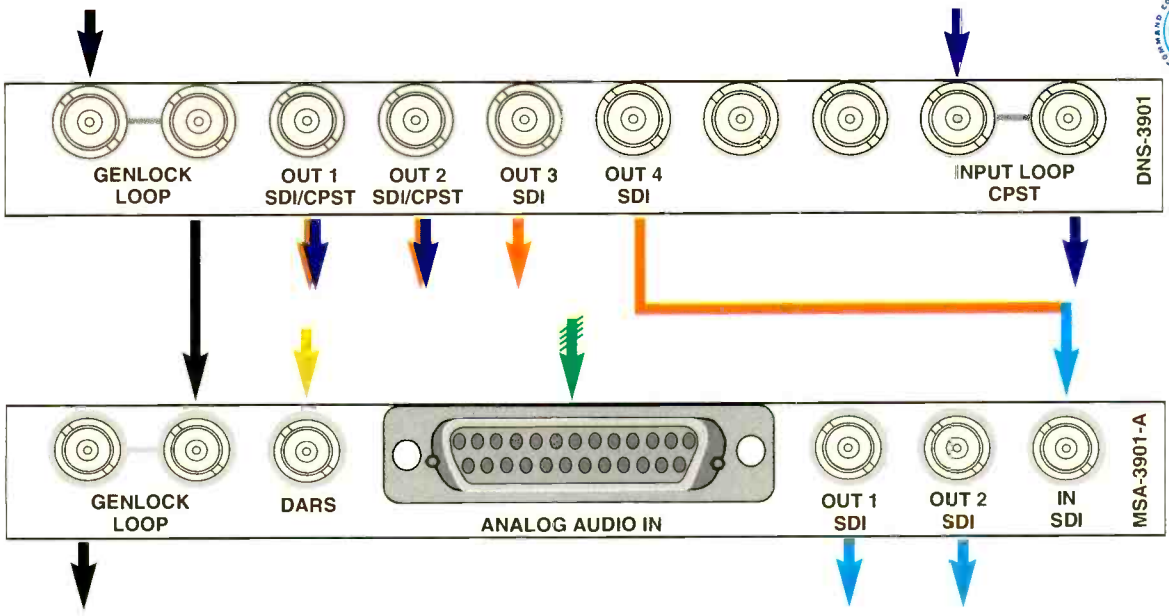
- NEOSCOPE card edge video monitoring
- A to D 12-bit input processing
- Noise reduction removes impulse and random noise
- Input standard auto detect supporting NTSC / PAL-B / PAL-M
- User-selectable adaptive comb filter (Frame, field, 3 line adaptive and notch)
- SDI input with color decode bypass
- Hanover bar suppressor for PAL signals (On / Off)
- Input noise immunity and input video soft clipping
- 2 dedicated SDI outputs with embedded EDH
- 2 user-selectable outputs:
  - SDI output with embedded EDH, or
  - Composite analog monitoring
- Composite Monitoring, offering two outputs
- VBI selection (normal, simple, bypass, delete)
- Shadowed / restored parameter settings when changing video standards
- Analog audio 4 channel input
- DARS input
- Internal audio processing amplifier (gain, swap, invert, delay, mix)
- Operation as an audio synchronizer or as an audio delay line
- Selectable 16 / 20 / 24-bit audio processing
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

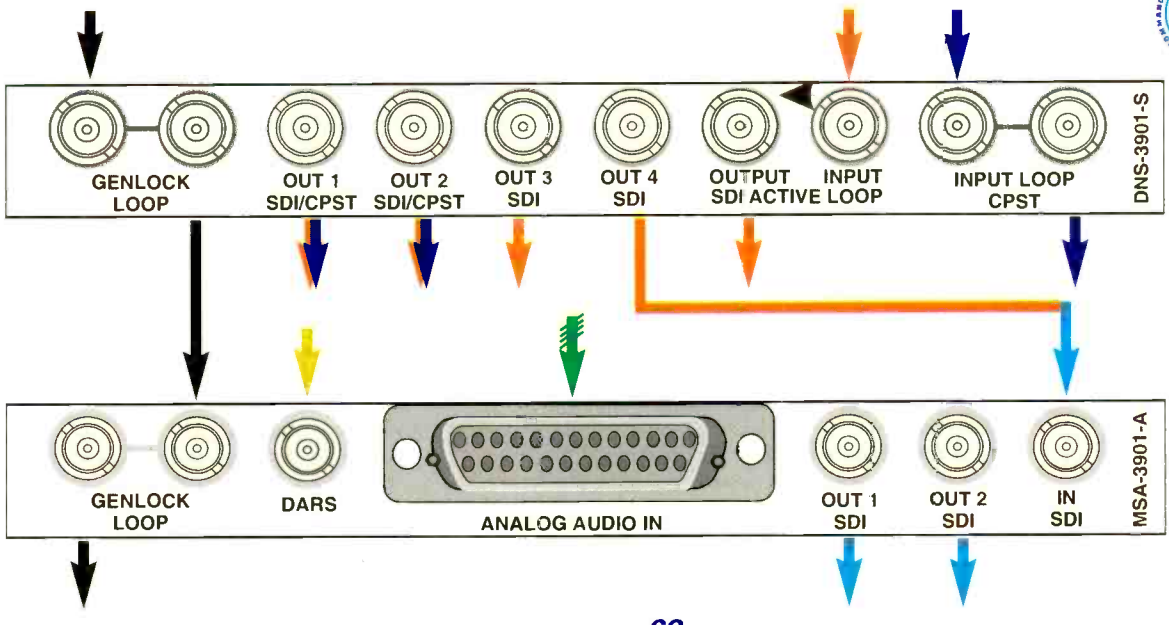
## DNS-3901-S MSA-3901-A

# NTSC/PAL to SDI with Noise Reduction, Color Decode Bypass 4 Channel Analog Audio Synchronizer / Processor / Multiplexer

- NEOSCOPE card edge video monitoring
- A to D 12-bit input processing
- Noise reduction removes impulse and random noise
- Input standard auto detect supporting NTSC / PAL-B / PAL-M
- User-selectable adaptive comb filter (Frame, field, 3 line adaptive and notch)
- SDI input with color decode bypass
- Hanover bar suppressor for PAL signals (On / Off)
- Input noise immunity and input video soft clipping
- 2 dedicated SDI outputs with embedded EDH
- 2 user-selectable outputs:
  - SDI output with embedded EDH, or
  - Composite analog monitoring
- Composite monitoring, offering two outputs
- VBI selection (normal, simple, bypass, delete)
- Shadowed / restored parameter settings when changing video standards
- Analog audio 4 channel inputs
- DARS input
- Genlock reference input with loop through
- Internal audio processing amplifier (gain, swap, invert, delay, mix)
- Operation as an audio synchronizer or as an audio delay line
- Selectable 16 / 20 / 24-bit audio processing
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system


GENLOCK LOOP
OUT 1 SDI/CPST
OUT 2 SDI/CPST
OUT 3 SDI
OUT 4 SDI
OUTPUT SDI ACTIVE
INPUT LOOP
INPUT LOOP CPST
DNS-3901-S
GENLOCK LOOP
DARS
ANALOG AUDIO IN
AES OUT
AES1 OUT
AES2 OUT
AS-3901-AD


GENLOCK LOOP
OUT 1 SDI/CPST
OUT 2 SDI/CPST
OUT 3 SDI
OUT 4 SDI
INPUT LOOP CPST
DNS-3901
GENLOCK LOOP
DARS
ANALOG AUDIO IN
OUT 1 SDI
OUT 2 SDI
IN SDI
MSA-3901-A


GENLOCK LOOP
OUT 1 SDI/CPST
OUT 2 SDI/CPST
OUT 3 SDI
OUT 4 SDI
OUTPUT SDI ACTIVE
INPUT LOOP
INPUT LOOP CPST
DNS-3901-S
GENLOCK LOOP
DARS
ANALOG AUDIO IN
OUT 1 SDI
OUT 2 SDI
IN SDI
MSA-3901-A

NEO™

# SDI to NTSC/PAL with 2 AES Digital to 4 Channel Analog Audio Synchronizer / Processor

**ENS-3901**
**AS-3901-DA**

*Available Fall 2002*

- Outputs — offering 6 composite analog outputs, NTSC / PAL-B / PAL-M
- One re-clocked SDI output
- 12-bit signal processing
- EDH Detection and Reporting
- User-adjustable level controls: luminance, chrominance, black
- Vertical blanking field/line/mode control
- Timing controls: vertical, horizontal, fine SC (from genlock)
- Cross color reduction and aperture control (2 dimensional)
- Input auto mode detect supporting 525/625
- External genlock user selectable: H-lock, chroma lock or auto mode
- Digital audio 2 AES input
- 4 channel analog audio outputs
- Full audio processing (gain, channel swap, invert, delay, mix)
- Balanced or unbalanced AES input
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

# SDI to NTSC/PAL with 4 Channel Analog Audio Synchronizer / Processor / Demultiplexer

**ENS-3901**
**DSA-3901-A**

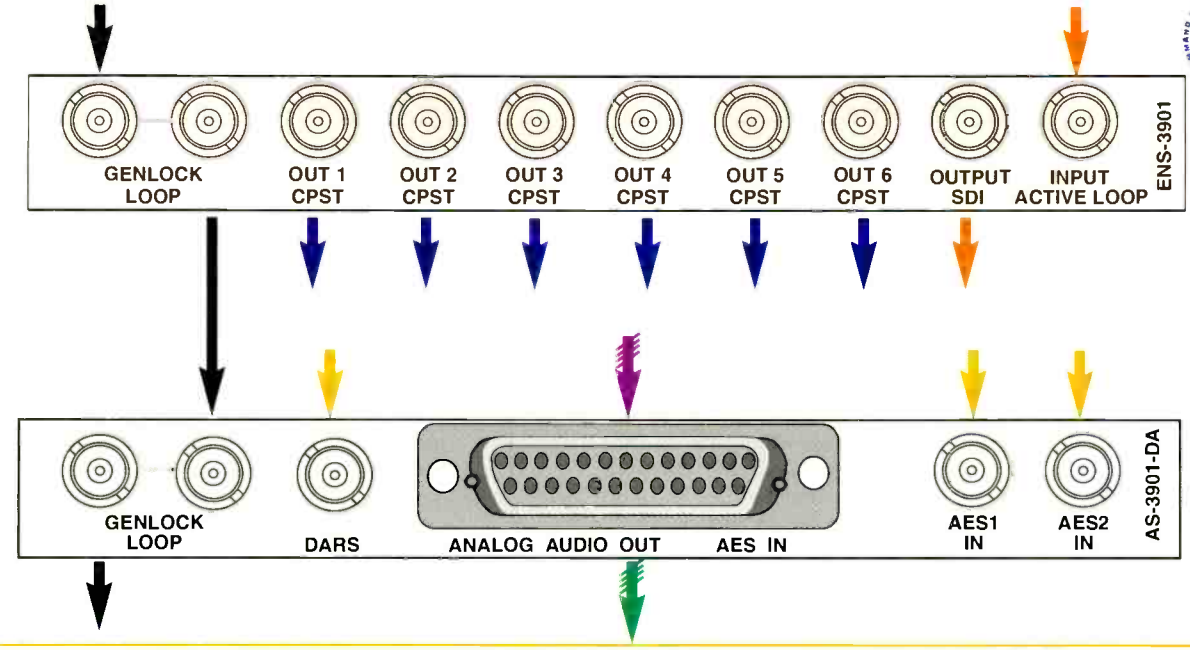
- Outputs — offering 6 composite analog outputs, NTSC / PAL-B / PAL-M
- One re-clocked SDI output
- 12-bit signal processing
- EDH detection and reporting
- User-adjustable level controls: luminance, chrominance, black
- Vertical blanking field/line/mode control
- Timing controls: vertical, horizontal, fine SC (from genlock)
- Cross color reduction and aperture control (2 dimensional)
- Input auto mode detect supporting 525/625
- External genlock user selectable: H-lock, chroma lock or auto mode
- Selectable 16 / 20 / 24 bit audio processing
- 4 channel analog outputs
- Audio processing amplifier (gain, swap, invert, delay, mix)
- Synchronization and delay
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

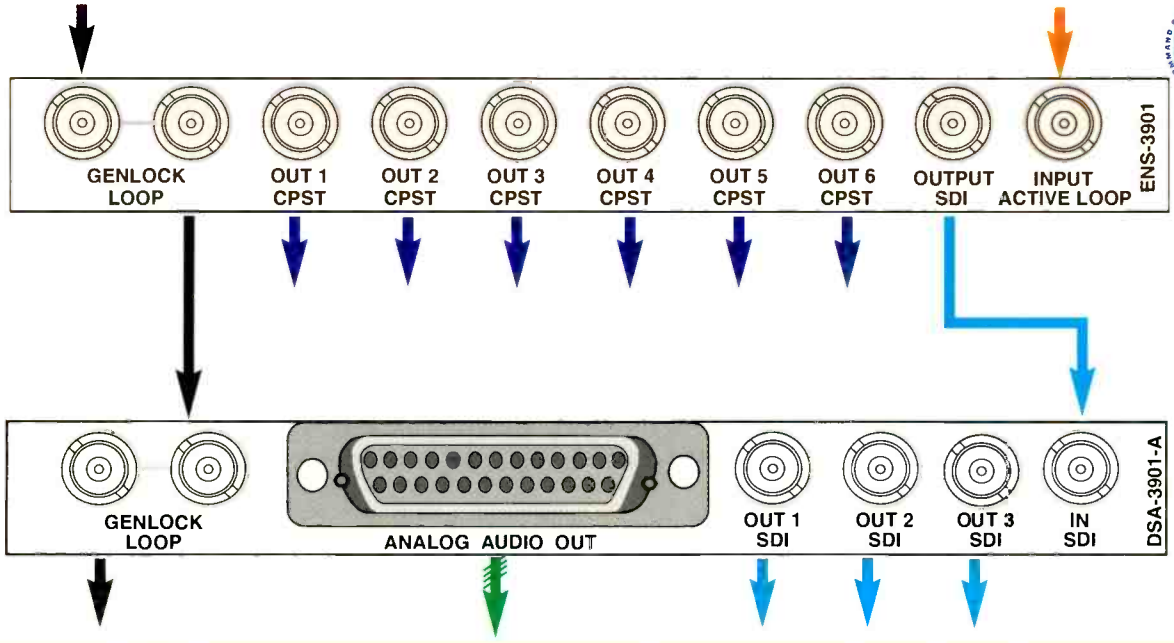
# SDI and 4 Channel Analog to AES Digital Audio Synchronizer / Processor

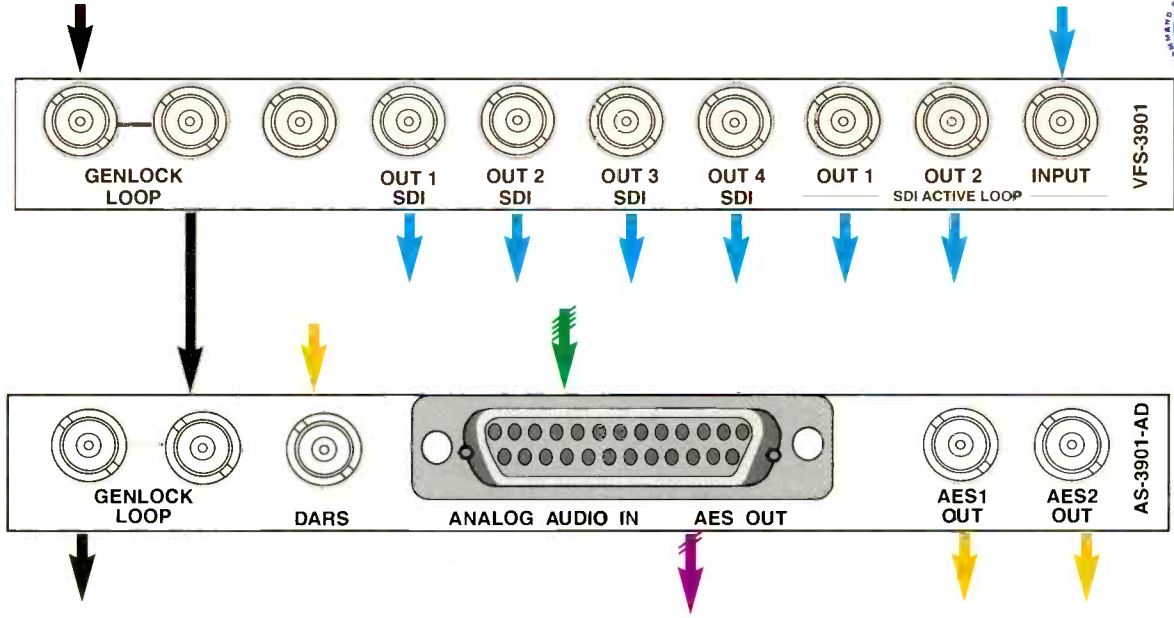
**VFS-3901**
**AS-3901-AD**

*Available Fall 2002*

- 10-bit processing
- Input signals
  - Serial digital SMPTE 259M
  - Genlock
- Output signals
  - Two reclocked original serial digital SMPTE 259M input
  - Four synchronized serial digital SMPTE 259M
- Input standard 525/625 operation auto-detect or user-forced
- Input EDH detect and pass through to output
- User-selectable genlock input lock
- Internal test signal generator
- User-selectable EDH reinsertion on / off
- Analog audio 4 channel input, balanced and unbalance AES (2) output
- Tracks to video synchronizer products
- Full audio processing (gain, channel swap, invert, delay, mix)
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system


GENLOCK LOOP
OUT 1 CPST
OUT 2 CPST
OUT 3 CPST
OUT 4 CPST
OUT 5 CPST
OUT 6 CPST
OUTPUT SDI
INPUT ACTIVE LOOP
ENS-3901
GENLOCK LOOP
DARS
ANALOG AUDIO OUT
AES IN
AES1 IN
AES2 IN
AS-3901-DA


GENLOCK LOOP
OUT 1 CPST
OUT 2 CPST
OUT 3 CPST
OUT 4 CPST
OUT 5 CPST
OUT 6 CPST
OUTPUT SDI
INPUT ACTIVE LOOP
ENS-3901
GENLOCK LOOP
ANALOG AUDIO OUT
OUT 1 SDI
OUT 2 SDI
OUT 3 SDI
IN SDI
DSA-3901-A


GENLOCK LOOP
OUT 1 SDI
OUT 2 SDI
OUT 3 SDI
OUT 4 SDI
OUT 1
OUT 2
SDI ACTIVE LOOP
INPUT
VFS-3901
GENLOCK LOOP
DARS
ANALOG AUDIO IN
AES OUT
AES1 OUT
AES2 OUT
AS-3901-AD

NEO™

# SDI and 4 Channel Analog to AES Digital Audio Synchronizer / Processor

**VFS-3901**
**AS-3901-DA**

*Available Fall 2002*

- 10-bit processing
- Input signals
  - Serial digital SMPTE 259M
  - Genlock
- Output signals
  - Two reclocked original serial digital SMPTE 259M input
  - Four synchronized serial digital SMPTE 259M
- Input standard 525/625 operation auto-detect or user-forced
- Input EDH detect and pass through to output
- User-selectable genlock input lock
- Internal test signal generator
- User-selectable EDH reinsertion on / off
- Digital audio AES (2) input
- Tracks to video synchronizer products
- Full audio processing (gain, channel swap, invert, delay, mix)
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

# SDI and 4 Channel Analog Audio Synchronizer / Processor / Demultiplexer

**VFS-3901**
**DSA-3901-A**

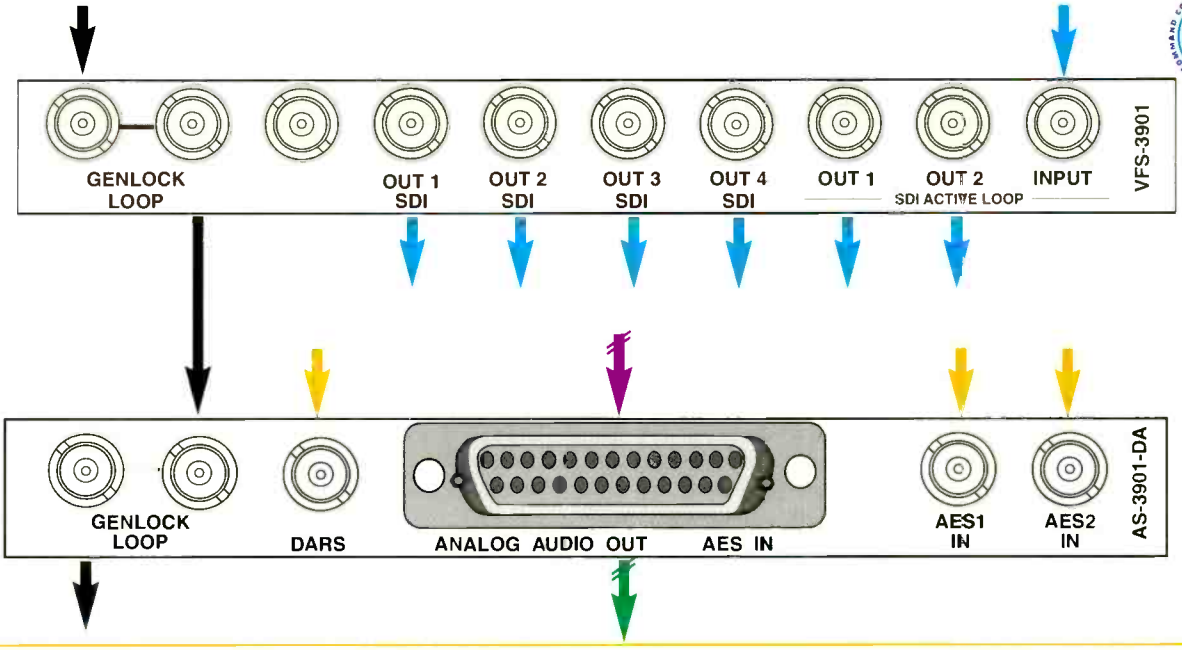
- 10-bit processing
- Input signals
  - Serial digital SMPTE 259M
  - Genlock
- Output signals
  - Two reclocked original serial digital SMPTE 259M input
  - Three processed SDI outputs
- Input standard 525/625 operation auto-detect or user-forced
- Input EDH detect and pass through to output
- Delay mode
- User-selectable genlock input lock
- Internal test signal generator
- User-selectable EDH reinsertion on / off
- Selectable 16 / 20 / 24 bit audio processing
- 4 channel analog audio outputs
- Audio processing amplifier (gain, swap, invert, delay, mix)
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

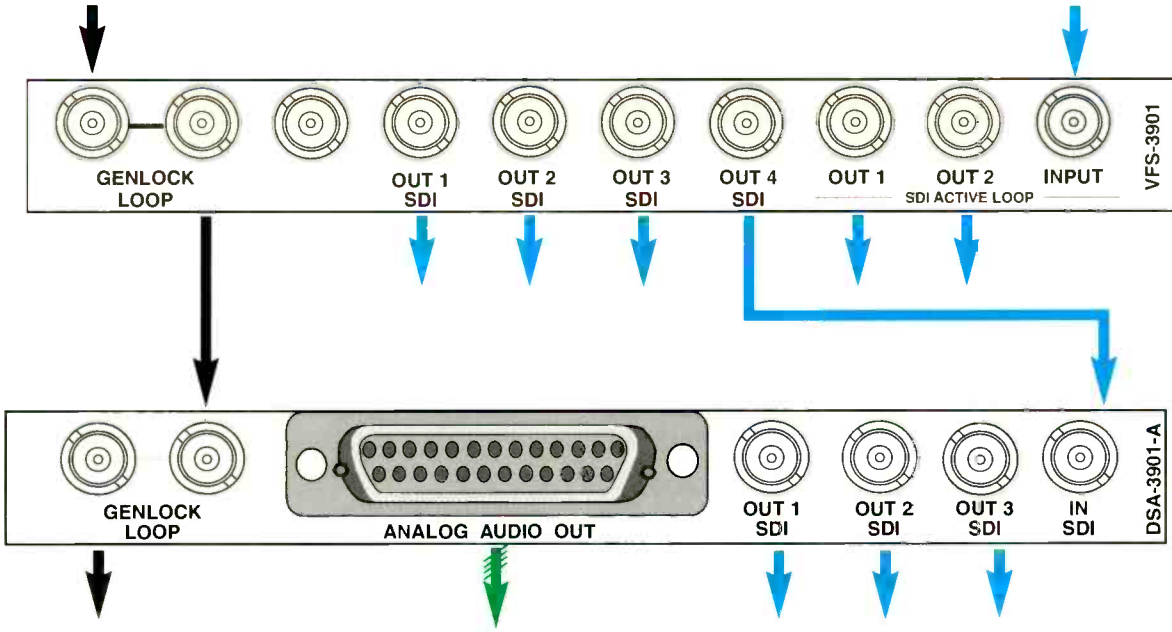
# SDI and 4 AES Input / Output Synchronizer / Processor

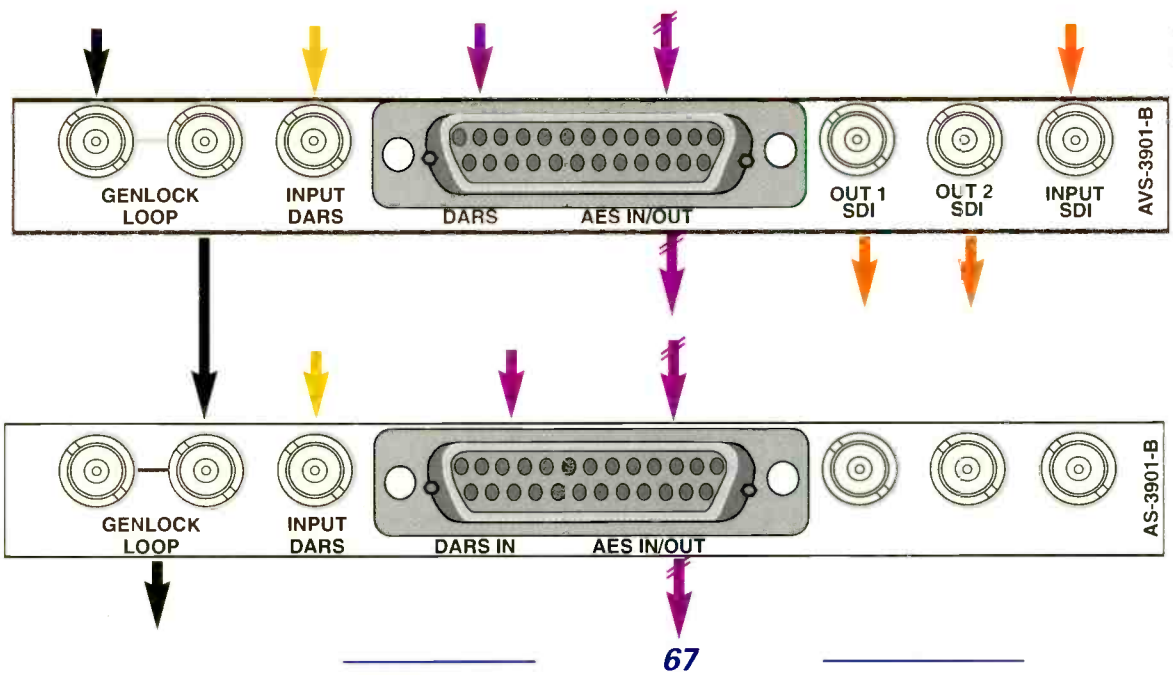
**AVS-3901-B**
**AS-3901-B**

*Available Fall 2002*

- SDI video input with two processed video outputs
- DARS input
- Genlock reference input with loop through
- Digital audio AES (4) input / output
- Full audio processing (gain, channel swap, invert, delay, mix)
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system


GENLOCK LOOP
OUT 1 SDI
OUT 2 SDI
OUT 3 SDI
OUT 4 SDI
OUT 1
OUT 2
SDI ACTIVE LOOP
INPUT
VFS-3901
GENLOCK LOOP
DARS
ANALOG AUDIO OUT
AES IN
AES1 IN
AES2 IN
AS-3901-DA


GENLOCK LOOP
OUT 1 SDI
OUT 2 SDI
OUT 3 SDI
OUT 4 SDI
OUT 1
OUT 2
SDI ACTIVE LOOP
INPUT
VFS-3901
GENLOCK LOOP
ANALOG AUDIO OUT
OUT 1 SDI
OUT 2 SDI
OUT 3 SDI
IN SDI
DSA-3901-A


GENLOCK LOOP
INPUT DARS
DARS
AES IN/OUT
OUT 1 SDI
OUT 2 SDI
INPUT SDI
AVS-3901-B
GENLOCK LOOP
INPUT DARS
DARS IN
AES IN/OUT
AS-3901-B

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# SDI and 4 AES Input / Output Synchronizer / Processor

## AVS-3901-C
## AS-3901-C

*Available Fall 2002*

- SDI video input with two processed video outputs
- DARS input
- Genlock reference input with loop through
- Digital audio AES (4) input / output
- Full audio processing (gain, channel swap, invert, delay, mix)
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

# SDI and 4 AES Input / Output Synchronizer / Processor / Multiplexer

## AVM-3901-B
## MSA-3901-B

*Available Fall 2002*

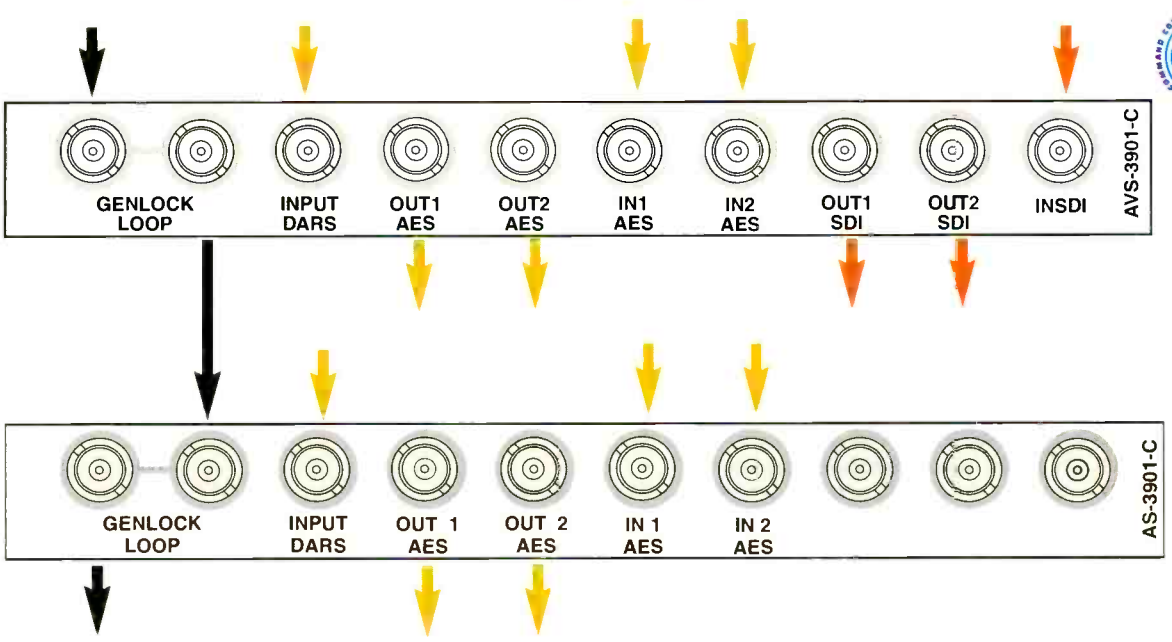
- SDI video input with three processed outputs
- DARS input
- Genlock reference input with loop through
- Digital audio AES (4) input / output
- Internal audio processing amplifier (gain, swap, invert, delay, mix)
- Operation as an audio synchronizer or as an audio delay line
- Selectable 16 / 20 / 24-bit audio processing
- Audio re-sampling for 32-108kHz AES inputs, with bypass for data over AES operation
- C, U & V bit transparency
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

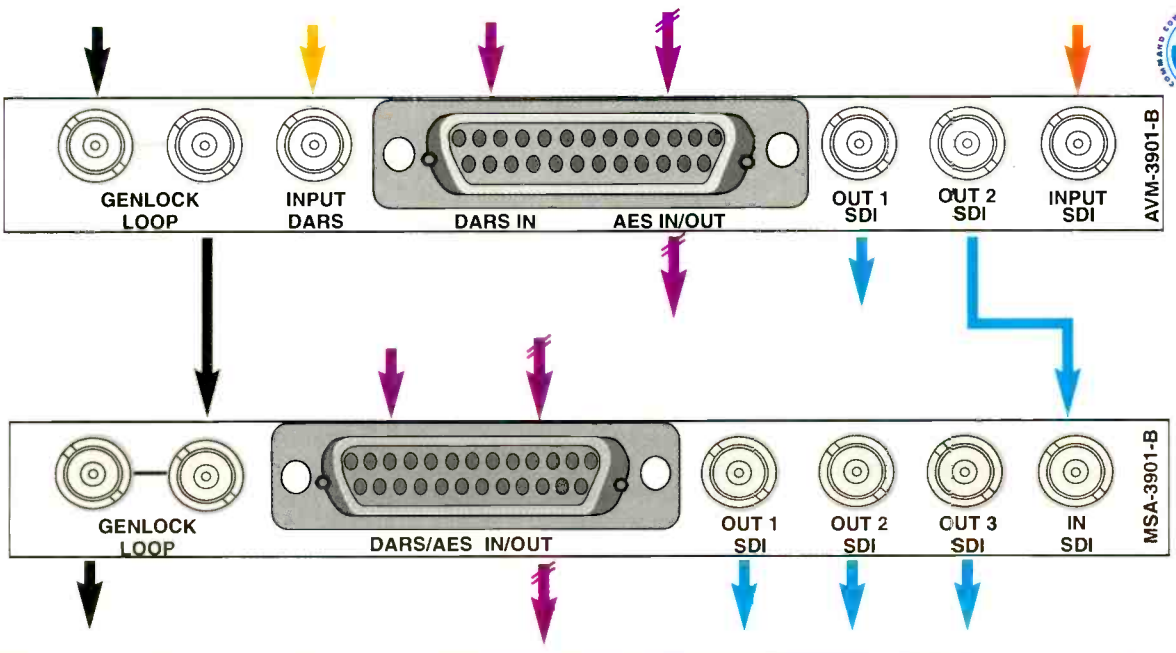
# SDI and 4 AES Input / Output Synchronizer / Processor / Multiplexer

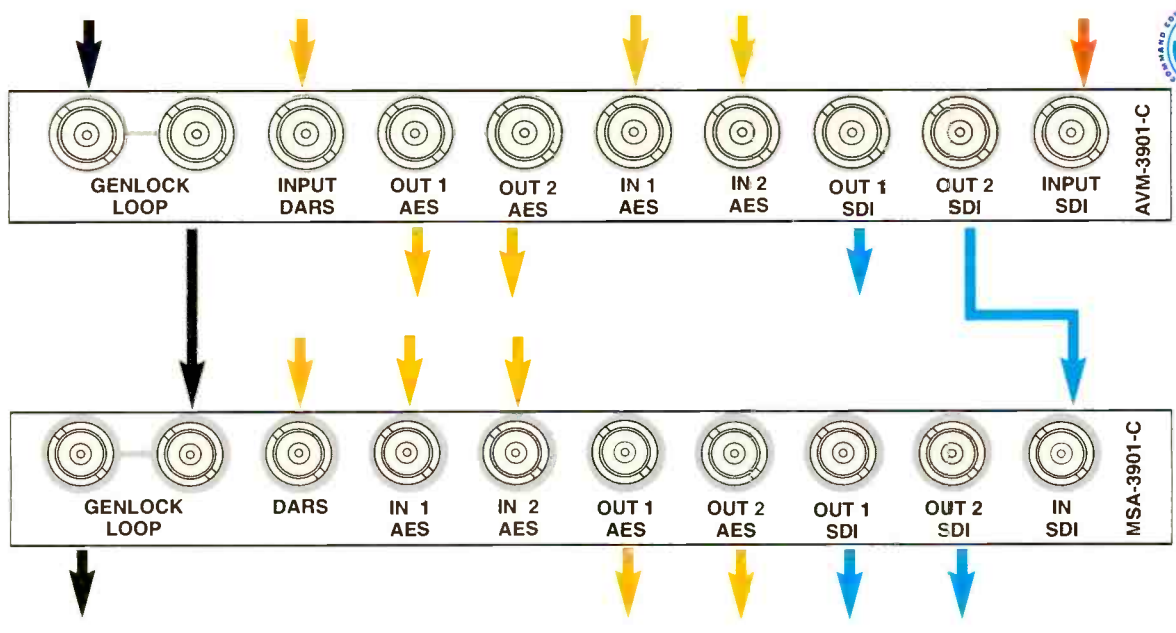
## AVM-3901-C
## MSA-3901-C

*Available Fall 2002*

- SDI video input with two processed outputs
- DARS input
- Genlock reference input with loop through
- Digital audio AES (4) input / output
- Internal audio processing amplifier (gain, swap, invert, delay, mix)
- Operation as an audio synchronizer or as an audio delay line
- Selectable 16 / 20 / 24-bit audio processing
- Audio re-sampling for 32-108kHz AES inputs, with bypass for data over AES operation
- C, U & V bit transparency
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system


GENLOCK LOOP
INPUT DARS
OUT1 AES
OUT2 AES
IN1 AES
IN2 AES
OUT1 SDI
OUT2 SDI
INSDI
AVS-3901-C
GENLOCK LOOP
INPUT DARS
OUT 1 AES
OUT 2 AES
IN 1 AES
IN 2 AES
AS-3901-C


GENLOCK LOOP
INPUT DARS
DARS IN
AES IN/OUT
OUT 1 SDI
OUT 2 SDI
INPUT SDI
AVM-3901-B
GENLOCK LOOP
DARS/AES IN/OUT
OUT 1 SDI
OUT 2 SDI
OUT 3 SDI
IN SDI
MSA-3901-B


GENLOCK LOOP
INPUT DARS
OUT 1 AES
OUT 2 AES
IN 1 AES
IN 2 AES
OUT 1 SDI
OUT 2 SDI
INPUT SDI
AVM-3901-C
GENLOCK LOOP
DARS
IN 1 AES
IN 2 AES
OUT 1 AES
OUT 2 AES
OUT 1 SDI
OUT 2 SDI
IN SDI
MSA-3901-C

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# SDI and 4 AES Synchronizer / Processor / Multiplexer

**AVM-3901-B**
**MSA-3901-B**

*Available Fall 2002*

- SDI video input with two processed outputs
- DARS input
- Genlock reference input with loop through
- Selectable 16 / 20 / 24-bit audio processing
- 8 AES digital audio outputs
- Audio processing amplifier
- Synchronization and delay
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
    - System Discovery/Diagnostics
    - Local/Remote Control, Configuration, Monitoring and Secure Access
    - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
    - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

# SDI and 4 AES Synchronizer / Processor / Multiplexer

**AVM-3901-B4**
**MSA-3901-B4**

*Available Fall 2002*

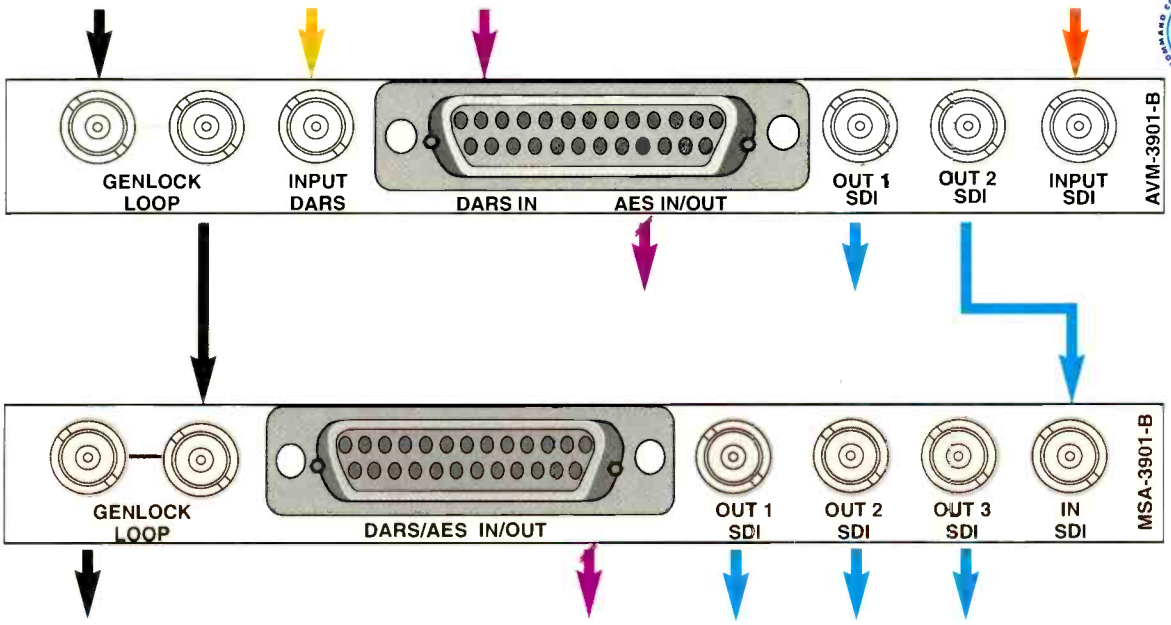
- SDI video input with two processed outputs
- DARS input
- Genlock reference input with loop through
- Selectable 16 / 20 / 24-bit audio processing
- 8 AES digital audio outputs
- Audio processing amplifier (gain, swap, invert, delay, mix)
- Synchronization and delay
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
    - System Discovery/Diagnostics
    - Local/Remote Control, Configuration, Monitoring and Secure Access
    - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
    - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

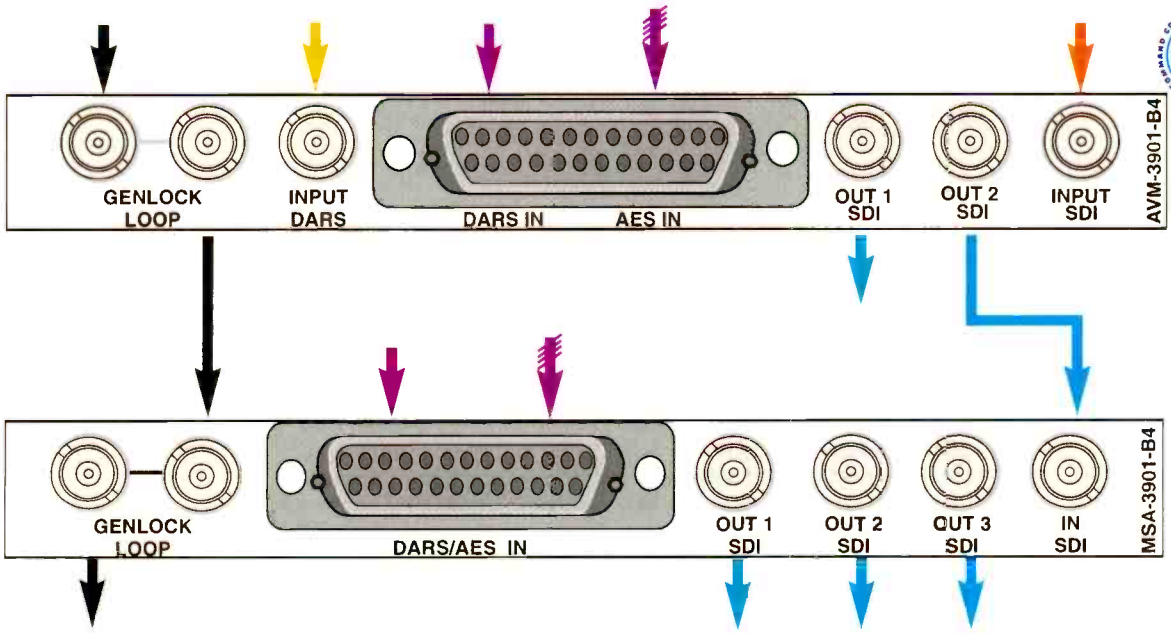
# SDI and 4 AES Synchronizer / Processor / Demultiplexer

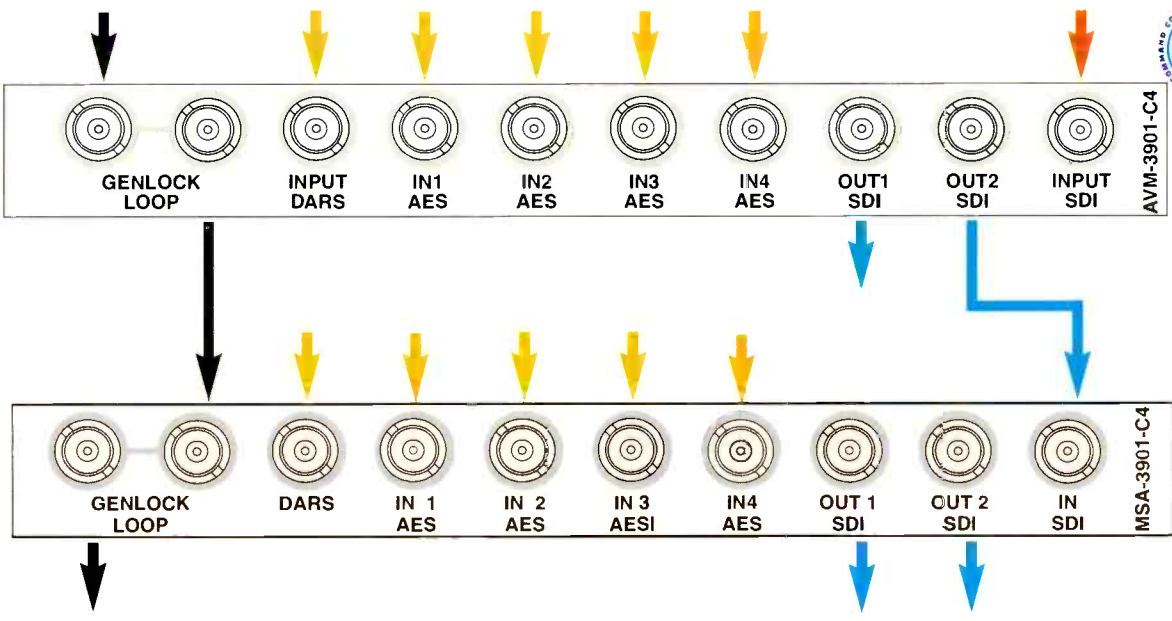
**AVM-3901-C4**
**MSA-3901-C4**

*Available Fall 2002*

- SDI video input with two processed outputs
- DARS input
- Genlock reference input with loop through
- C, U & V bit transparency
- Internal audio processing amplifier (gain, swap, invert, delay, mix)
- Operator as an audio synchronizer or as an audio delay line
- Selectable 16 / 20 / 24-bit audio processing
- Audio re-sampling for 32-108kHz AES outputs, with bypass for data over AES operation
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
    - System Discovery/Diagnostics
    - Local/Remote Control, Configuration, Monitoring and Secure Access
    - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
    - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system


GENLOCK LOOP
INPUT DARS
DARS IN
AES IN/OUT
OUT 1 SDI
OUT 2 SDI
INPUT SDI
AVM-3901-B
GENLOCK LOOP
DARS/AES IN/OUT
OUT 1 SDI
OUT 2 SDI
OUT 3 SDI
IN SDI
MSA-3901-B


GENLOCK LOOP
INPUT DARS
DARS IN
AES IN
OUT 1 SDI
OUT 2 SDI
INPUT SDI
AVM-3901-B4
GENLOCK LOOP
DARS/AES IN
OUT 1 SDI
OUT 2 SDI
OUT 3 SDI
IN SDI
MSA-3901-B4


GENLOCK LOOP
INPUT DARS
IN1 AES
IN2 AES
IN3 AES
IN4 AES
OUT1 SDI
OUT2 SDI
INPUT SDI
AVM-3901-C4
GENLOCK LOOP
DARS
IN 1 AES
IN 2 AES
IN 3 AESI
IN4 AES
OUT 1 SDI
OUT 2 SDI
IN SDI
MSA-3901-C4

NEO™

## SDI and 4 AES Synchronizer / Processor / Demultiplexer

**AVD-3901-B4**
**DSA-3901-B4**

*Available Fall 2002*

- SDI video input with two processed outputs
- DARS input
- Genlock reference input with loop through
- Selectable 16 / 20 / 24-bit audio processing
- 8 AES digital audio outputs
- Audio processing amplifier (gain, swap, invert, delay, mix)
- Synchronization and delay
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

## SDI and 4 AES Synchronizer / Processor / Demultiplexer

**AVD-3901-C4**
**DSA-3901-C4**

*Available Fall 2002*

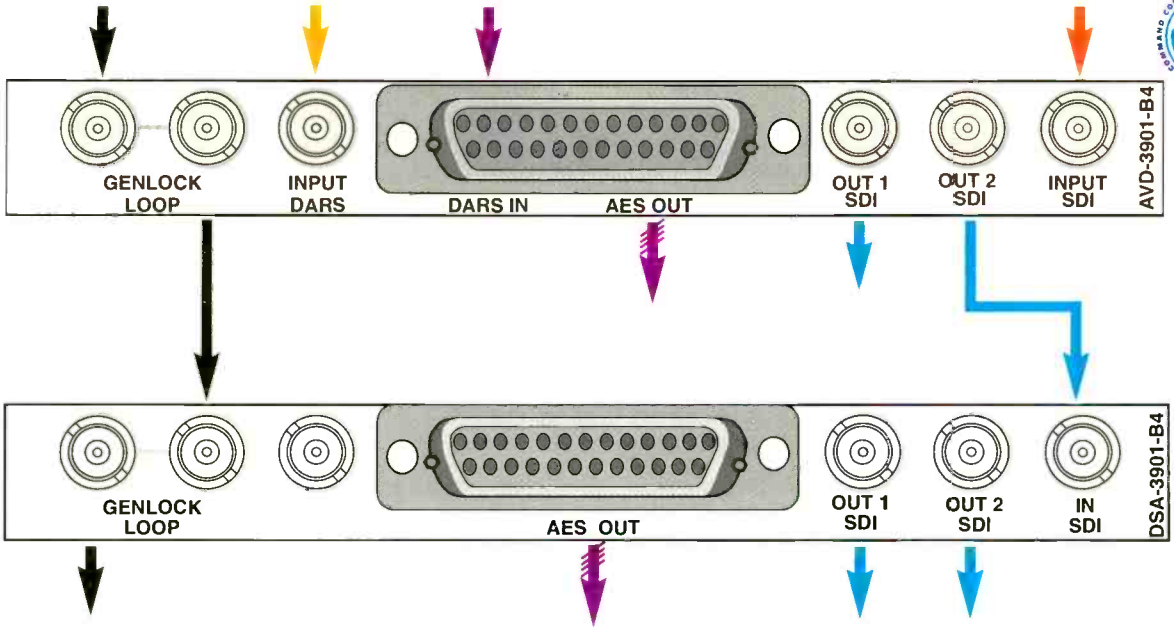
- SDI video input with two processed outputs
- DARS input
- Genlock reference input with loop through
- Selectable 16 / 20 / 24-bit audio processing
- 8 AES digital audio outputs
- Audio processing amplifier (gain, swap, invert, delay, mix)
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System Discovery/Diagnostics
  - Local/Remote Control, Configuration, Monitoring and Secure Access
  - Control via card edge, local/remote control panels, RS232/422 or Ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- DejaView intelligent settings recovery system

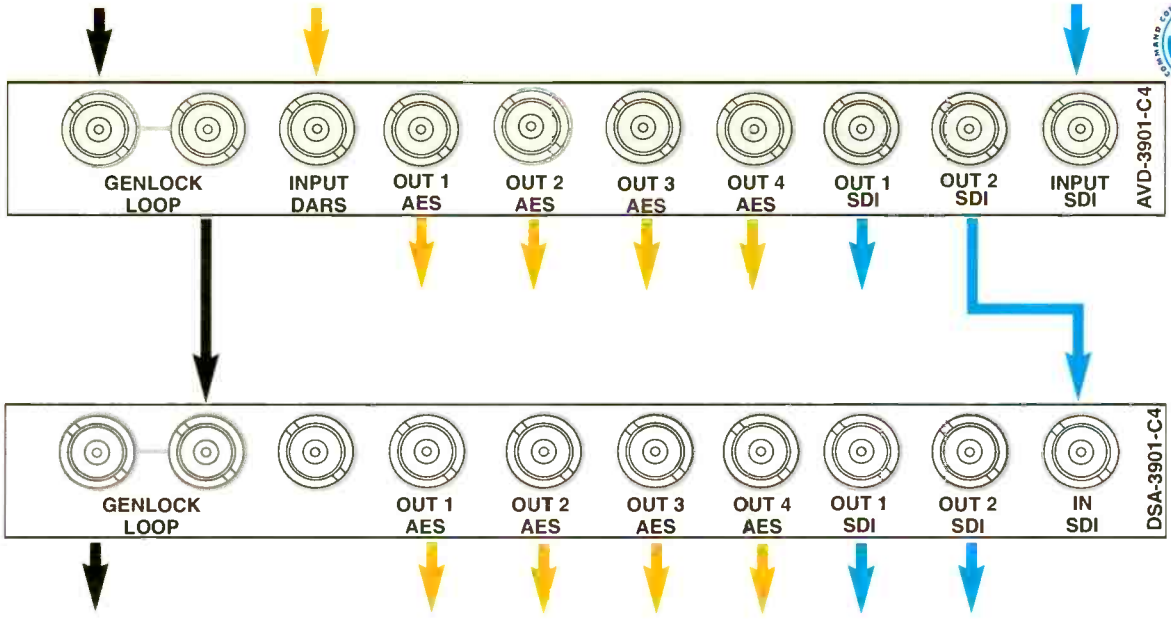
Genesis™

## 10-Bit Component Video A-D Converter

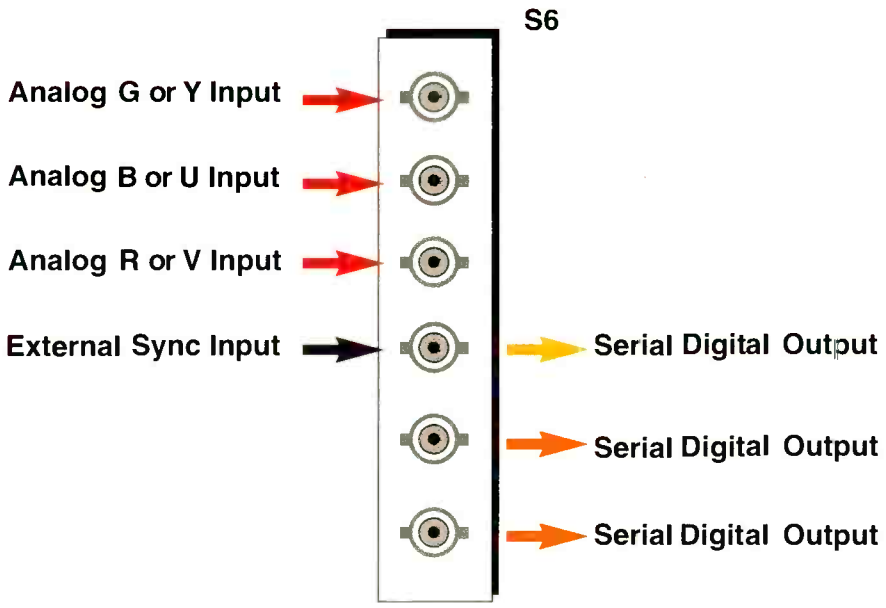
**ADC-6001-S6**

- Oversampling analog to digital converters
- GBR/YUV inputs
- Horizontal phasing control
- NTSC/SMPTE/Betacam/MII input levels
- Looping/terminated input
- EDH insertion
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol


GENLOCK LOOP
INPUT DARS
DARS IN
AES OUT
OUT 1 SDI
OUT 2 SDI
INPUT SDI
AVD-3901-B4
GENLOCK LOOP
AES OUT
OUT 1 SDI
OUT 2 SDI
IN SDI
DSA-3901-B4


GENLOCK LOOP
INPUT DARS
OUT 1 AES
OUT 2 AES
OUT 3 AES
OUT 4 AES
OUT 1 SDI
OUT 2 SDI
INPUT SDI
AVD-3901-C4
GENLOCK LOOP
OUT 1 AES
OUT 2 AES
OUT 3 AES
OUT 4 AES
OUT 1 SDI
OUT 2 SDI
IN SDI
DSA-3901-C4




S6
Analog G or Y Input
Analog B or U Input
Analog R or V Input
External Sync Input
Serial Digital Output
Serial Digital Output
Serial Digital Output

Genesis™

# 10-Bit Component Video A-D Converter

## ADC-6001-S15

- Oversampling analog to digital converters
- GBR/YUV inputs
- Horizontal phasing control
- NTSC/SMPTE/Betacam/MII input levels
- Looping/terminated input
- EDH insertion
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol

# Digital Comb Filter Decoder

## DEC-6001-S6

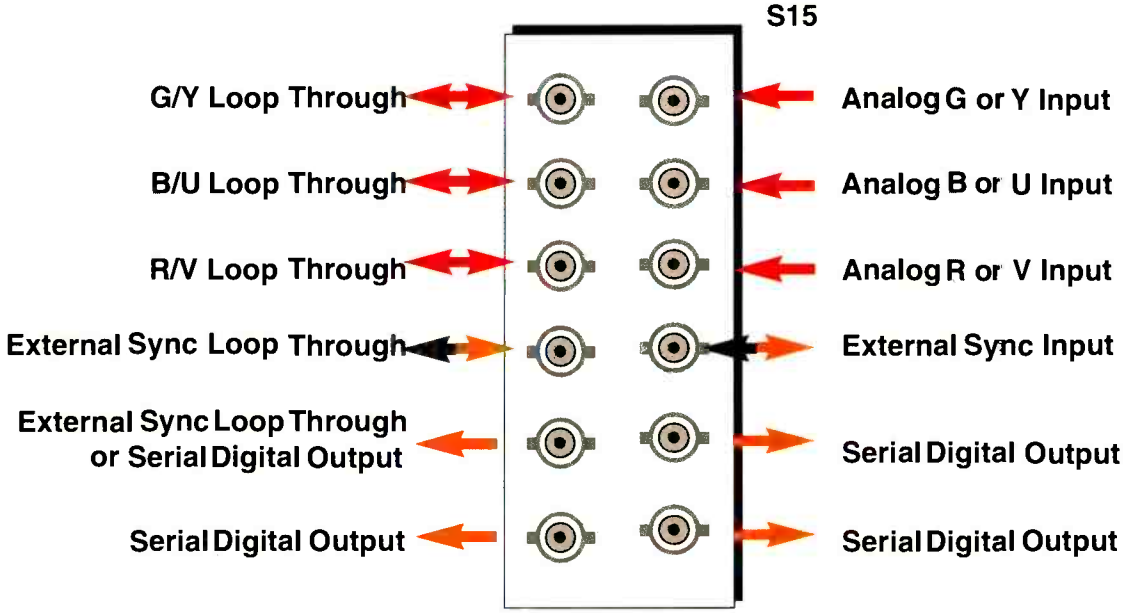
- Full broadcast quality performance
- PAL or NTSC operation
- Proc amp facilities
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- 10-bit precision ADC
- Precision adaptive comb filtering
- Looping analog input
- 4 x 75 ohm 270 Mb/s output

# Digital Comb Filter Decoder

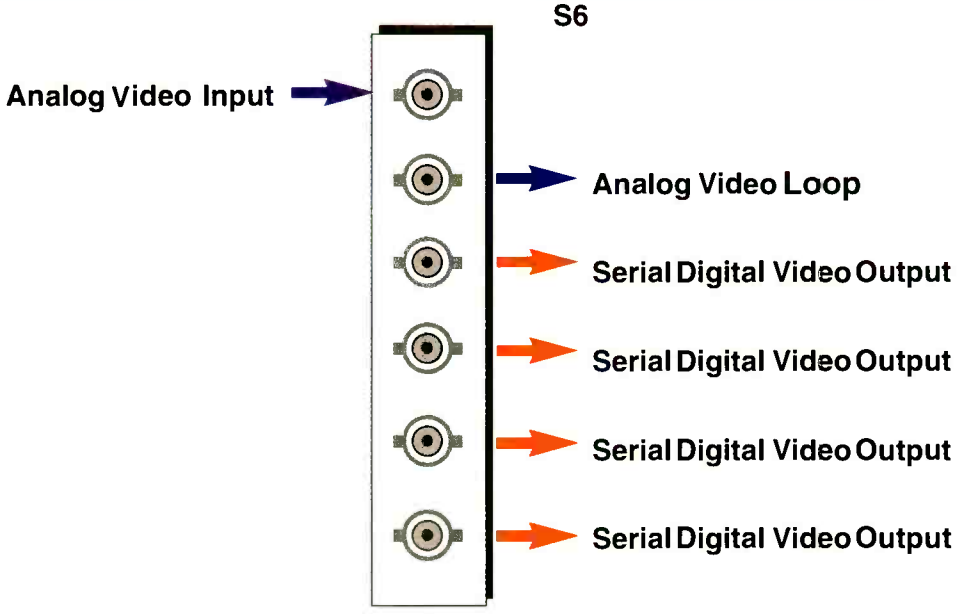
## DEC-6002-S6

- Full broadcast quality performance
- PAL, NTSC, PAL-M and PAL-N automatic/manual standard selection
- Error Detection and Handling (EDH)
- Proc amp facilities
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- 10-bit precision ADC
- Precision adaptive comb filtering
- Looping analog input
- 4 x 75 ohm 270 Mb/s output

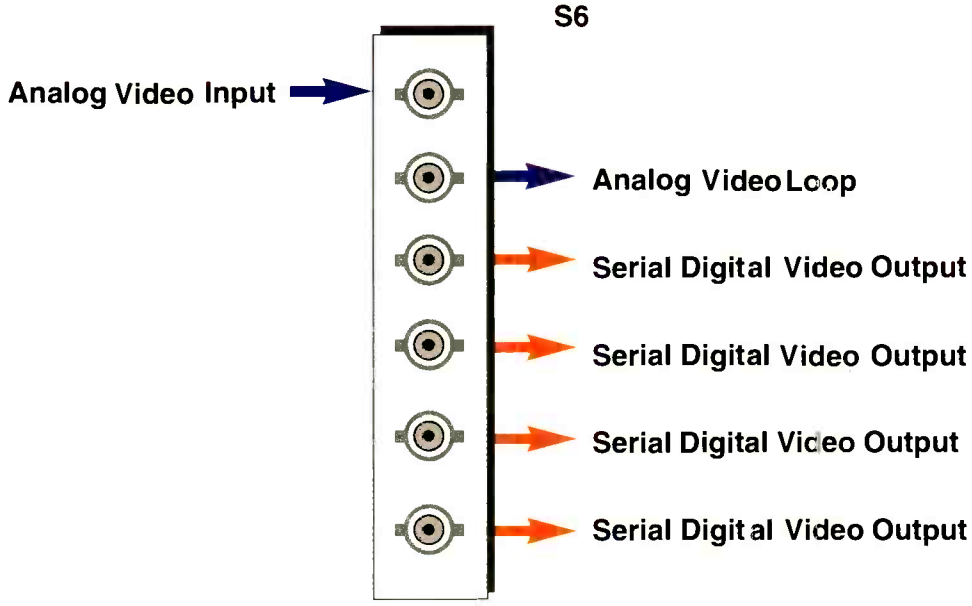
S15


G/Y Loop Through
B/U Loop Through
R/V Loop Through
External Sync Loop Through
External Sync Loop Through or Serial Digital Output
Serial Digital Output
Analog G or Y Input
Analog B or U Input
Analog R or V Input
External Sync Input
Serial Digital Output
Serial Digital Output

S6


Analog Video Input
Analog Video Loop
Serial Digital Video Output
Serial Digital Video Output
Serial Digital Video Output
Serial Digital Video Output

S6


Analog Video Input
Analog Video Loop
Serial Digital Video Output
Serial Digital Video Output
Serial Digital Video Output
Serial Digital Video Output

Genesis™

ASI-6001-S6

# Serial Digital Video Distribution Amplifier

- 143/177/270/360Mb/s operation
- DVB ASI compatible
- 5 SDI outputs
- Automatic equalization and reclocking
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol

ASI-6001-S16

# Serial Digital Video Distribution Amplifier

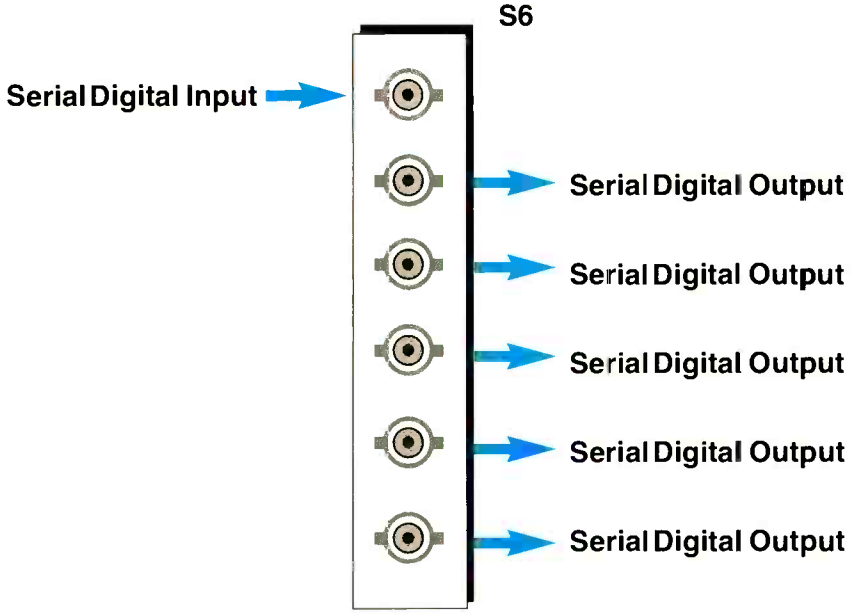
- 143/177/270/360Mb/s operation
- DVB ASI compatible
- 9 SDI outputs (6 DVB ASI outputs)
- Automatic equalization and reclocking
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol

ASI-6001-S12

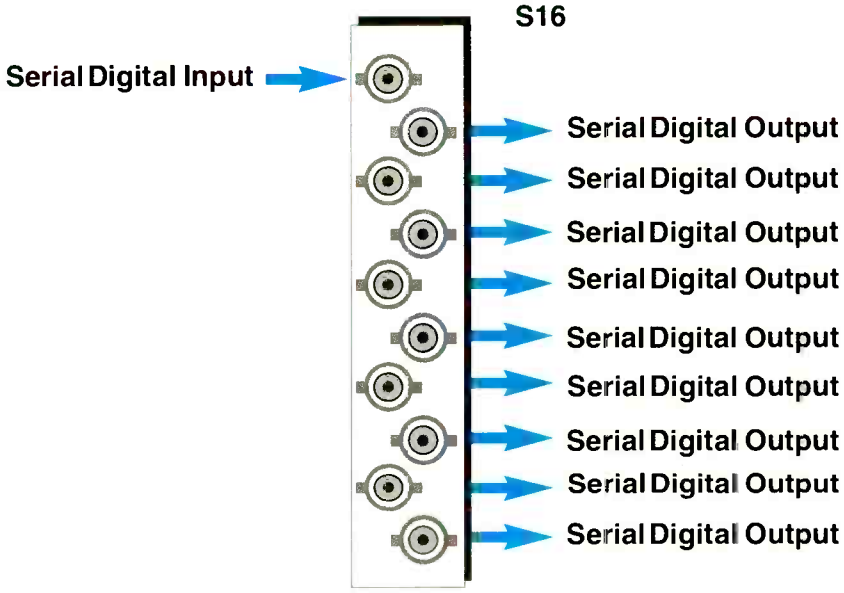
# Serial Digital Video Distribution Amplifier

- 143/177/270/360Mb/s operation
- DVB ASI compatible
- 11 SDI outputs (6 DVB ASI outputs)
- Automatic equalization and reclocking
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol

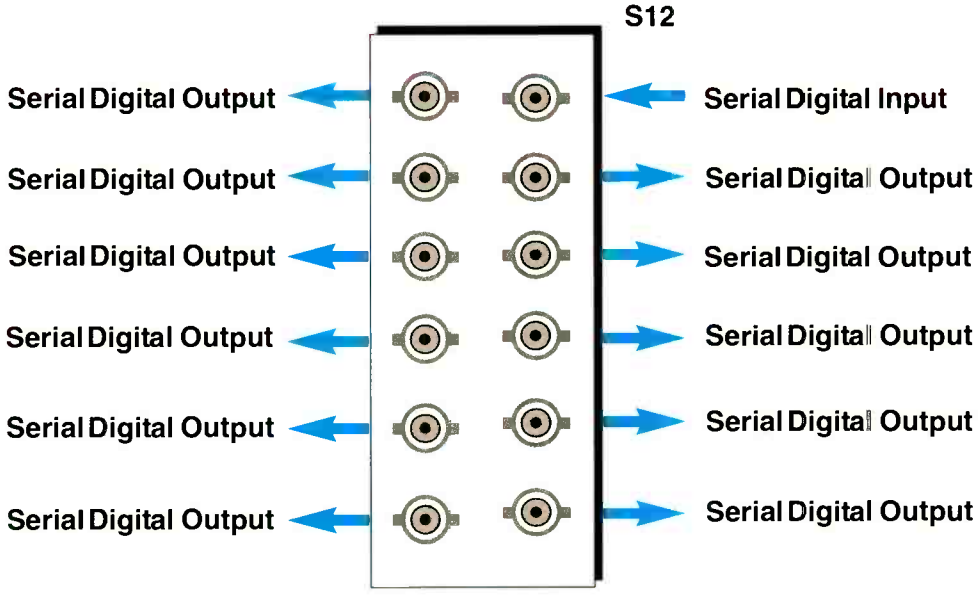
## S6


Serial Digital Input
Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Output

## S16


Serial Digital Input
Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Output

## S12


Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Input
Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Output

Genesis™

# Serial Distribution Amplifier With EDH

EDH-6001-S6

- 270Mb/s operation
- Error Detection and Handling (EDH)
- 5 x 75 ohm 270 Mb/s outputs
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Automatic cable equalization


# Serial Distribution Amplifier With EDH


EDH-6001-S12

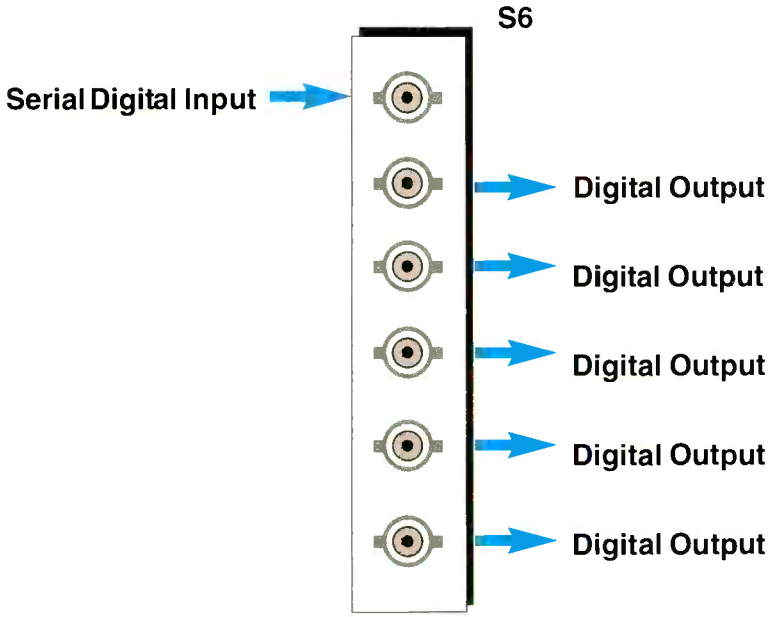

- 270Mb/s operation
- Error Detection and Handling (EDH)
- 8 x 75 ohm 270 Mb/s outputs
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Automatic cable equalization

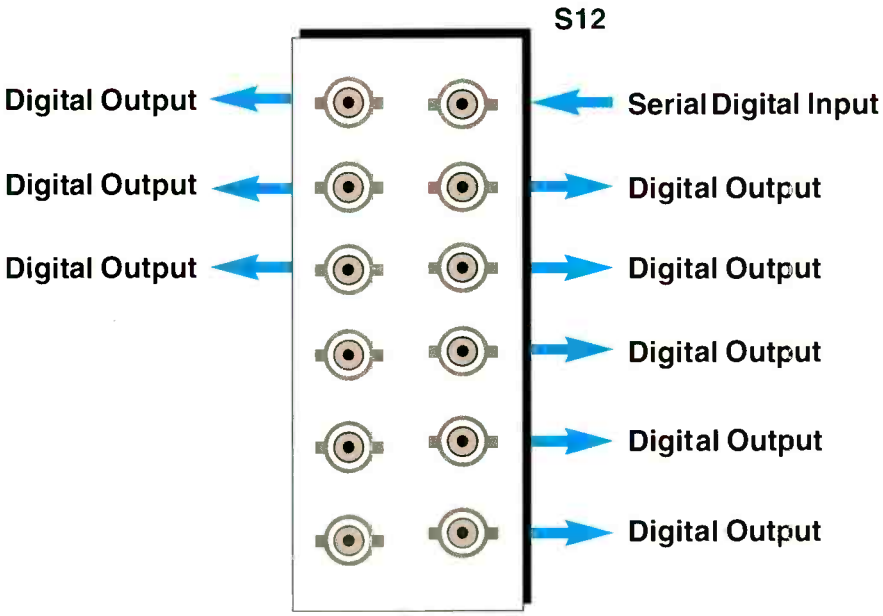


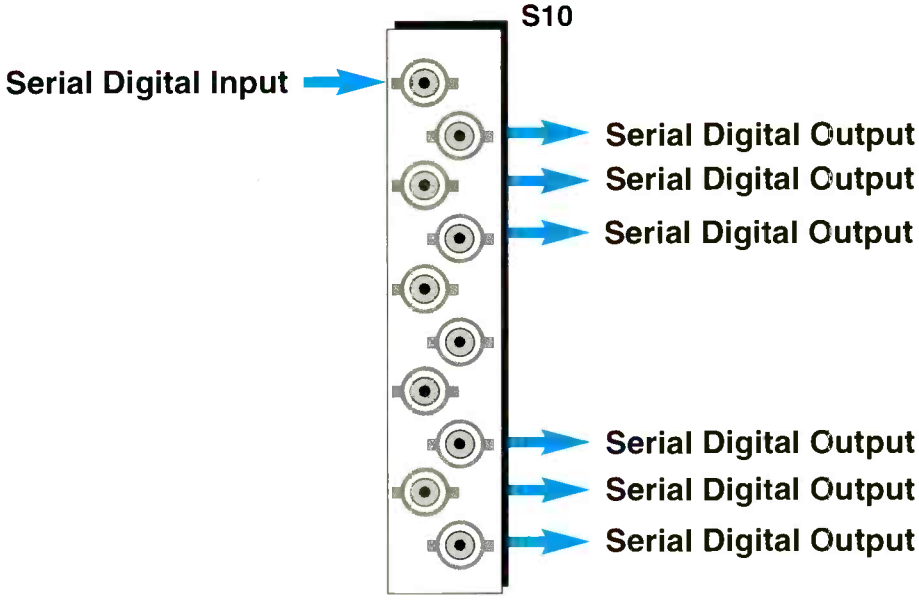
# Serial Distribution Amplifier With EDH


EDH-6001-S10


- 270Mb/s operation
- Error Detection and Handling (EDH)
- 6 x 75 ohm 270 Mb/s outputs
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Automatic cable equalization


S6
Serial Digital Input
Digital Output
Digital Output
Digital Output
Digital Output
Digital Output


S12
Digital Output
Digital Output
Digital Output
Serial Digital Input
Digital Output
Digital Output
Digital Output
Digital Output
Digital Output


S10
Serial Digital Input
Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Output

# Genesis™

## EDH-6001-S16 — Serial Distribution Amplifier With EDH

- 270Mb/s operation
- Error Detection and Handling (EDH)
- 8 x 75 ohm 270 Mb/s outputs
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Automatic cable equalization

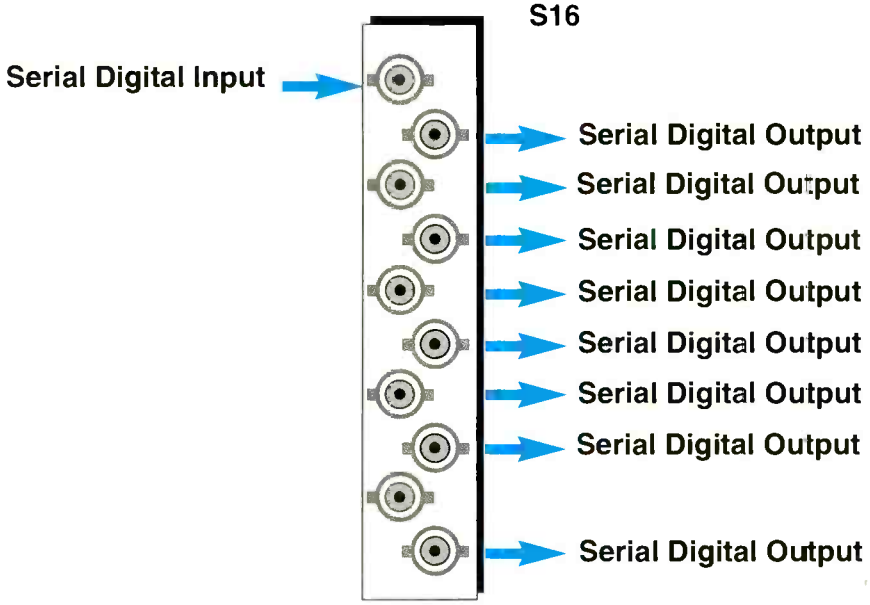
## VSE-6001-S6 — Serial Digital Amplifier

- 270Mb/s operation
- 5 x 75 ohm 270 Mb/s outputs
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Automatic cable equalization

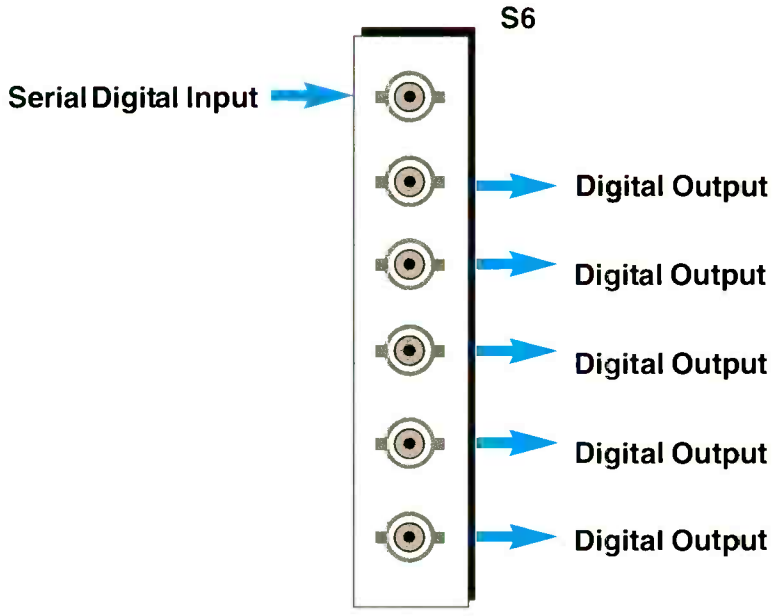
## VSE-6001-S12 — Serial Digital Amplifier

- 270Mb/s operation
- Error Detection and Handling (EDH)
- 8 x 75 ohm 270 Mb/s outputs
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Automatic cable equalization

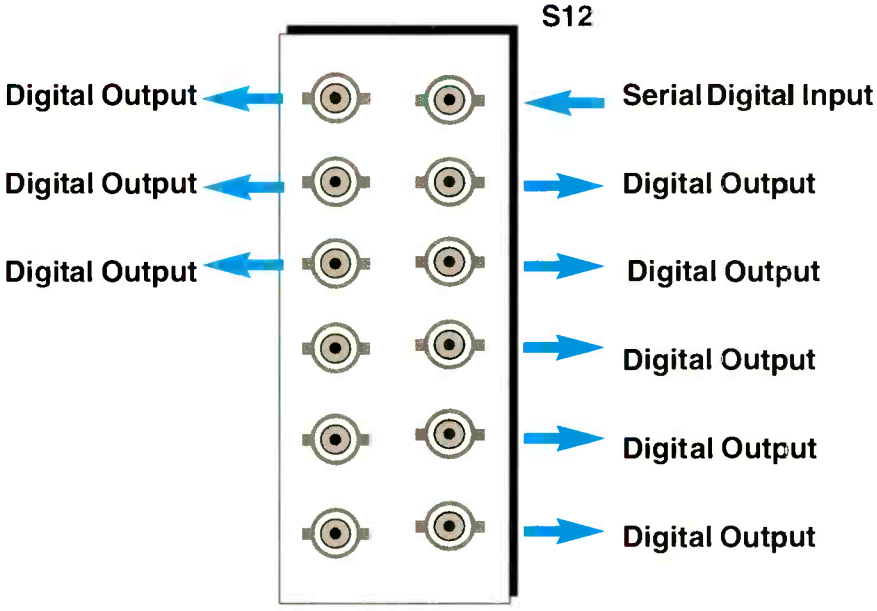
## S16


Serial Digital Input
Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Output

## S6


Serial Digital Input
Digital Output
Digital Output
Digital Output
Digital Output
Digital Output

## S12


Digital Output
Digital Output
Digital Output
Serial Digital Input
Digital Output
Digital Output
Digital Output
Digital Output

# Genesis™

## VSE-6001-S10 Serial Distribution Amplifier

- 270Mb/s operation
- Error Detection and Handling (EDH)
- 6 x 75 ohm 270 Mb/s outputs
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Automatic cable equalization

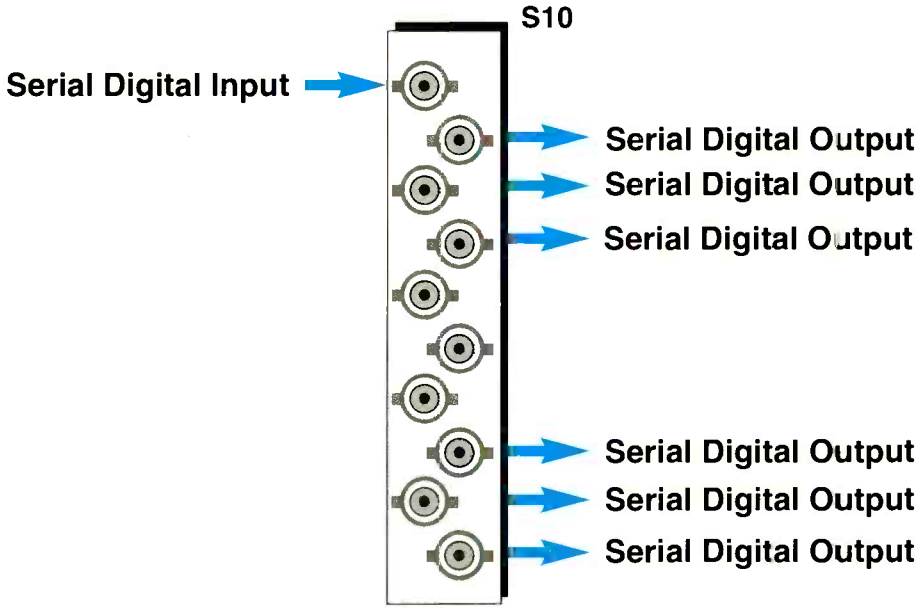
## VSE-6001-S16 Serial Distribution Amplifier

- 270Mb/s operation
- Error Detection and Handling (EDH)
- 8 x 75 ohm 270 Mb/s outputs
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Automatic cable equalization

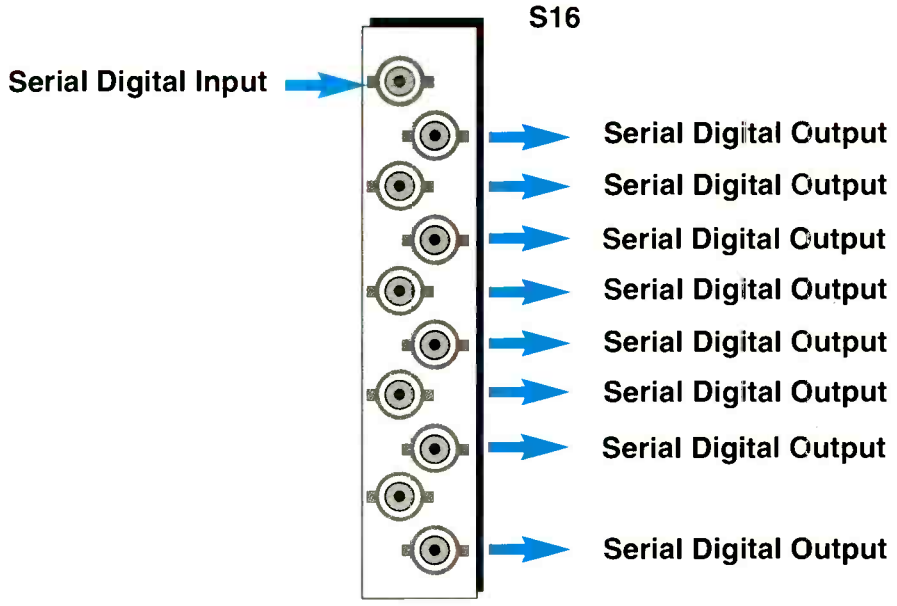
## VSM-6001-S6 Monitoring Serial Distribution Amplifier

- 270Mb/s operation
- 4 x PAL/NTSC monitoring outputs
- 5 x 75 ohm 270 Mb/s outputs
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Automatic cable equalization

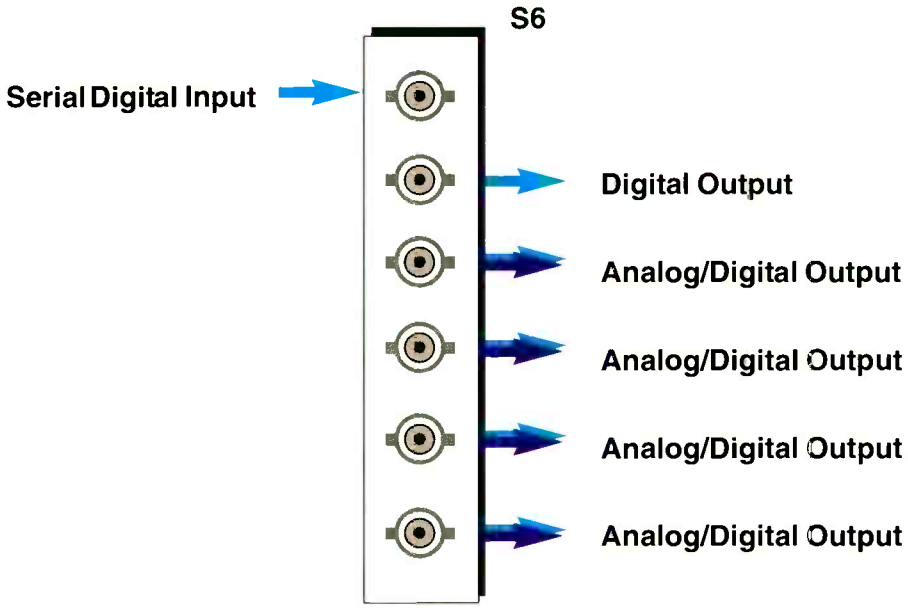
## S10


Serial Digital Input
Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Output

## S16


Serial Digital Input
Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Output

## S6


Serial Digital Input
Digital Output
Analog/Digital Output
Analog/Digital Output
Analog/Digital Output
Analog/Digital Output

Genesis™

# Monitoring Serial Distribution Amplifier

## VSM-6001-S12

- 270Mb/s operation
- Error Detection and Handling (EDH)
- 4 x PAL/NTSC monitoring option
- 8 x 75 ohm 270 Mb/s outputs
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Automatic cable equalization


# Monitoring Serial Distribution Amplifier


## VSM-6001-S10

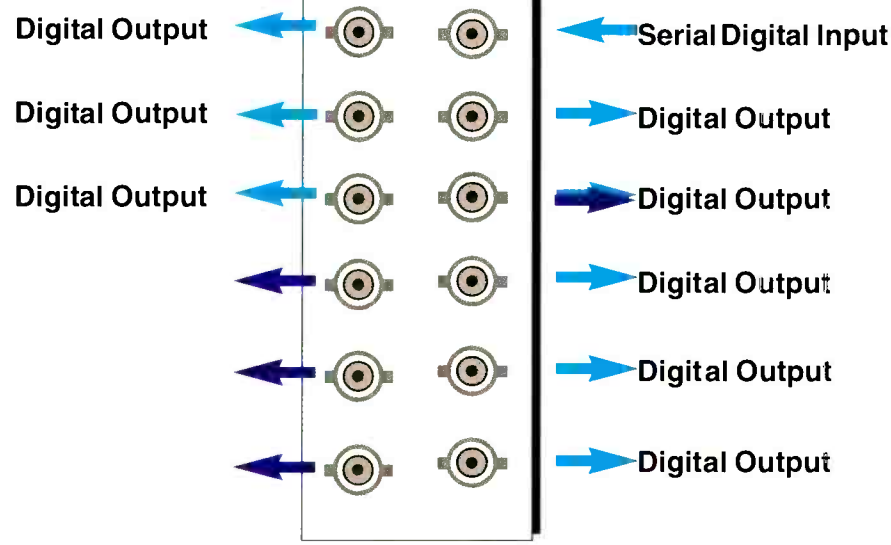
- 270Mb/s operation
- 4 x PAL/NTSC monitoring outputs
- 6 x 75 ohm 270 Mb/s outputs
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Automatic cable equalization


# Monitoring Serial Distribution Amplifier

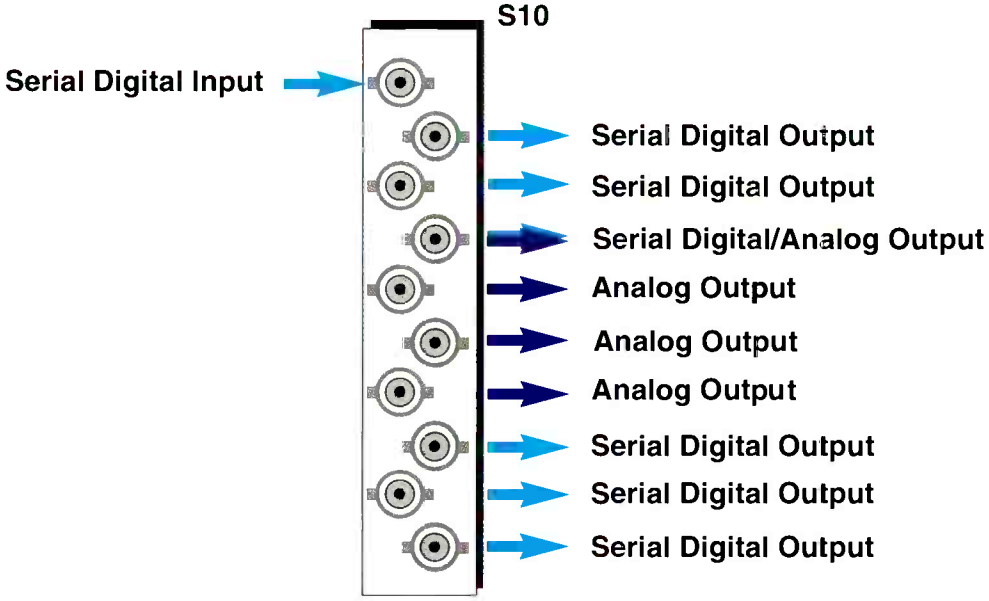

## VSM-6001-S16

- 270Mb/s operation
- 4 x PAL/NTSC monitoring option
- 8 x 75 ohm 270 Mb/s outputs
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Automatic cable equalization

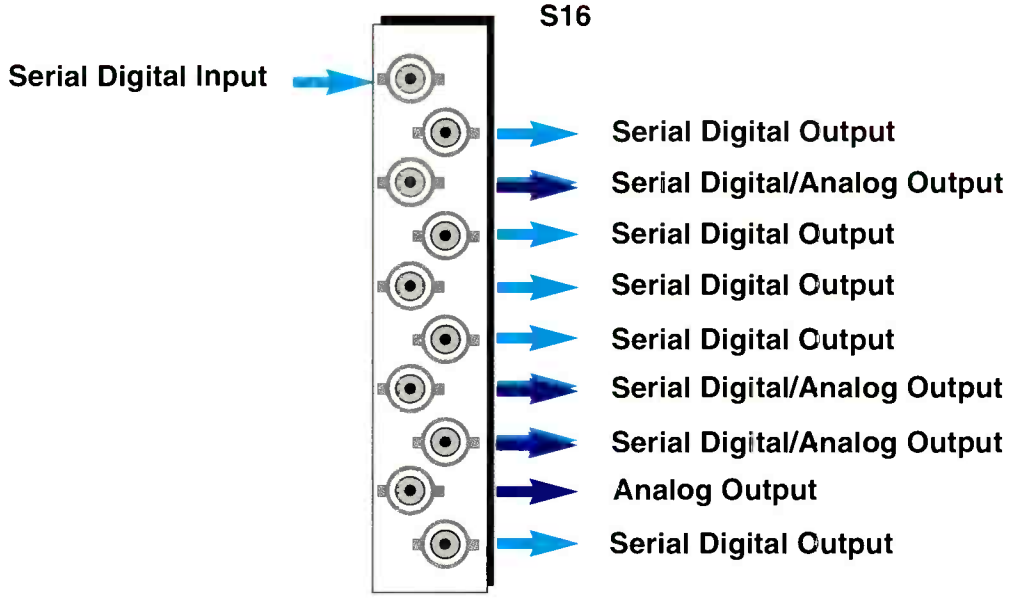
## S12


Digital Output
Digital Output
Digital Output
Serial Digital Input
Digital Output
Digital Output
Digital Output
Digital Output
Digital Output

## S10


Serial Digital Input
Serial Digital Output
Serial Digital Output
Serial Digital/Analog Output
Analog Output
Analog Output
Analog Output
Serial Digital Output
Serial Digital Output
Serial Digital Output

## S16


Serial Digital Input
Serial Digital Output
Serial Digital/Analog Output
Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital/Analog Output
Serial Digital/Analog Output
Analog Output
Serial Digital Output

Genesis™

VSM-6002-S6

# Monitoring Serial Distribution Amplifier With EDH

- 270Mb/s operation
- Error Detection and Handling (EDH)
- 4 x PAL/NTSC monitoring option
- 5 x 75 ohm 270 Mb/s outputs
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Automatic cable equalization

VSM-6002-S12

# Monitoring Serial Distribution Amplifier With EDH

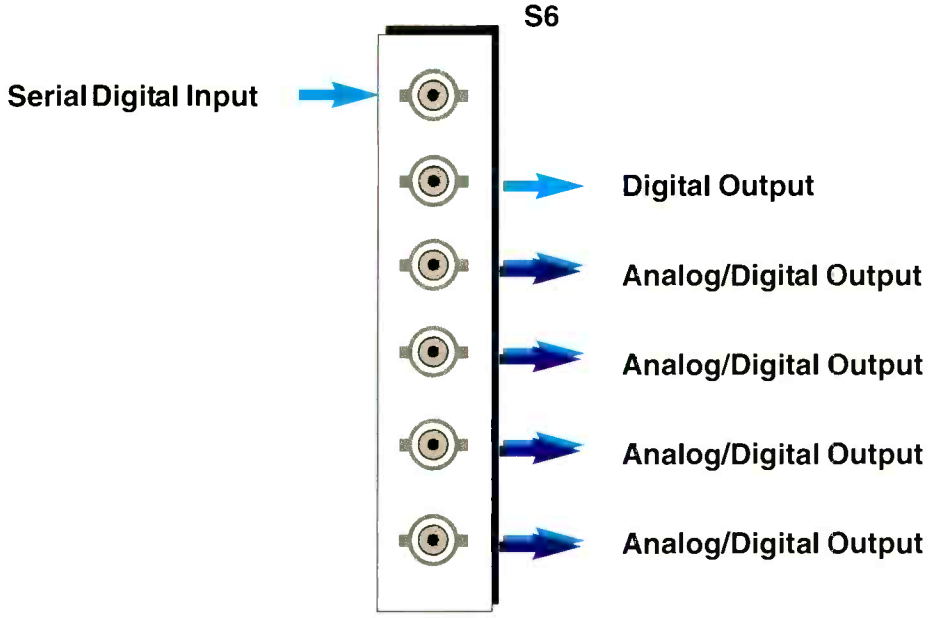
- 270Mb/s operation
- Error Detection and Handling (EDH)
- 4 x PAL/NTSC monitoring option
- 8 x 75 ohm 270 Mb/s outputs
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Automatic cable equalization

VSM-6002-S10

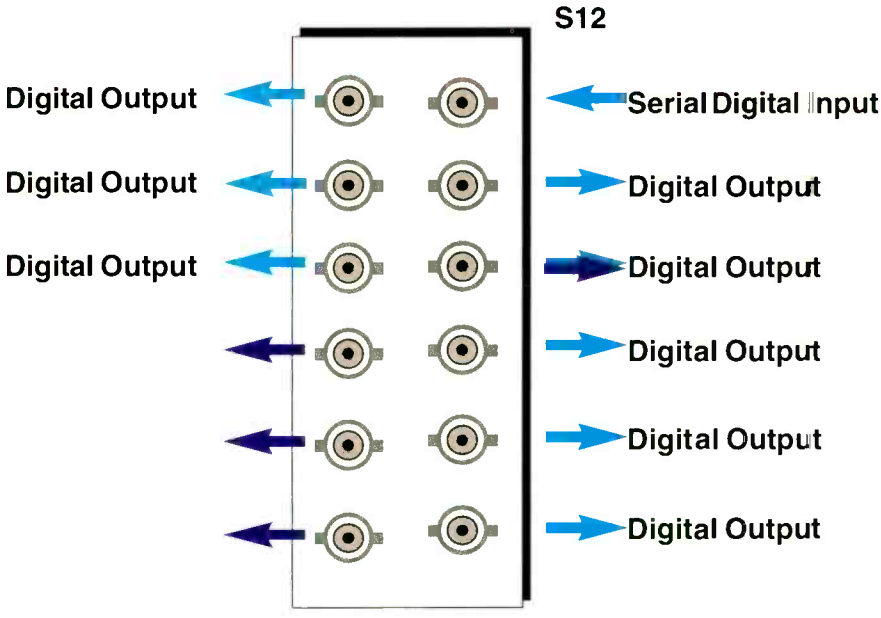
# Monitoring Serial Distribution Amplifier With EDH

- 270Mb/s operation
- Error Detection and Handling (EDH)
- 4 x PAL/NTSC monitoring option
- 6 x 75 ohm 270 Mb/s outputs
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Automatic cable equalization

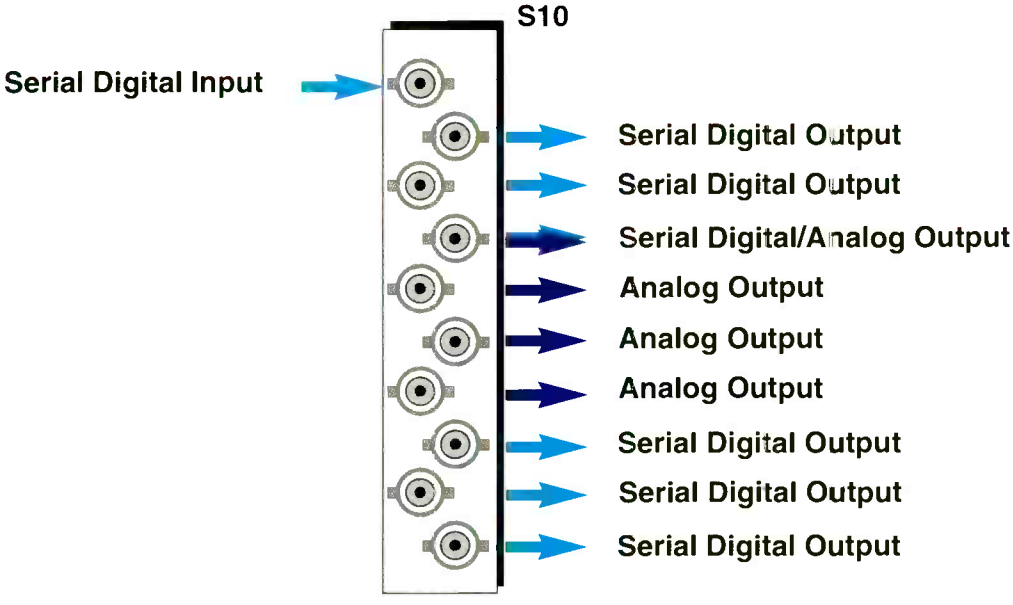
## S6


Serial Digital Input
Digital Output
Analog/Digital Output
Analog/Digital Output
Analog/Digital Output
Analog/Digital Output

## S12


Digital Output
Digital Output
Digital Output
Serial Digital Input
Digital Output
Digital Output
Digital Output
Digital Output
Digital Output

## S10


Serial Digital Input
Serial Digital Output
Serial Digital Output
Serial Digital/Analog Output
Analog Output
Analog Output
Analog Output
Serial Digital Output
Serial Digital Output
Serial Digital Output

Genesis™

VSM-6002-S16

# Monitoring Serial Distribution Amplifier With EDH

- 270Mb/s operation
- Error Detection and Handling (EDH)
- 4 x PAL/NTSC monitoring option
- 8 x 75 ohm 270 Mb/s outputs
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Automatic cable equalization

ASM-6001-S5

# Monitoring Serial DA With Analog Audio Outputs

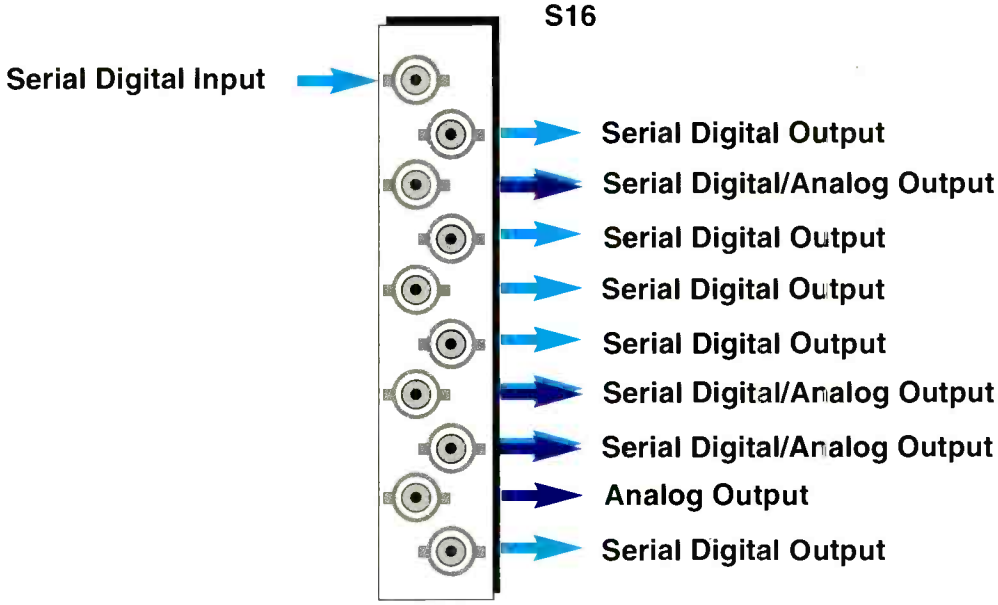
- 270Mb/s operation
- 525/625 operation
- 3 x PAL/NTSC monitoring outputs
- 3 x 75 ohm 270Mb/s outputs
- Analog audio outputs
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Alarm output

ASM-6001-S11

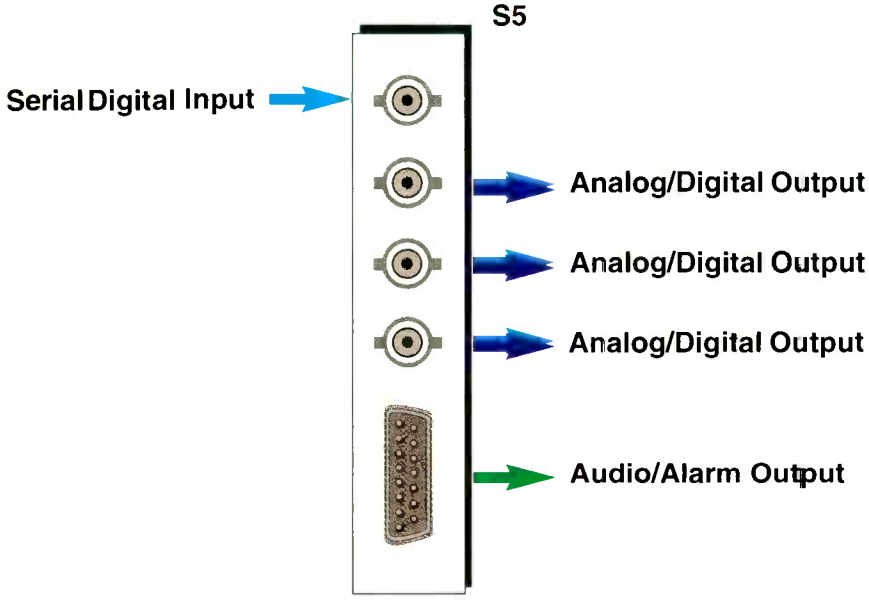
# Monitoring Serial DA With Analog Audio Outputs

- 270Mb/s operation
- 525/625 operation
- 4 x PAL/NTSC monitoring outputs
- 8 x 75 ohm 270Mb/s outputs
- Analog audio outputs
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Alarm output

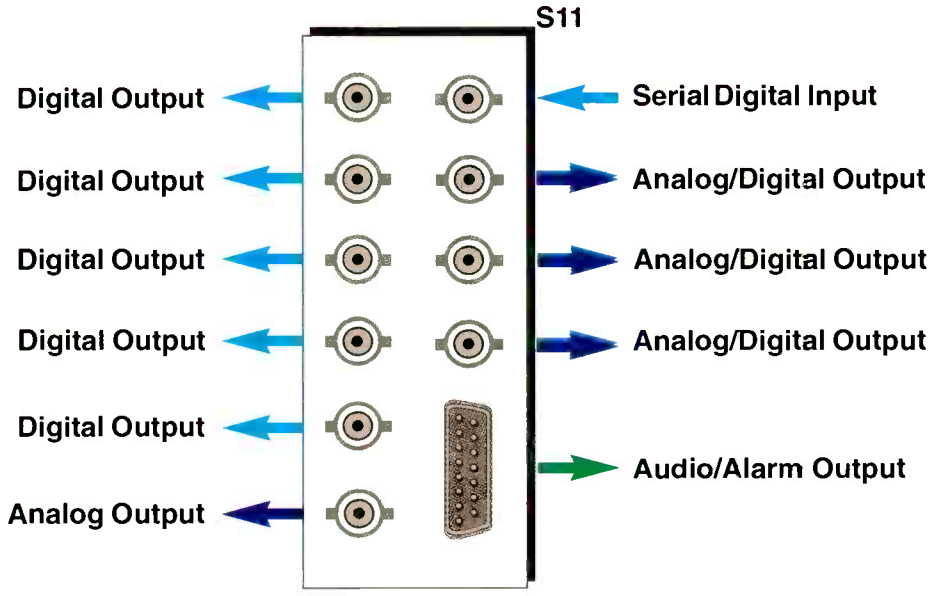
## S16


Serial Digital Input
Serial Digital Output
Serial Digital/Analog Output
Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital/Analog Output
Serial Digital/Analog Output
Analog Output
Serial Digital Output

## S5


Serial Digital Input
Analog/Digital Output
Analog/Digital Output
Analog/Digital Output
Audio/Alarm Output

## S11


Digital Output
Digital Output
Digital Output
Digital Output
Digital Output
Analog Output
Serial Digital Input
Analog/Digital Output
Analog/Digital Output
Analog/Digital Output
Audio/Alarm Output

Genesis™

# VSD-6001-S6 Serial Fan Out Distribution Amplifier

- 143/177/270/360Mb/s operation
- 525/625 operation
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Automatic input equalization
- 5 x 75 ohm 143/177/270/360Mb/s outputs
- Front of board diagnostic LEDs
- Low cost serial DA
- ASI compatible

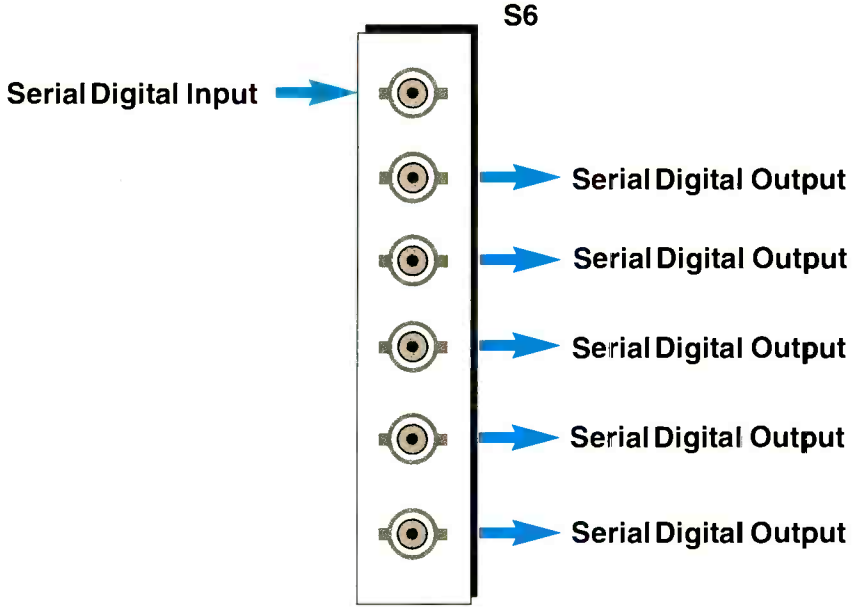
# VSD-6001-S12 Serial Fan Out Distribution Amplifier

- 143/177/270/360Mb/s operation
- 525/625 operation
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Automatic input equalization
- 11 x 75 ohm 143/177/270/360Mb/s outputs
- Front of board diagnostic LEDs
- Low cost serial DA
- ASI compatible

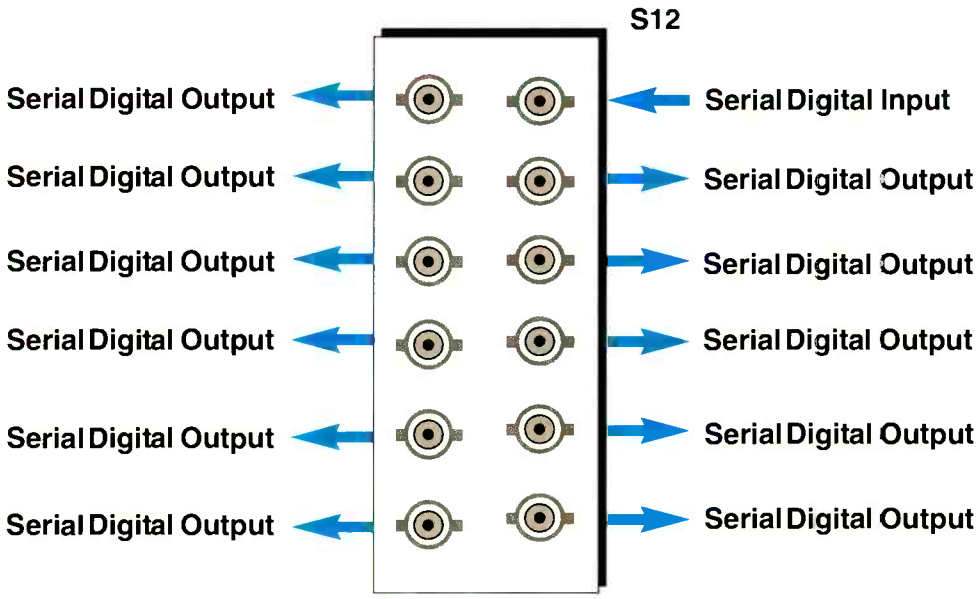
# VSD-6001-S16 Serial Fan Out Distribution Amplifier

- 163/177/270/360Mb/s operation
- 525/625 operation
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Automatic input equalization
- 9 x 75 ohm 143/177/270/360Mb/s outputs
- Front of board diagnostic LEDs
- Low cost serial DA
- ASI compatible

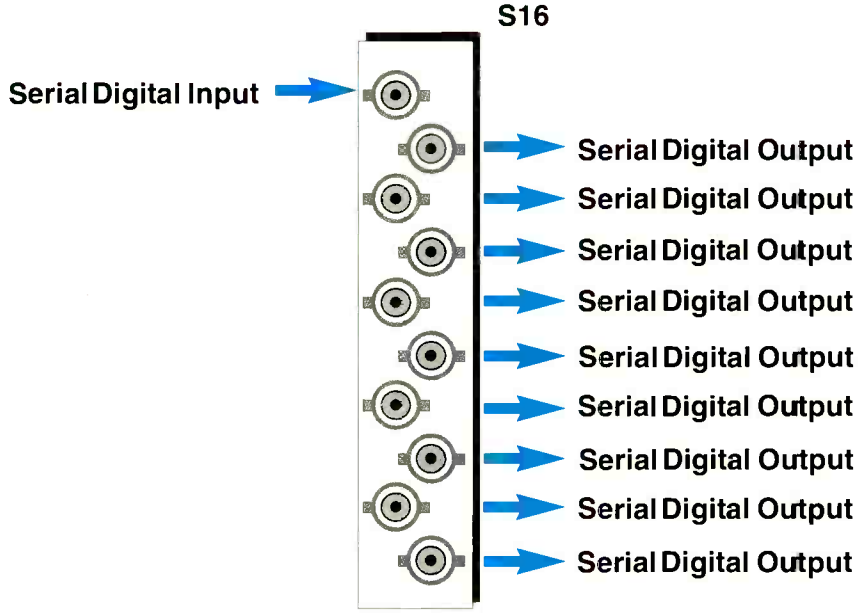
## S6


Serial Digital Input
Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Output

## S12


Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Input
Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Output

## S16


Serial Digital Input
Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Output

Genesis™

# MXA-6001-S4 Analog Audio Multiplexer/Embedder

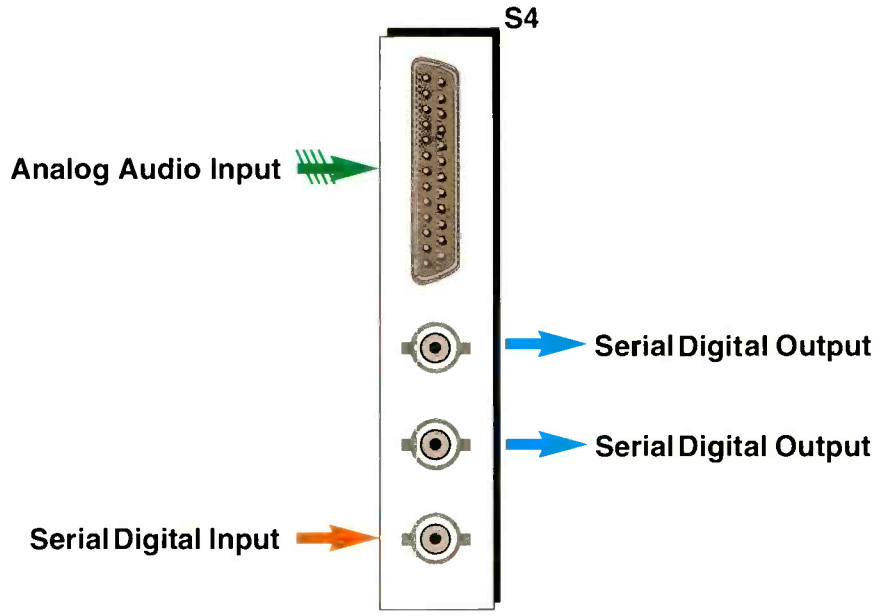
- 270Mb/s operation
- 525/625 operation
- Error Detection and Handling (EDH)
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- 20-bit audio operation

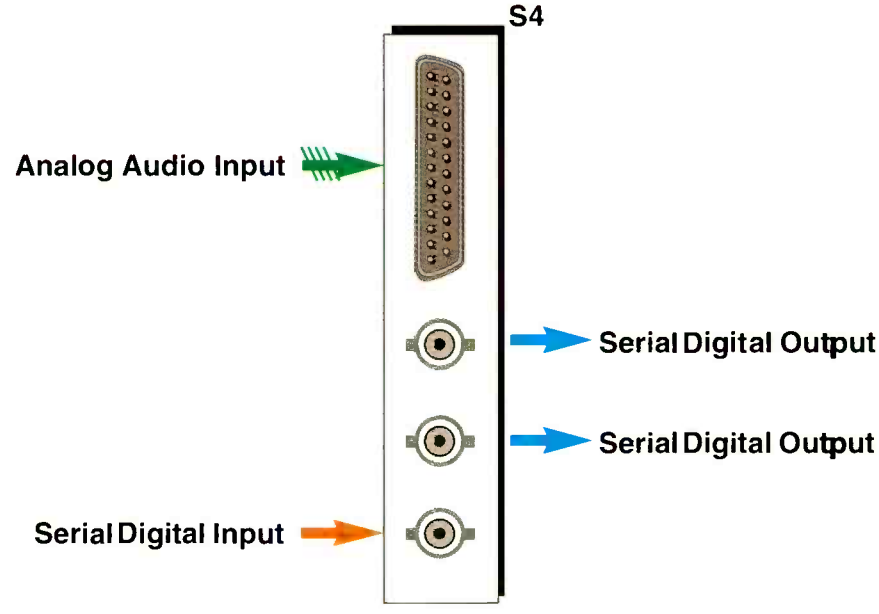
# MXA-6002-S4 Analog Audio Multiplexer/Embedder With Channel Swapping

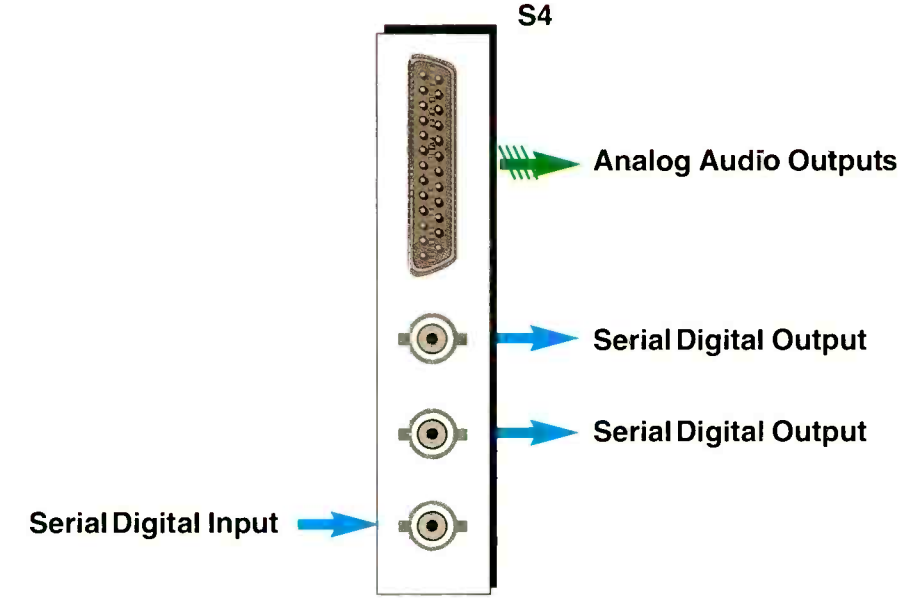
- 270Mb/s operation
- 525/625 operation
- Error Detection and Handling (EDH)
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- 20-bit audio operation
- Audio channel swapping

# DMX-6001-S4 Analog Audio Demultiplexer/Extractor

- 270Mb/s operation
- 525/625 operation
- Error Detection and Handling (EDH)
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- 20-bit audio operation
- Audio swapping capability


S4
Analog Audio Input
Serial Digital Output
Serial Digital Output
Serial Digital Input


S4
Analog Audio Input
Serial Digital Output
Serial Digital Output
Serial Digital Input


S4
Analog Audio Outputs
Serial Digital Output
Serial Digital Output
Serial Digital Input

Genesis™

DAC-6001-S6

# 10-Bit Component D-A Converter

- 525/625 operation
- Separate syncs operation
- 1 x 75 ohm YCbCr or GBR outputs
- SMPTE/NTSC/BETACAM/MII levels
- Adjustable 1H delay
- Optional Proc Amp (DAC-6001V)
- VBI handling
- EDH Reading

DAC-6001-S12

# 10-Bit Component D-A Converter

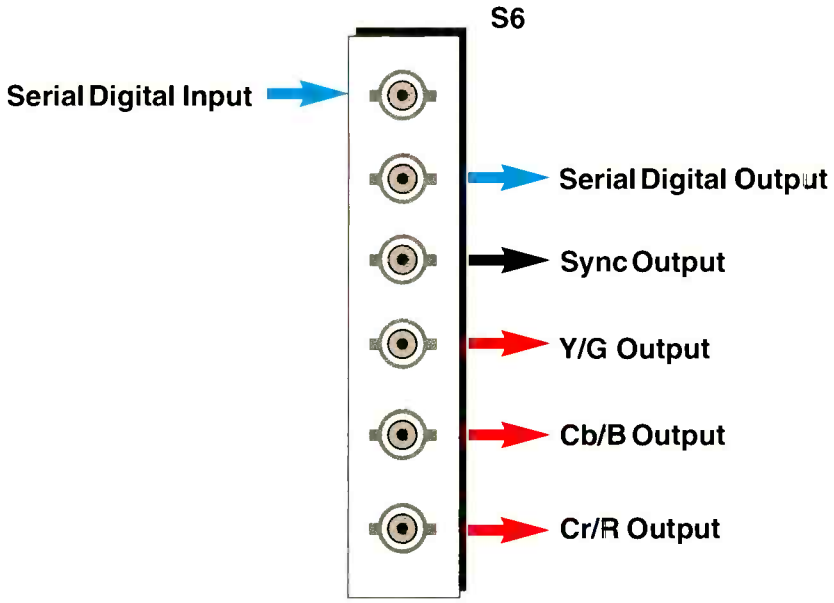
- 525/625 operation
- Separate syncs operation
- 2 x 75 ohm YCbCr or GBR outputs
- SMPTE/NTSC/BETACAM/MII levels
- Adjustable 1H delay
- Optional Proc Amp (DAC-6001V)
- VBI handling
- EDH Reading

DAC-6001-S10

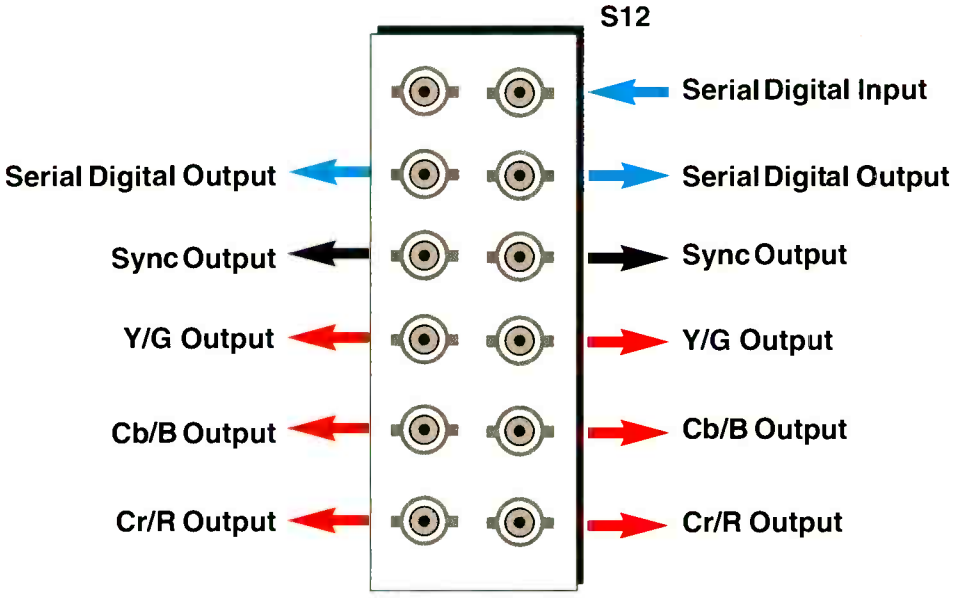
# 10-Bit Component D-A Converter

- 525/625 operation
- Separate syncs operation
- 2 x 75 ohm YCbCr or GBR outputs
- SMPTE/NTSC/BETACAM/MII levels
- Adjustable 1H delay
- Optional Proc Amp (DAC-6001V)
- VBI handling
- EDH Reading

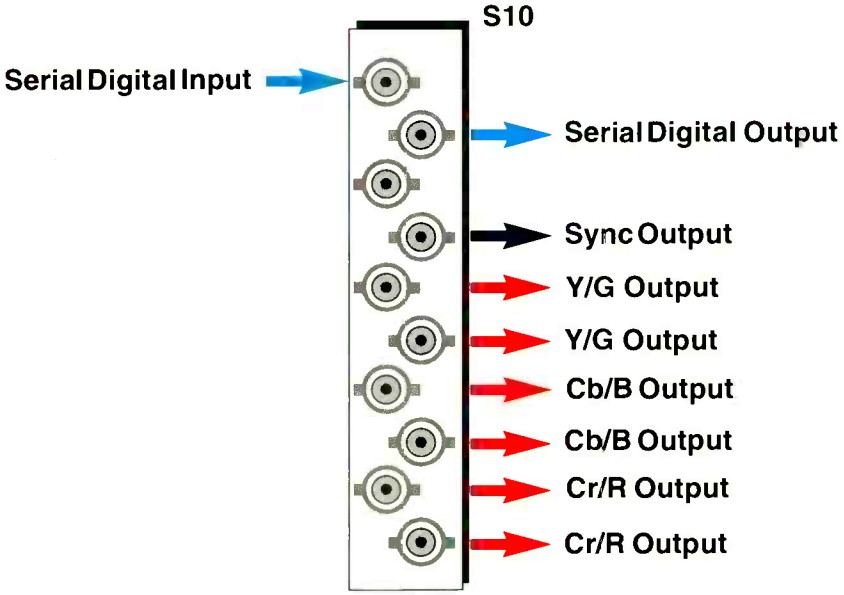
## S6


Serial Digital Input
Serial Digital Output
Sync Output
Y/G Output
Cb/B Output
Cr/R Output

## S12


Serial Digital Input
Serial Digital Output
Sync Output
Y/G Output
Cb/B Output
Cr/R Output
Serial Digital Output
Sync Output
Y/G Output
Cb/B Output
Cr/R Output

## S10


Serial Digital Input
Serial Digital Output
Sync Output
Y/G Output
Y/G Output
Cb/B Output
Cb/B Output
Cr/R Output
Cr/R Output

Genesis™

# Analog Video Distribution Amplifier

VDA-6001-V6

- Two analog video channels on one module
- One input, two outputs per channel
- Variable gain option (VDA-6001V)
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Front of board video monitoring
- Video peak level detection
- Configurable to single channel use

Analog Video Distribution Amplifier

VDA-6001-V10

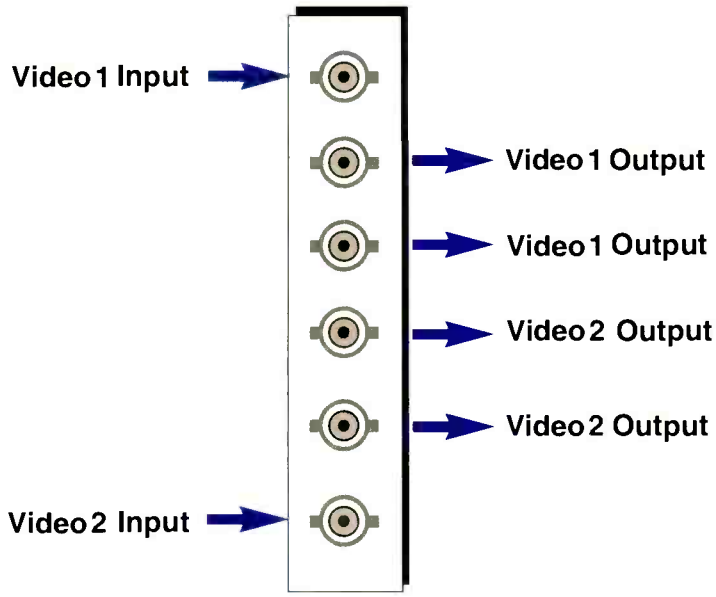

- Two analog video channels on one module
- One input, four outputs per channel
- Variable gain option (VDA-6001V)
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Front of board video monitoring
- Video peak level detection
- Configurable to single channel use


Analog Video Distribution Amplifier

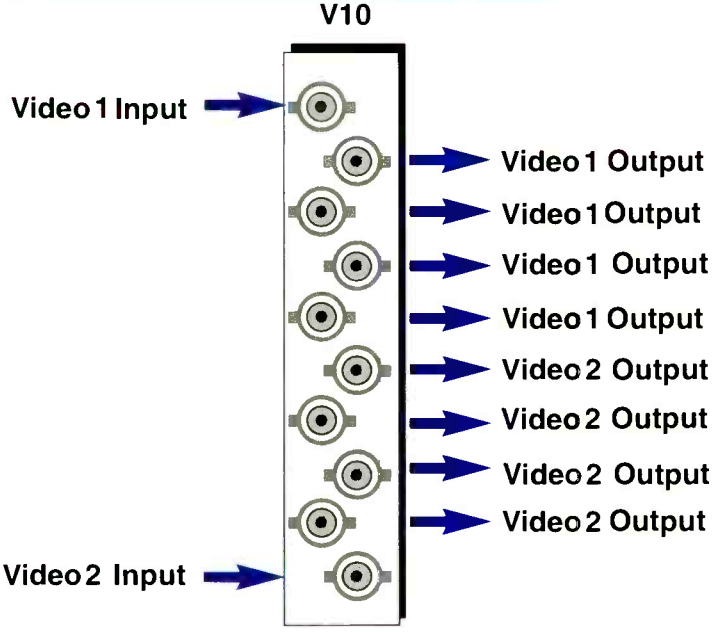
VDA-6001-V13

- One input, ten outputs with loop through
- Variable gain option (VDA-6001V)
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Front of board video monitoring
- Video peak level detection

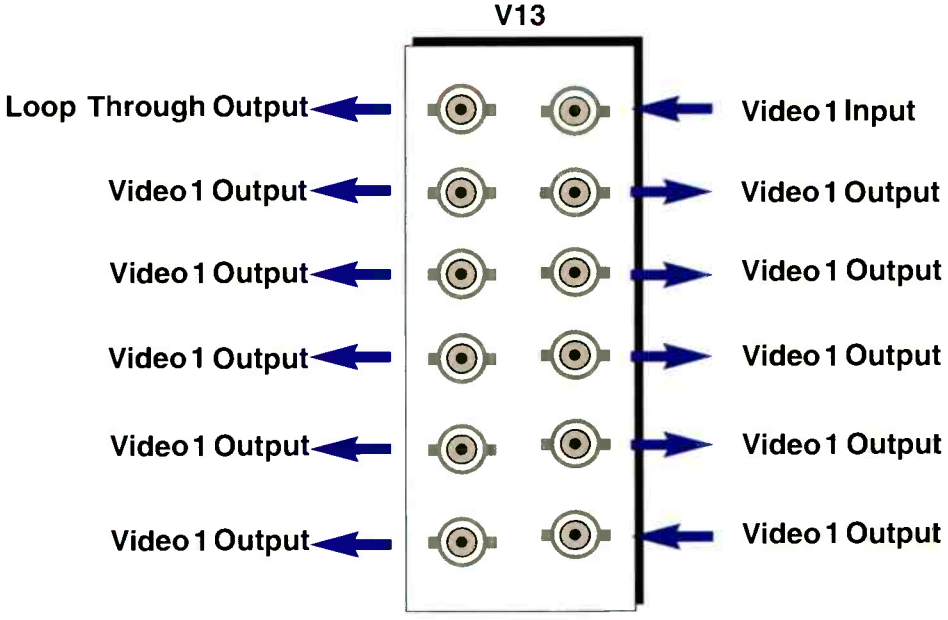
## V6


Video 1 Input
Video 1 Output
Video 1 Output
Video 2 Output
Video 2 Output
Video 2 Input

## V10


Video 1 Input
Video 1 Output
Video 1 Output
Video 1 Output
Video 1 Output
Video 2 Output
Video 2 Output
Video 2 Output
Video 2 Output
Video 2 Input

## V13


Loop Through Output
Video 1 Output
Video 1 Output
Video 1 Output
Video 1 Output
Video 1 Output
Video 1 Input
Video 1 Output
Video 1 Output
Video 1 Output
Video 1 Output
Video 1 Output

Genesis™

VDA-6001-V14

# Analog Video Distribution Amplifier

- Two analog video channels on one module
- One input, five outputs per channel
- Variable gain option (VDA-6001V)
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Front of board video monitoring
- Video peak level detection
- Configurable to single channel use

ENC-6001-S6

# Genlockable 10-Bit PAL/NTSC Digital Encoder

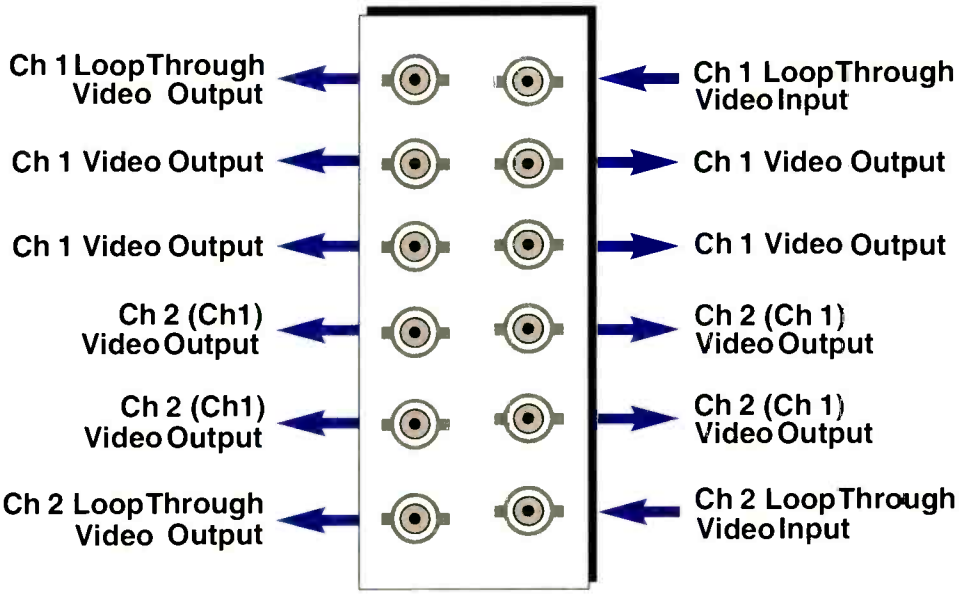
- Full broadcast quality performance
- PAL, NTSC, PAL-M and PAL-N encoding
- Error Detection and Handling (EDH)
- Proc amp facilities
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- 12-bit precision DAC
- 3 x analog composite outputs
- 1 x 75 ohm 270Mb/s output
- Genlock reference input

MXA-6003-S4

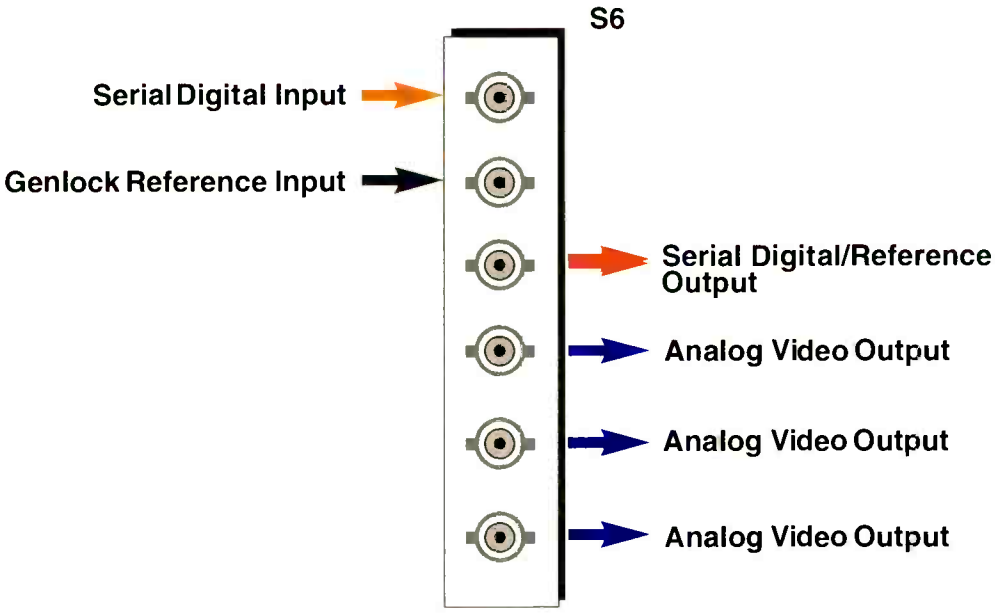
# AES Audio Multiplexer/Embedder

- 270 Mb/s operation
- 20-bit 110 ohm AES inputs
- AES/SMPTE compatible 110 Ohm AES inputs
- 48/44.1/32kHz AES audio operation
- 48kHz non-linear audio, or data mode
- Analog audio monitoring
- Asynchronous/synchronous audio operation
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol

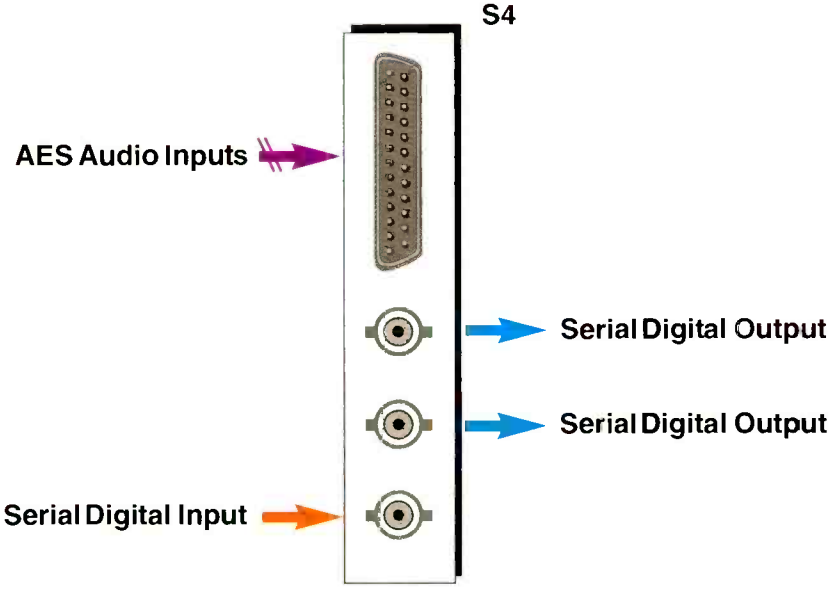
## V14


Ch 1 LoopThrough Video Output
Ch 1 Video Output
Ch 1 Video Output
Ch 2 (Ch1) Video Output
Ch 2 (Ch1) Video Output
Ch 2 LoopThrough Video Output
Ch 1 LoopThrough Video Input
Ch 1 Video Output
Ch 1 Video Output
Ch 2 (Ch 1) Video Output
Ch 2 (Ch 1) Video Output
Ch 2 LoopThrough Video Input

## S6


Serial Digital Input
Genlock Reference Input
Serial Digital/Reference Output
Analog Video Output
Analog Video Output
Analog Video Output

## S4


AES Audio Inputs
Serial Digital Output
Serial Digital Output
Serial Digital Input

Genesis™

MXA-6003-S6

# AES Audio Multiplexer/Embedder

- 270 Mb/s operation
- 20-bit 75 ohm AES inputs
- AES/SMPTE compatible 75 Ohm AES inputs
- 48/44.1/32kHz AES audio operation
- 48kHz non-linear audio, or data mode
- Analog audio monitoring
- Asynchronous/synchronous audio operation
- Command Control System (CCS) enabled:
  - — Support for CCS applications such as Pilot™
  - — System discovery/Diagnostics
  - — Remote control, configuration, monitoring and secure access
  - — Control via remote control panels, RS232/422 or ethernet (IP)
  - — Interface with 3rd party equipment and applications through simple, ASCII protocol

DMX-6002-S4

# AES Audio Demultiplexer/Extractor

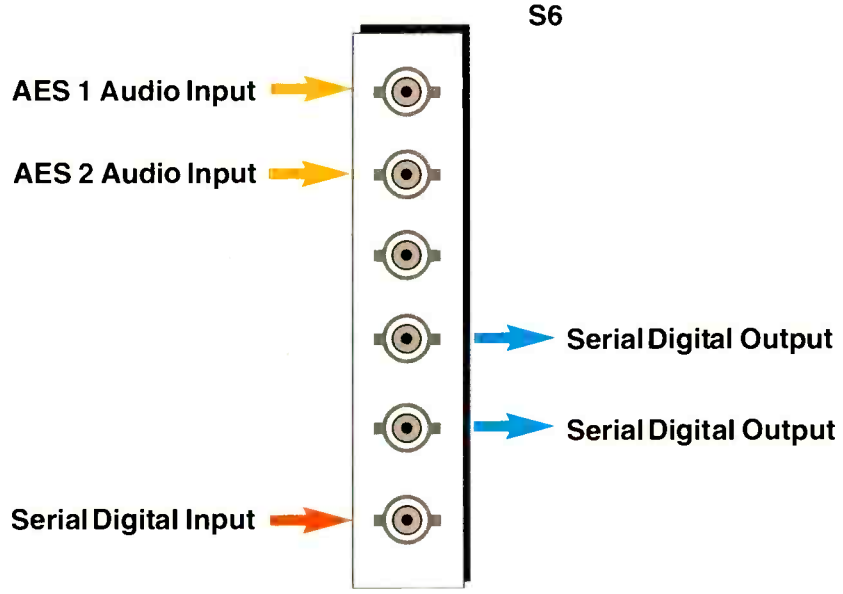
- 270 Mb/s operation
- 20-bit 110 ohm AES outputs
- AES/SMPTE 110 ohm or Hi-Z AES reference input
- 48/44.1/32kHz AES/EBU audio operation
- Asynchronous/synchronous audio operation
- 48kHz synchronous non-linear audio/data mode
- Analog audio monitoring output
- Command Control System (CCS) enabled:
  - — Support for CCS applications such as Pilot™
  - — System discovery/Diagnostics
  - — Remote control, configuration, monitoring and secure access
  - — Control via remote control panels, RS232/422 or ethernet (IP)
  - — Interface with 3rd party equipment and applications through simple, ASCII protocol

DMX-6002-S6

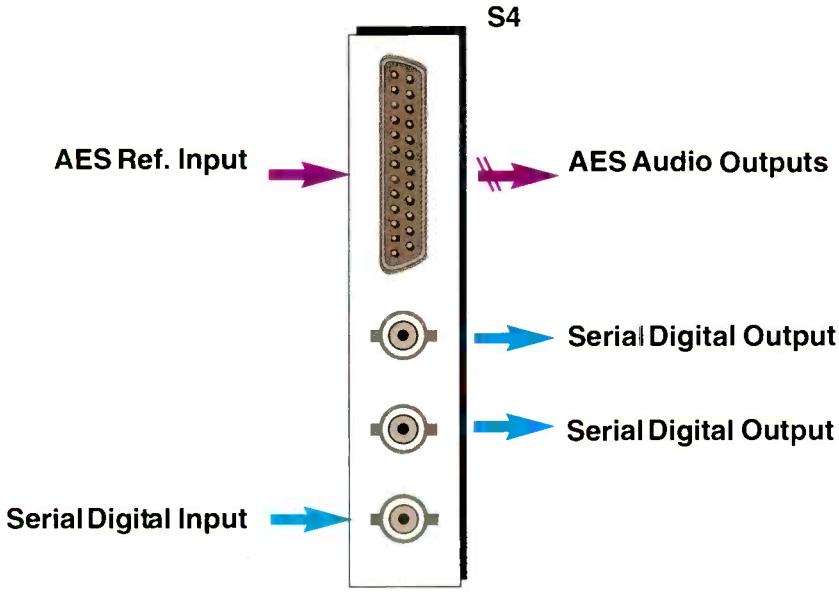
# AES Audio Demultiplexer/Extractor

- 270 Mb/s operation
- 20-bit 75 ohm AES outputs
- AES/SMPTE 75 ohm or Hi-Z AES reference input
- 48/44.1/32kHz AES/EBU audio operation
- Asynchronous/synchronous audio operation
- 48kHz synchronous non-linear audio/data mode
- Analog audio monitoring output
- Command Control System (CCS) enabled:
  - — Support for CCS applications such as Pilot™
  - — System discovery/Diagnostics
  - — Remote control, configuration, monitoring and secure access
  - — Control via remote control panels, RS232/422 or ethernet (IP)
  - — Interface with 3rd party equipment and applications through simple, ASCII protocol

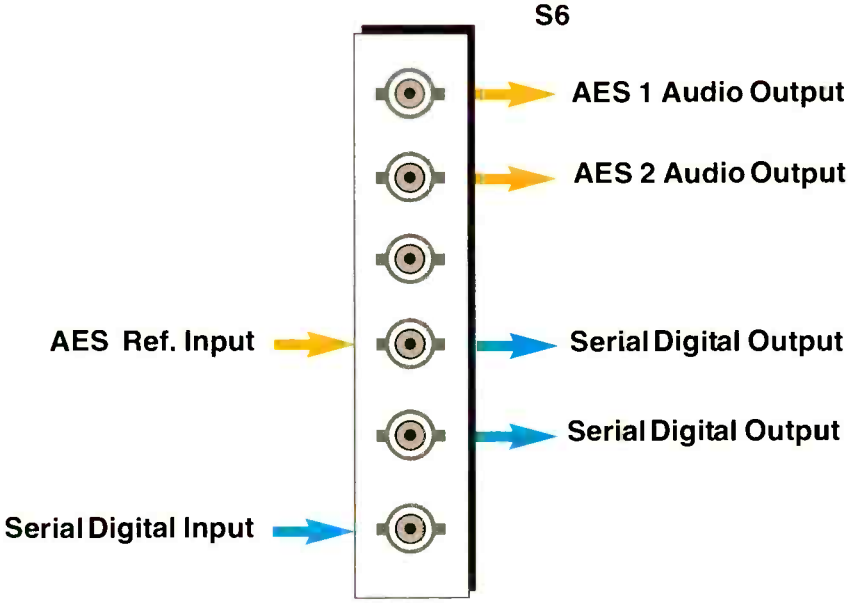
S6


AES 1 Audio Input
AES 2 Audio Input
Serial Digital Output
Serial Digital Output
Serial Digital Input

S4


AES Ref. Input
AES Audio Outputs
Serial Digital Output
Serial Digital Output
Serial Digital Input

S6


AES 1 Audio Output
AES 2 Audio Output
AES Ref. Input
Serial Digital Output
Serial Digital Output
Serial Digital Input

Genesis™

# Serial Digital Framestore Synchronizer

VFS-6001-S6

- 270Mb/s and 525/625 operation
- Error Detection and Handling (EDH)
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Delay tracking output
- Diagnostic LEDs

# Serial Digital Framestore Synchronizer With Embedded Audio Synchronizer

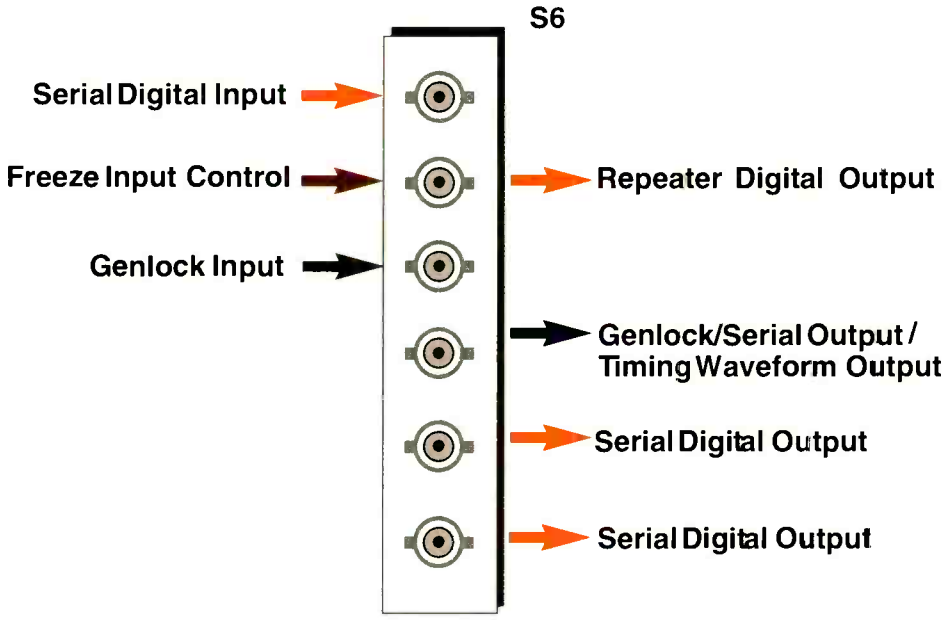
VFS-6002-S6

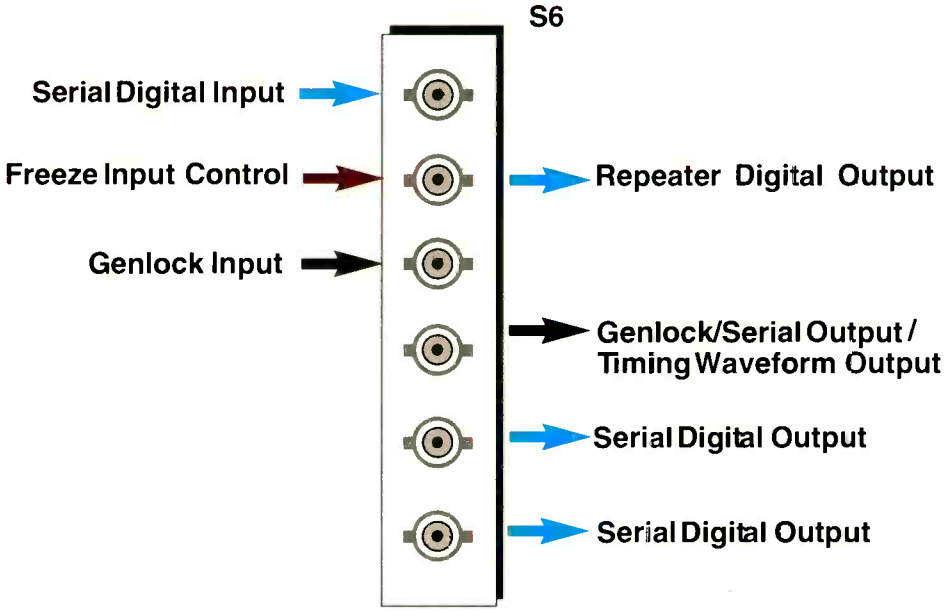
- 270Mb/s and 525/625 operation
- Error Detection and Handling (EDH)
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Delay tracking output
- Diagnostic LEDs
- Audio re-sampling and delay

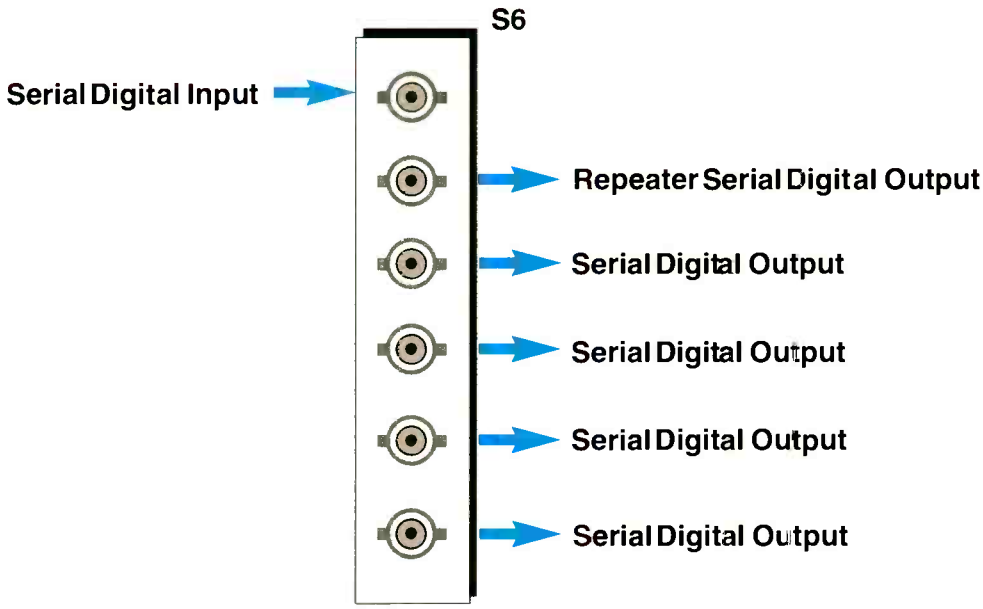
# Advanced Digital Noise Reducer

VNR-6001-S6

- 270Mb/s (525/625) 10-bit operation
- 3D impulse filtering
- Motion adaptive recursive filtering
- Automatic threshold setting for hands off operation
- Split screen mode
- Optional brick wall filter
- Horizontal and vertical aperture correction
- Relay bypass


S6
Serial Digital Input
Freeze Input Control
Genlock Input
Repeater Digital Output
Genlock/Serial Output /
Timing Waveform Output
Serial Digital Output
Serial Digital Output


S6
Serial Digital Input
Freeze Input Control
Genlock Input
Repeater Digital Output
Genlock/Serial Output /
Timing Waveform Output
Serial Digital Output
Serial Digital Output


S6
Serial Digital Input
Repeater Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Output
Serial Digital Output

VIDEO

Genesis™

# VNR-6001-S10 Advanced Digital Noise Reducer

- 270Mb/s (525/625) 10-bit operation
- 3D impulse filtering
- Motion adaptive recursive filtering
- Automatic threshold setting for hands off operation
- Split screen mode
- Optional brick wall filter
- Horizontal and vertical aperture correction
- Relay bypass
- Audio input switch on loss of signal

# VPA-6001-S7 Dual Channel Proc Amp

## PRELIMINARY INFORMATION

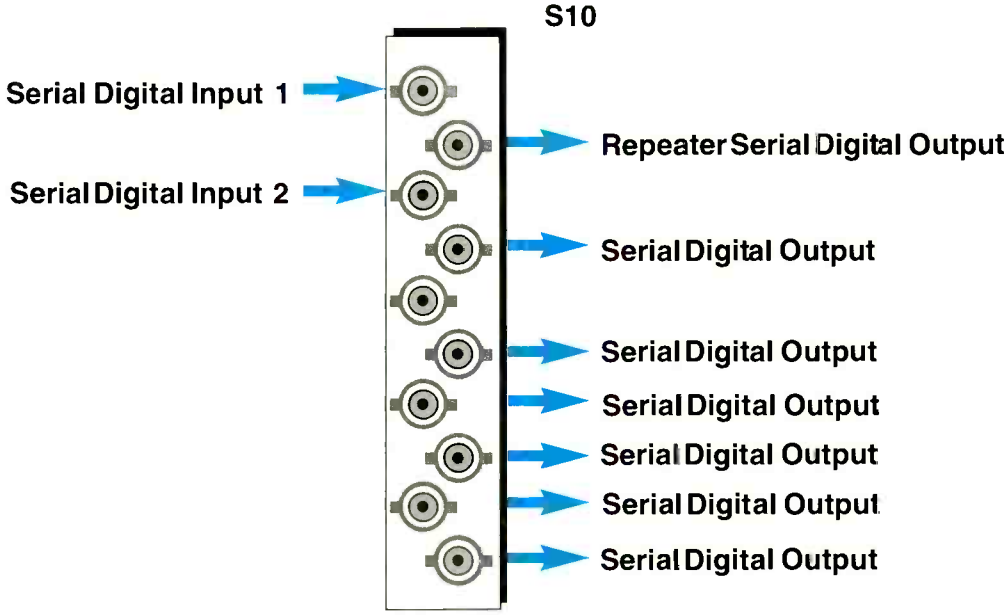
- 525/625 operation
- Individual proc amp controls for 2 separate SDI signals
- Y/C delay
- Y/Cr/Cb Gain, Black Level control
- Integrated SDI legalizers
- HANC and VANC transparency
- 4 user presets
- Command Control System (CCS) Enabled


# ARC-6001-S18 Aspect Ratio Converter

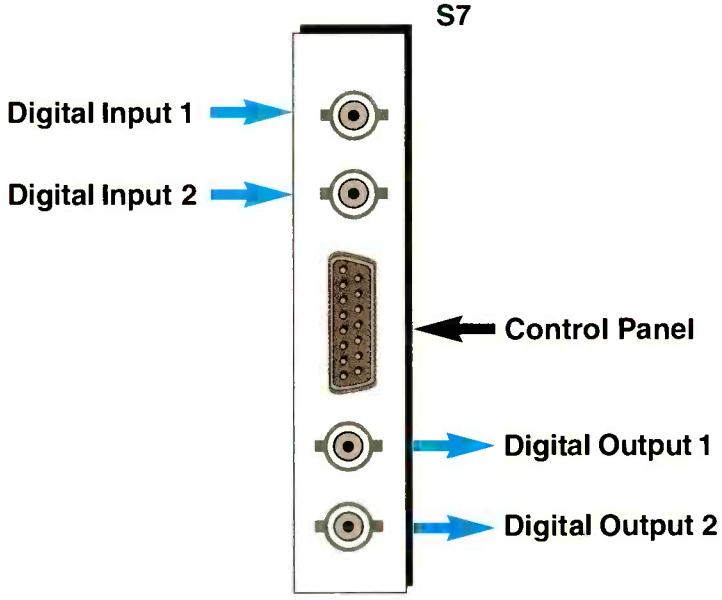
## PRELIMINARY INFORMATION

- 525/625 operation
- 4 field motion adaption
- Proprietary motion threshold processing
- Presets for fast selection of typical aspect ratios
- Variable aspect ratio settings
- Variable picture position
- Video index and WSS handling
- HANC and VANC transparency
- 8 user/factory presets
- Command Control System (CCS) Enabled

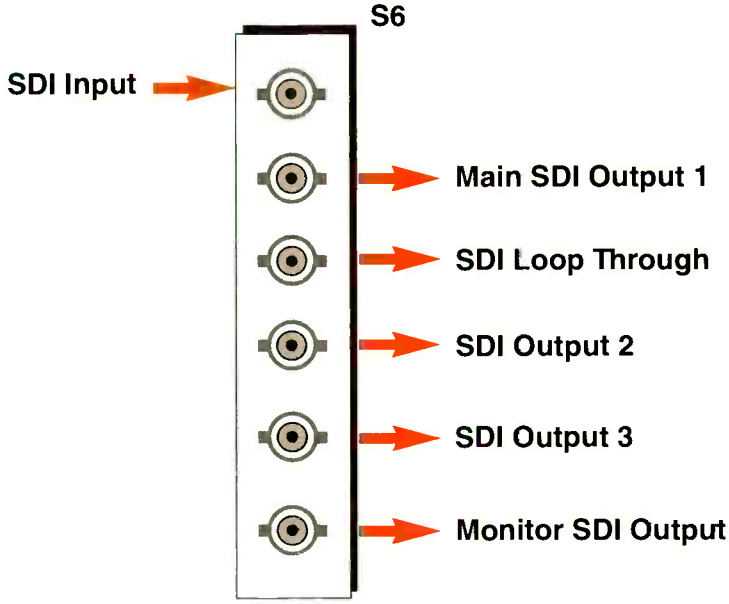
## S10




## S7




## S6




VIDEO

Genesis™

VAM-6001-S6

# Dual Channel SDI System Monitor

- Two SDI channels on one module
- 270Mb/s (525/625) operation
- Embedded audio handling
- Error Detection and Handling (EDH)
- Command Control System (CCS) enabled:
  - — Support for CCS applications such as Pilot™
  - — System discovery/Diagnostics
  - — Remote control, configuration, monitoring and secure access
  - — Control via remote control panels, RS232/422 or ethernet (IP)
  - — Interface with 3rd party equipment and applications through simple, ASCII protocol
- Front of module audio monitoring
- Video/audio amplitude monitoring
- GPI output

VAM-6001-S8

# Dual Channel SDI System Monitor

- Two SDI channels on one module
- 270Mb/s (525/625) operation
- Embedded audio handling
- Error Detection and Handling (EDH)
- Command Control System (CCS) enabled:
  - — Support for CCS applications such as Pilot™
  - — System discovery/Diagnostics
  - — Remote control, configuration, monitoring and secure access
  - — Control via remote control panels, RS232/422 or ethernet (IP)
  - — Interface with 3rd party equipment and applications through simple, ASCII protocol
- Front of module audio monitoring
- Video/audio amplitude monitoring
- GPI output

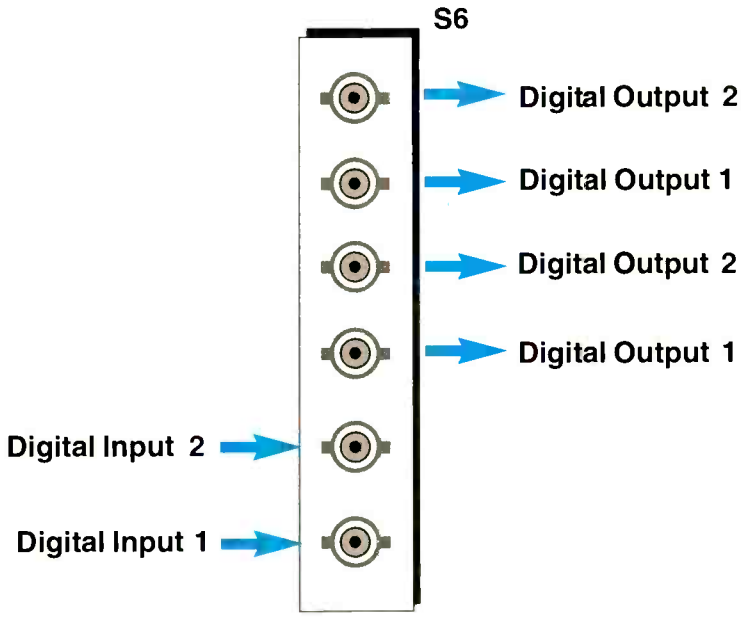
MXC-6001-S6

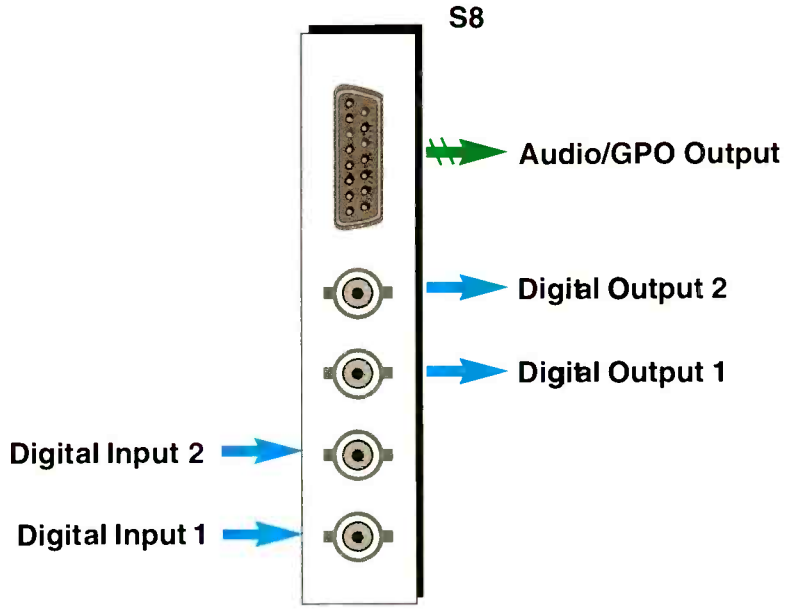
# Dual Channel SDI Communications Module

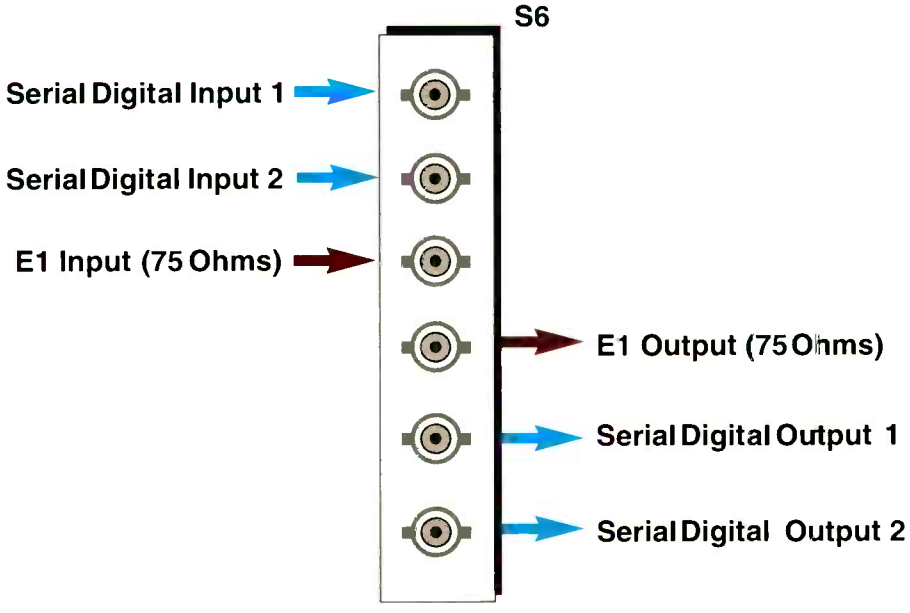
## PRELIMINARY INFORMATION

- RS422/232 over SDI
- Two SDI channels on one module
- 270Mb/s (525/625) operation
- Embedded audio handling
- RS232/422/GPI/LTC/E1 or T1 interface
- Command Control System (CCS) enabled:
  - — Support for CCS applications such as Pilot™
  - — System discovery/Diagnostics
  - — Remote control, configuration, monitoring and secure access
  - — Control via remote control panels, RS232/422 or ethernet (IP)
  - — Interface with 3rd party equipment and applications through simple, ASCII protocol
- Error Detection and Handling (EDH)
- SDI jitter removal on RX channel

NEW


S6
Digital Output 2
Digital Output 1
Digital Output 2
Digital Output 1
Digital Input 2
Digital Input 1


S8
Audio/GPO Output
Digital Output 2
Digital Output 1
Digital Input 2
Digital Input 1


S6
Serial Digital Input 1
Serial Digital Input 2
E1 Input (75 Ohms)
E1 Output (75 Ohms)
Serial Digital Output 1
Serial Digital Output 2

Genesis™

# 2x2, 2x1 Intelligent SDI Routing Switcher

VSR-6001-S7

- 525/625 (270 Mb/s) operation
- Automatic/Manual Control
- GPI output alarm reporting
- Programmable voting system
- Automatic changeover switching
- EDH reading and insertion

# Digital Video To Fiber Optic Transmitter

OTX-6001-O1

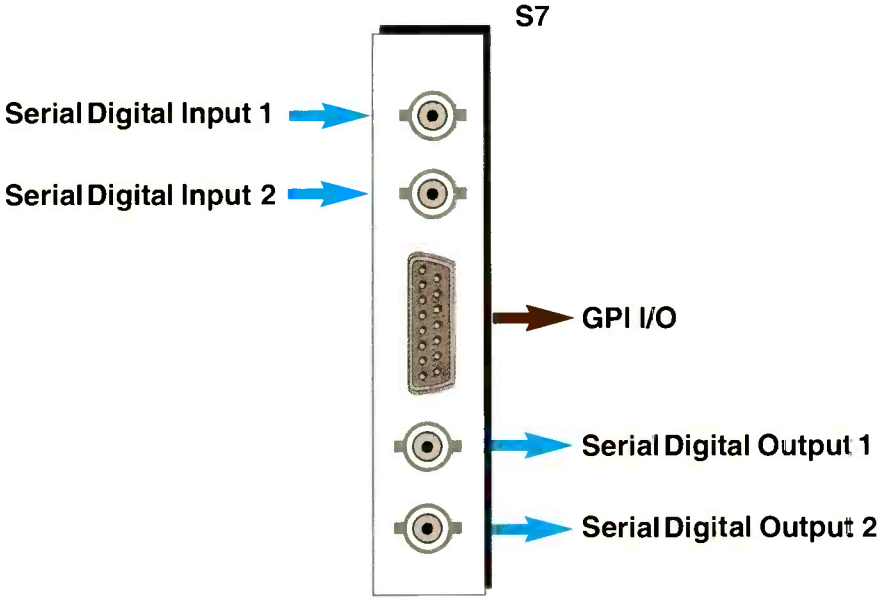
- 143/177/270Mb/s operation
- 360Mb/s optional operation
- DVB ASI compatible
- Multi/single mode options
- SDI pathological signal handling
- Fits into 4RU frame

# Fiber Optic To Digital Video Receiver

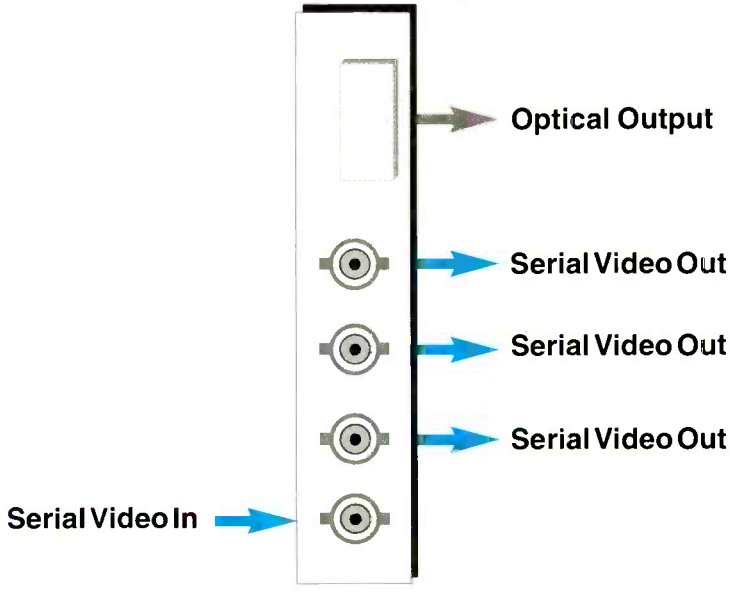
ORX-6001-O1

- 143/177/270Mb/s compatible
- 360Mb/s compatible option
- DVB-ASI compatible
- Multi/single mode options
- SDI pathological signal handling
- Fits into 4RU frame

S7

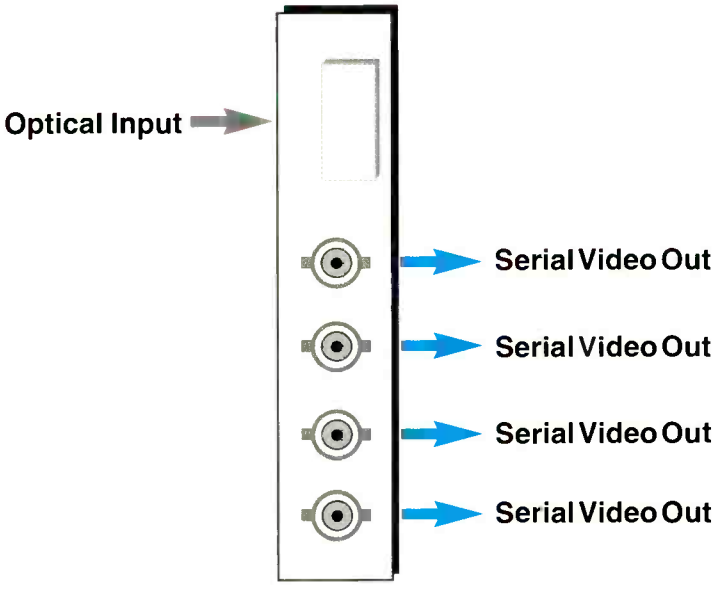

Serial Digital Input 1
Serial Digital Input 2
GPI I/O
Serial Digital Output 1
Serial Digital Output 2

O1


Optical Output
Serial Video Out
Serial Video Out
Serial Video Out
Serial Video In



O1


Optical Input
Serial Video Out
Serial Video Out
Serial Video Out
Serial Video Out

Genesis™

# Digital Video to Fiber Optic Transmitter

## OTX-6002-S2

- One Singlemode fiber optic TX
- 12 Tx IN 2RU
- Pathological Handling
- DVB/ASI compatible
- Rear connector module
- Fits into 2RU frame
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol

# Fiber Optic to Digital Video Receiver

## ORX-6002-S2

- One Singlemode fiber optic RX
- 12 Tx IN 2RU
- Pathological Handling
- DVB/ASI compatible
- Rear connector module
- Fits into 2RU frame
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol

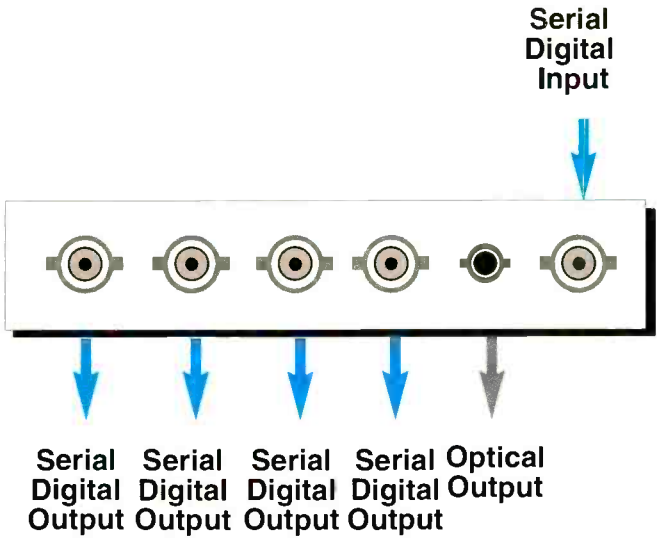
# Dual AES to Fiber Optic Transmitter

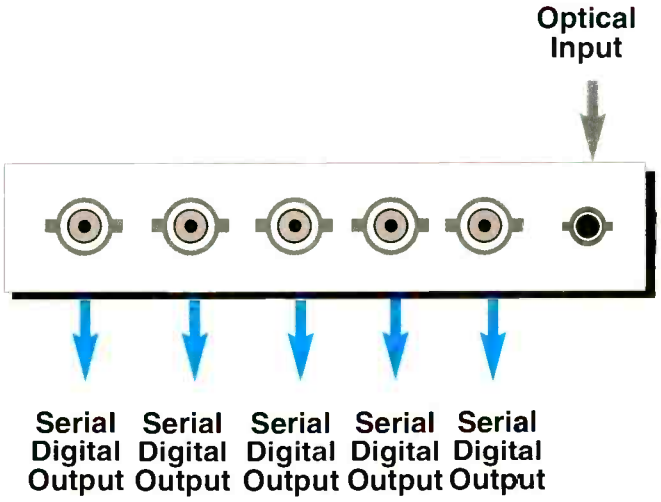
## PRELIMINARY INFORMATION

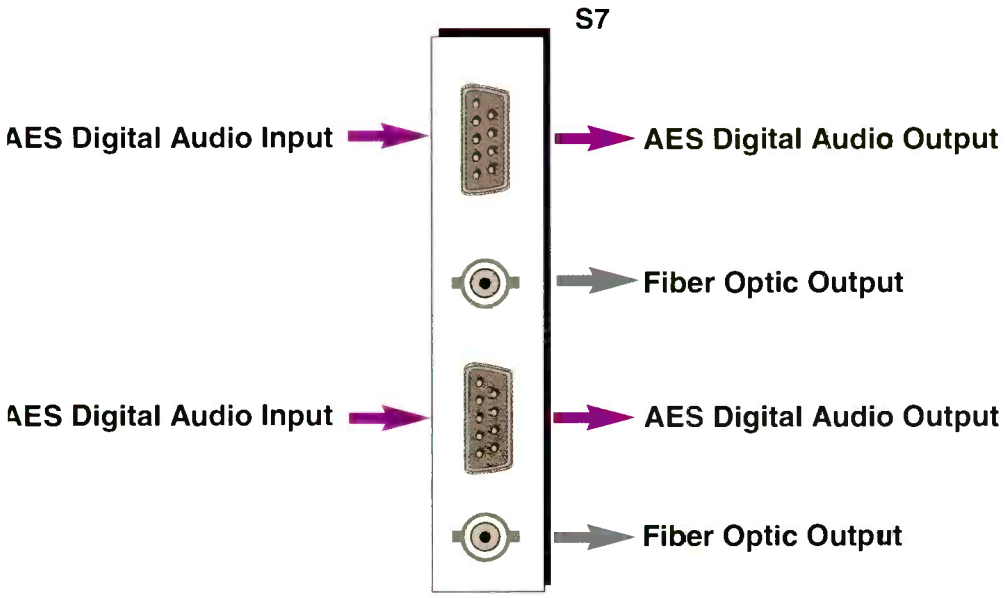
## OTX-6081-M2

- 525/625 operation
- Multimode operation
- 2 individual fiber outputs
- Each AES channel individually converted to fiber
- Rear connector module
- Fits into 2RU frame
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol

NEW


Serial
Digital
Input
Serial
Digital
Output
Serial
Digital
Output
Serial
Digital
Output
Serial
Digital
Output
Optical
Output


Optical
Input
Serial
Digital
Output
Serial
Digital
Output
Serial
Digital
Output
Serial
Digital
Output
Serial
Digital
Output


S7
AES Digital Audio Input
AES Digital Audio Output
Fiber Optic Output
AES Digital Audio Input
AES Digital Audio Output
Fiber Optic Output

Genesis™

# Dual Fiber Optic to AES Receiver

## PRELIMINARY INFORMATION

ORX-6081-M2

- 525/625 operation
- Multimode operation
- 2 individual fiber inputs
- Each fiber input converted to single AES channel
- Rear connector module
- Fits into 2RU frame
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol


# Four Channel Audio A to D Converter

ADC-6081-A10

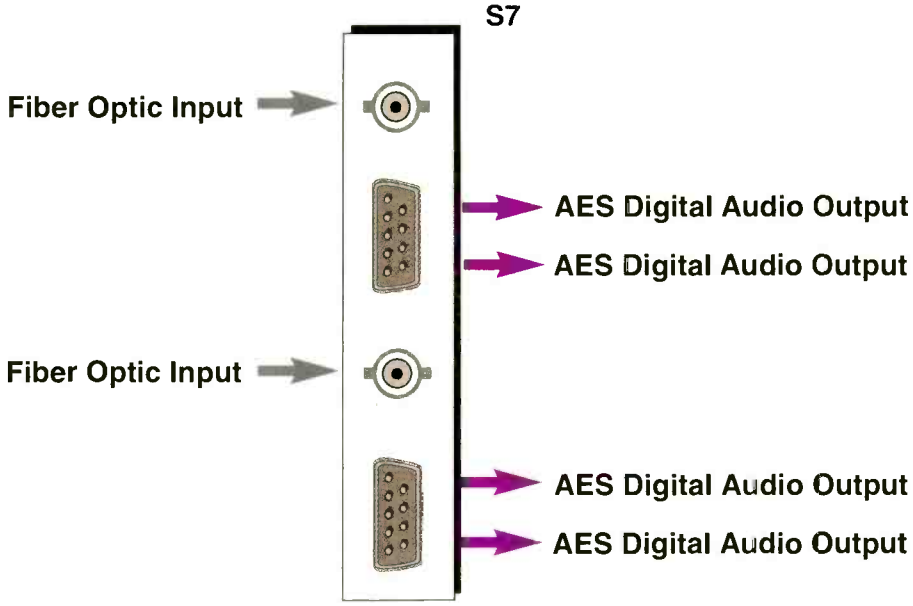
- 24 bit conversion
- 32/48kHz operation (44.1 kHz optional)
- 110 ohm operation
- Selectable Black + Burst/AES11 reference
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol

# Four Channel Audio A to D Converter

ADC-6081-A11

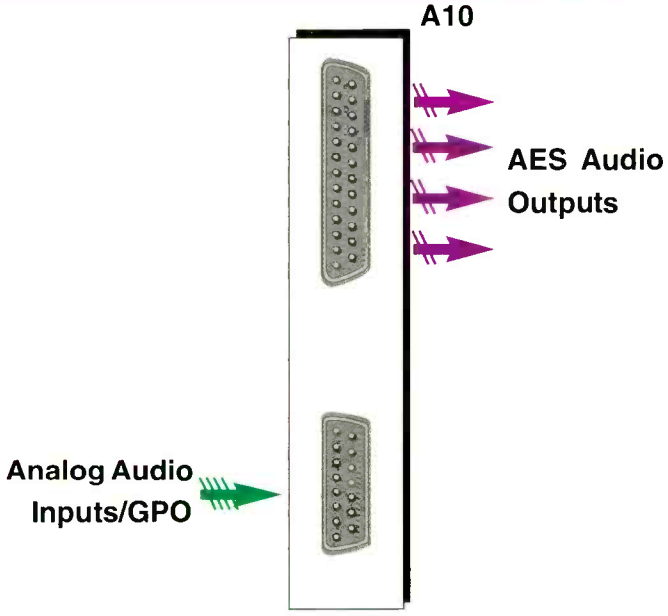
- 24 bit conversion
- 32/48kHz operation (44.1 kHz optional)
- 75 ohm operation
- Selectable Black + Burst/AES11 reference
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol

S7

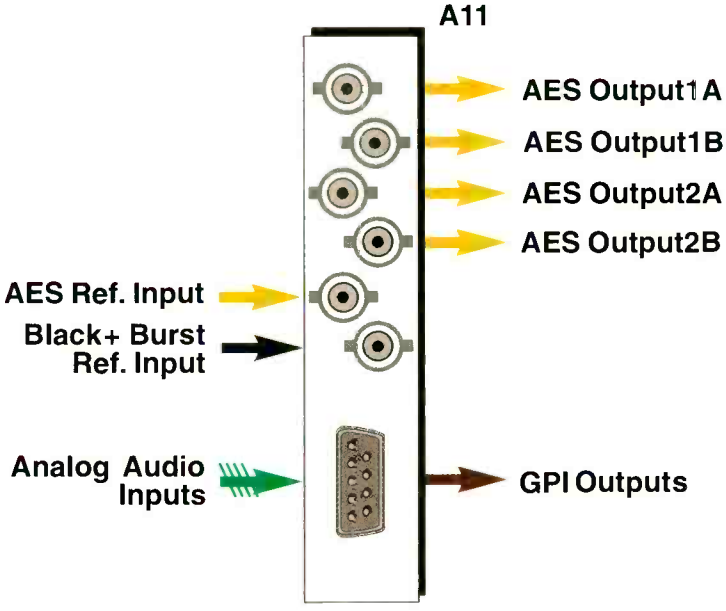

Fiber Optic Input
AES Digital Audio Output
AES Digital Audio Output
Fiber Optic Input
AES Digital Audio Output
AES Digital Audio Output



A10


AES Audio
Outputs
Analog Audio
Inputs/GPO

A11


AES Output1A
AES Output1B
AES Output2A
AES Output2B
AES Ref. Input
Black+ Burst
Ref. Input
Analog Audio
Inputs
GPI Outputs

Genesis™

DAC-6081-S4

# Four Channel Audio D to A Converter

- 24 bit conversion
- 32/44.1/48kHz operation
- GPI output
- 75 ohm operation
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Tone generator

DAC-6081-A6

# Four Channel Audio D to A Converter

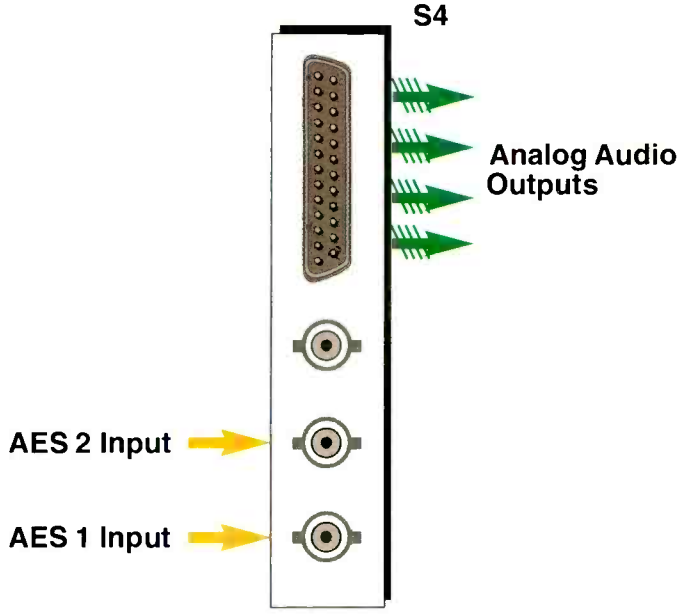
- 24 bit conversion
- 32/44.1/48kHz operation
- GPI output
- 110 ohm operation
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Tone generator

ADA-6081-A10

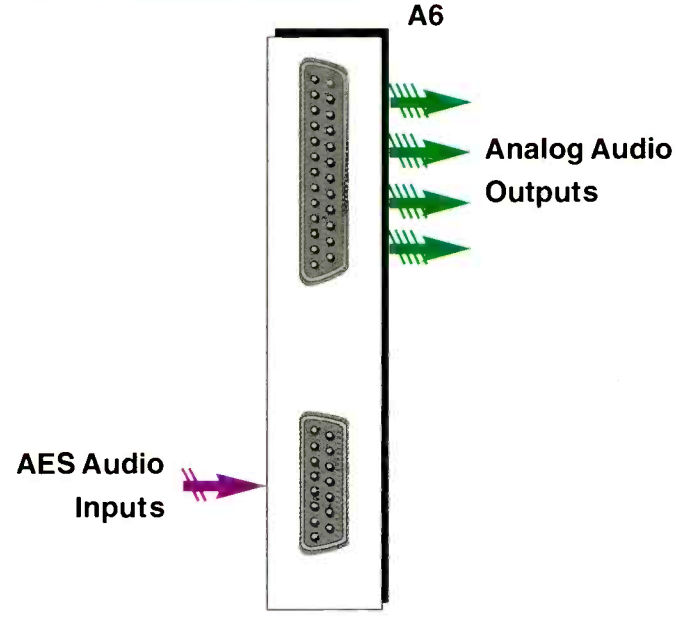
# Analog Audio Distribution Amplifier

- Two stereo analog audio channels on one module
- Differential input, electronically balanced outputs
- 3 outputs per stereo channel
- 2 x GPI outputs
- Front of card audio monitoring
- Audio peak level detection
- Variable gain option (ADA-6081V)
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Single channel mode

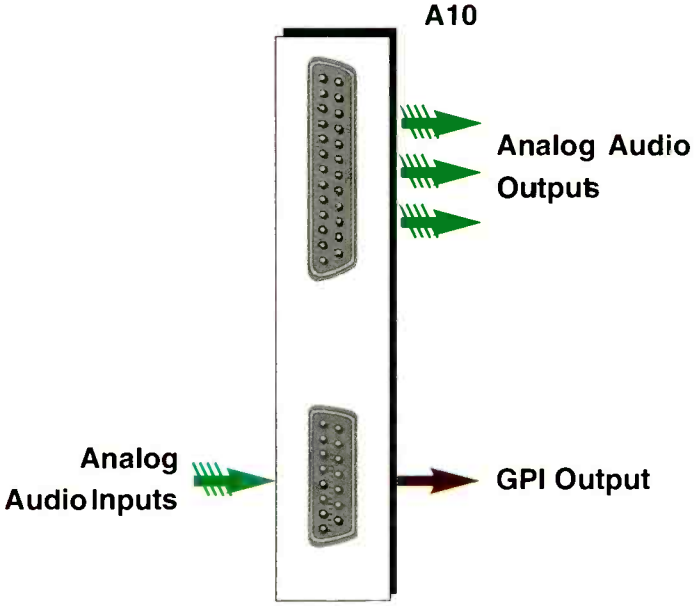
## S4


Analog Audio
Outputs
AES 2 Input
AES 1 Input

## A6


Analog Audio
Outputs
AES Audio
Inputs

## A10


Analog Audio
Outputs
Analog
Audio Inputs
GPI Output

Genesis™

AES-6081-A10

# Digital Audio Distribution Amplifier

- Two AES digital audio channels on one module
- One input, eight outputs per channel
- 110 ohm operation
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Single channel mode
- Optional analog audio monitoring output

AES-6081-V6

# Digital Audio Distribution Amplifier

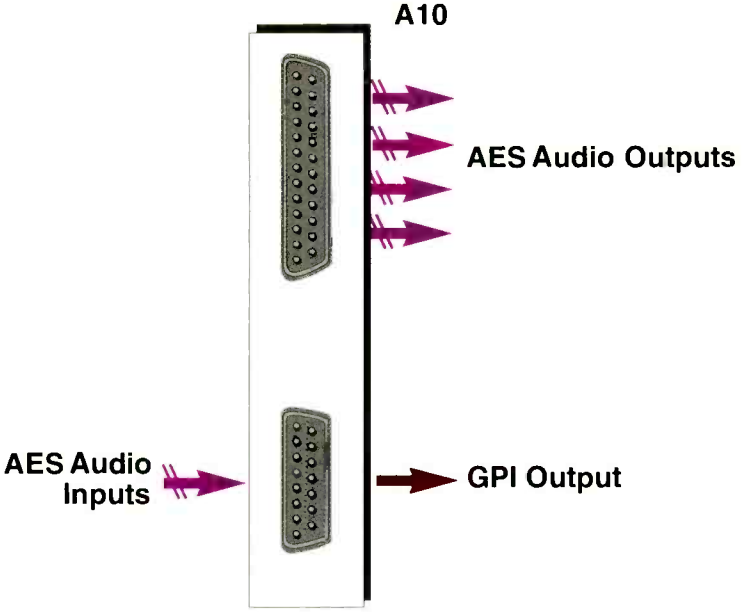
- Two AES digital audio channels on one module
- One input, two outputs per channel
- 75 ohm operation
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Optional analog audio monitoring output

AES-6081-V10

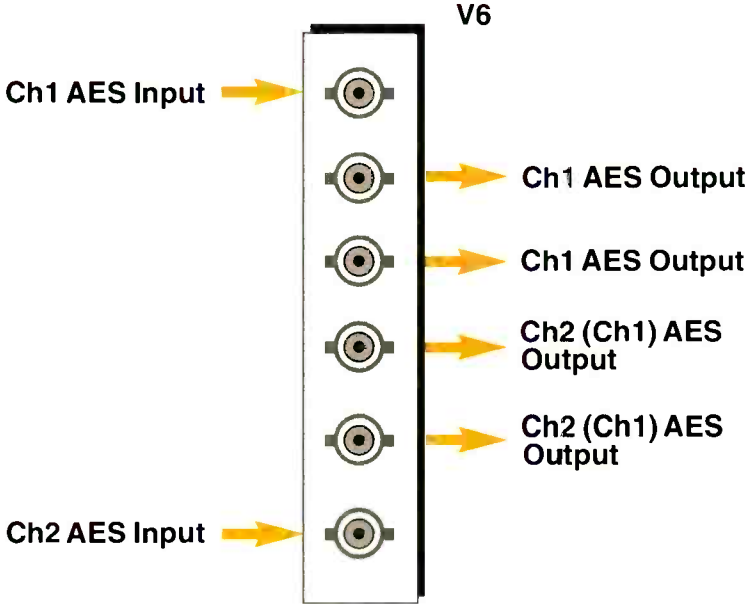
# Digital Audio Distribution Amplifier

- Two AES digital audio channels on one module
- One input, four outputs per channel
- 75 ohm operation
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Optional analog audio monitoring output

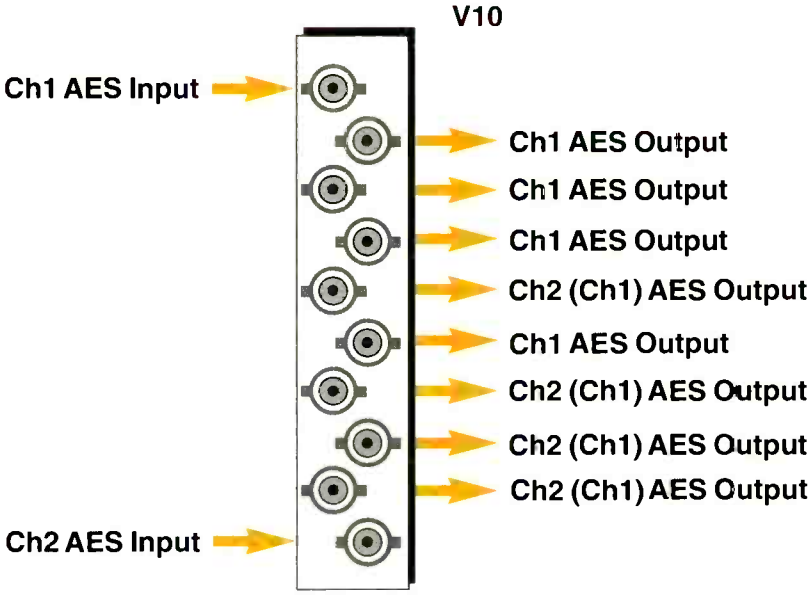
## A10


AES Audio Outputs
AES Audio Inputs
GPI Output

## V6


Ch1 AES Input
Ch1 AES Output
Ch1 AES Output
Ch2 (Ch1) AES Output
Ch2 (Ch1) AES Output
Ch2 AES Input

## V10


Ch1 AES Input
Ch1 AES Output
Ch1 AES Output
Ch1 AES Output
Ch2 (Ch1) AES Output
Ch1 AES Output
Ch2 (Ch1) AES Output
Ch2 (Ch1) AES Output
Ch2 (Ch1) AES Output
Ch2 AES Input

Genesis™

AES-6081-V12

# Digital Audio Distribution Amplifier

- Two AES digital audio channels on one module
- One input, four outputs per channel
- 75 ohm operation
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Card edge analog audio monitoring output

AES-6081-V13

# Digital Audio Distribution Amplifier

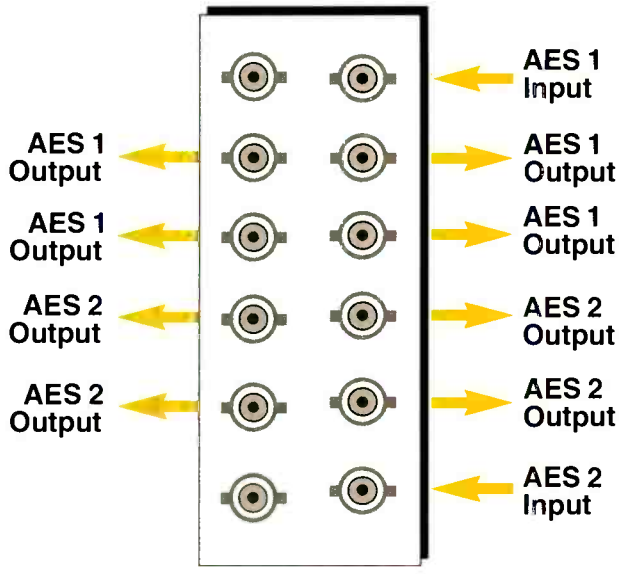
- Single channel AES audio DA with loop through
- One input, four outputs per channel
- 75 ohm operation
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Card edge analog audio monitoring output

AES-6081-V14

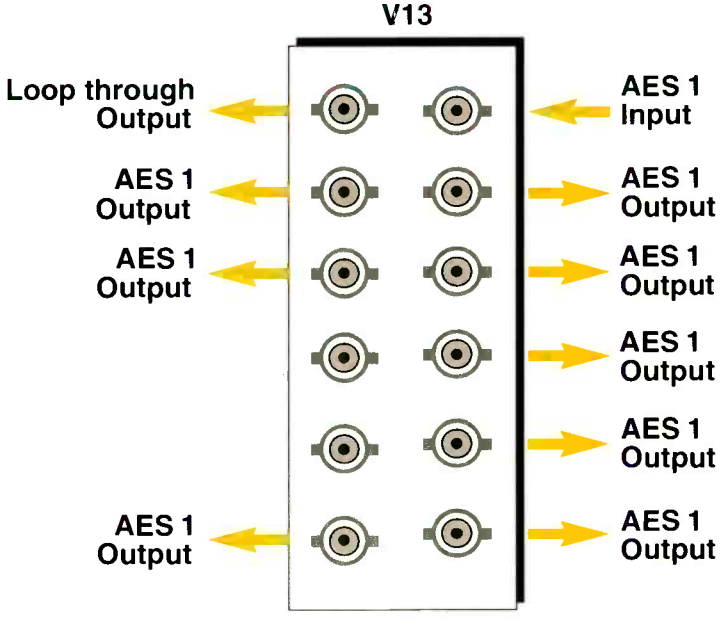
# Digital Audio Distribution Amplifier

- Two AES digital audio channels on one module
- One input, four outputs per channel with loop through
- 75 ohm operation
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Card edge analog audio monitoring output

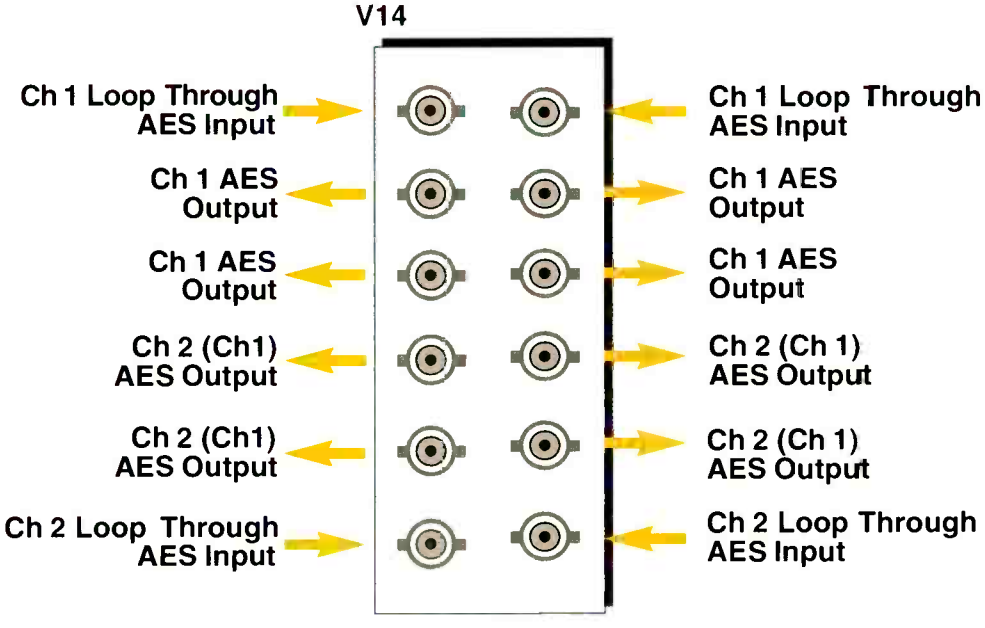
## V12


AES 1 Input
AES 1 Output
AES 1 Output
AES 1 Output
AES 2 Output
AES 2 Output
AES 2 Output
AES 2 Input

## V13


Loop through Output
AES 1 Input
AES 1 Output
AES 1 Output
AES 1 Output
AES 1 Output
AES 1 Output
AES 1 Output
AES 1 Output
AES 1 Output

## V14


Ch 1 Loop Through AES Input
Ch 1 Loop Through AES Input
Ch 1 AES Output
Ch 1 AES Output
Ch 1 AES Output
Ch 1 AES Output
Ch 2 (Ch1) AES Output
Ch 2 (Ch 1) AES Output
Ch 2 (Ch1) AES Output
Ch 2 (Ch 1) AES Output
Ch 2 Loop Through AES Input
Ch 2 Loop Through AES Input

Genesis™

DAP-6001-A8

# AES Digital Audio Processor and Channel Swapper

- 75 ohm operation
- Audio monitoring output
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Remote control panel

DAP-6001-A9

# AES Digital Audio Processor and Channel Swapper

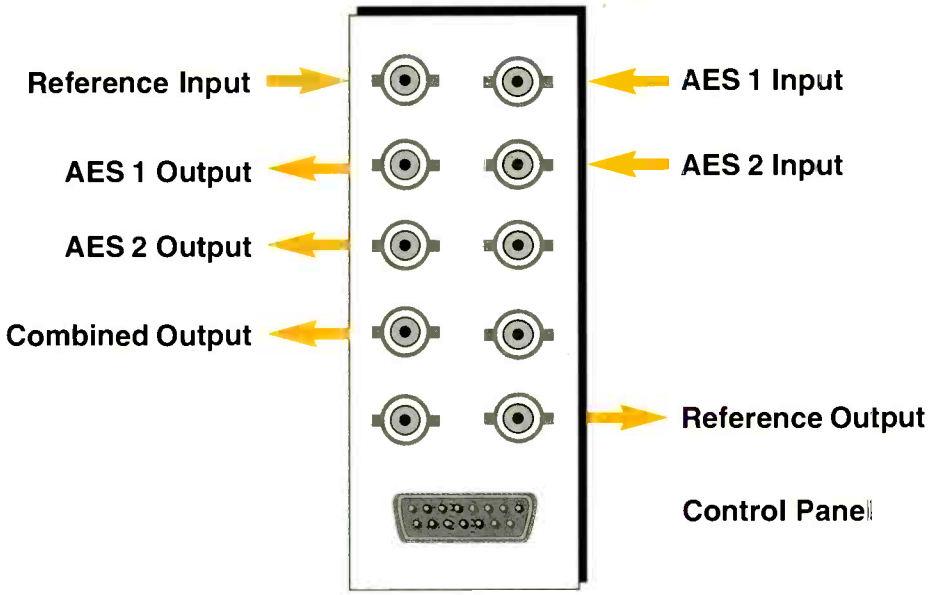
- 110 ohm operation
- Audio monitoring output
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Remote control panel

ACE-6081-A8

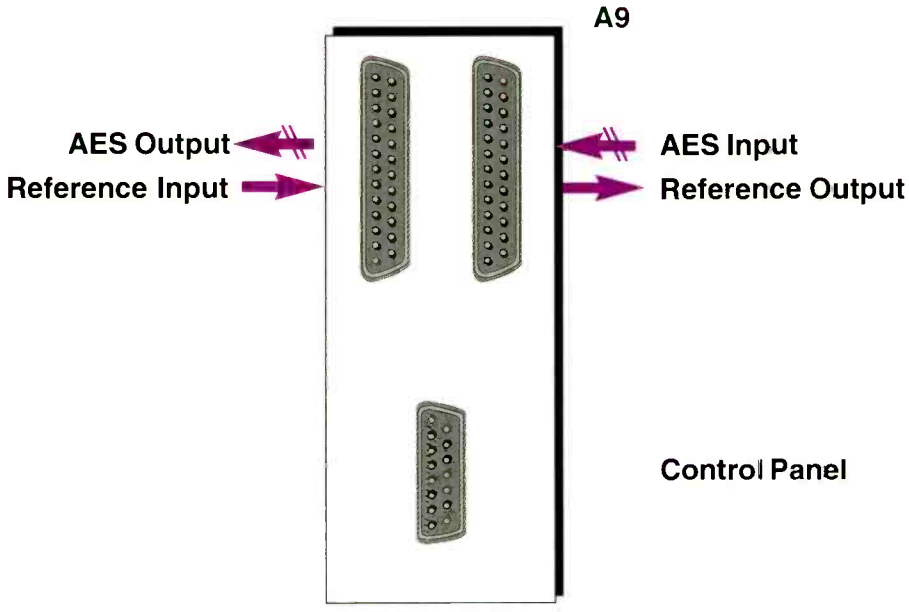
# AES Digital Audio Multichannel 4:1 Input Adapter

- 4:1 lossless compression
- 75 ohm AES operation
- Audio monitoring output
- Remote control panel option
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Remote control panel

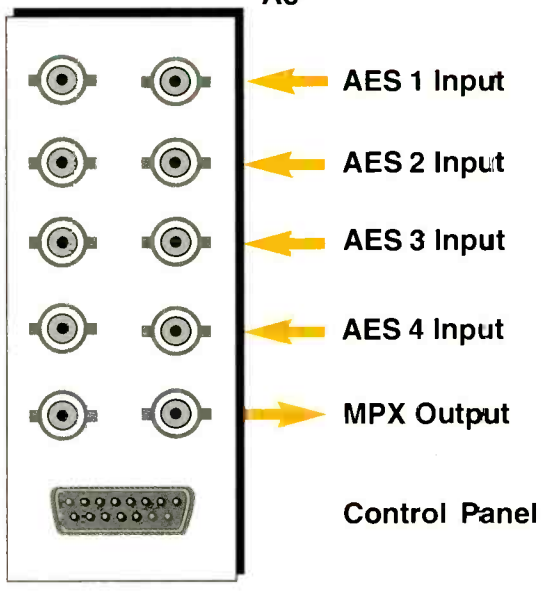
A8


Reference Input
AES 1 Output
AES 2 Output
Combined Output
AES 1 Input
AES 2 Input
Reference Output
Control Panel

A9


AES Output
Reference Input
AES Input
Reference Output
Control Panel

A8


AES 1 Input
AES 2 Input
AES 3 Input
AES 4 Input
MPX Output
Control Panel

Genesis™

ACE-6081-A9

# AES Digital Audio Multichannel 1:4 Input Adapter

- 4:1 lossless compression
- 110 ohm AES operation
- Audio monitoring output
- Remote control panel option
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol

ACD-6081-A8

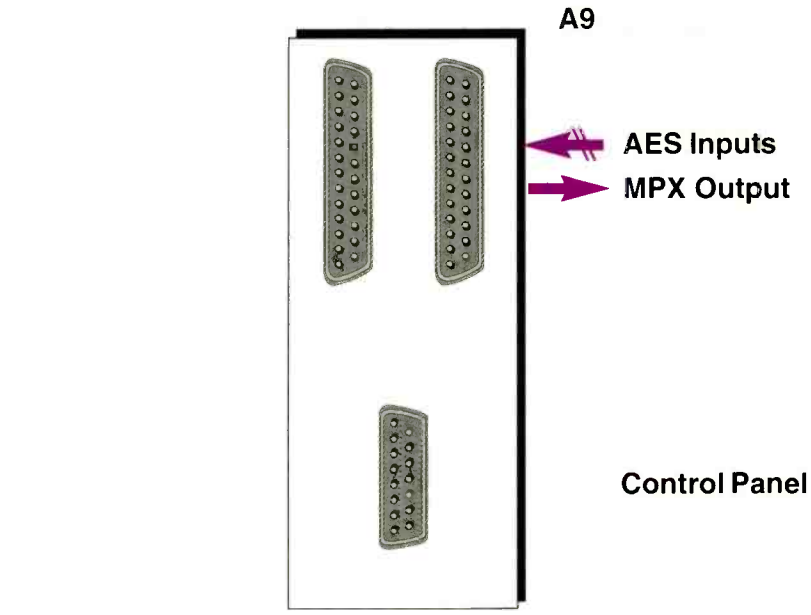
# AES Digital Audio Multichannel 1:4 Output Adapter

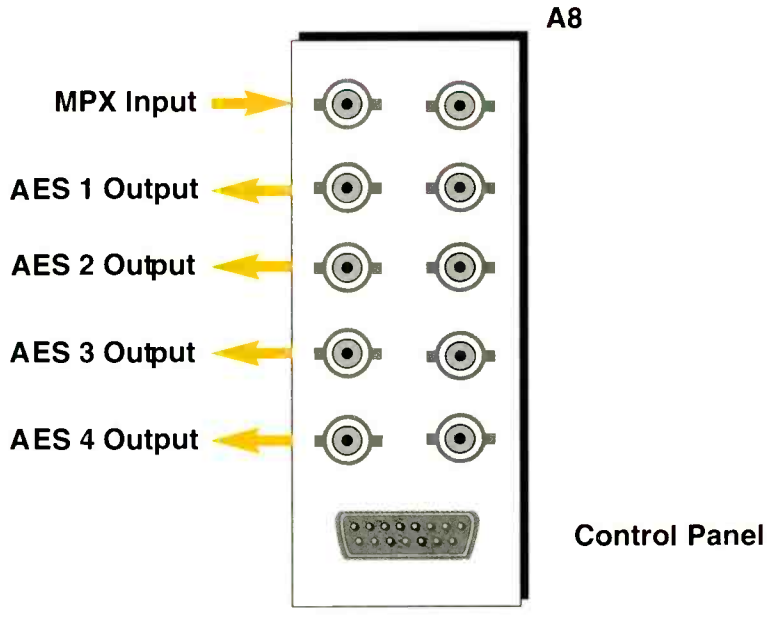
- 75 ohm AES operation
- Audio monitoring output
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Remote control panel option
- Lossless compression process

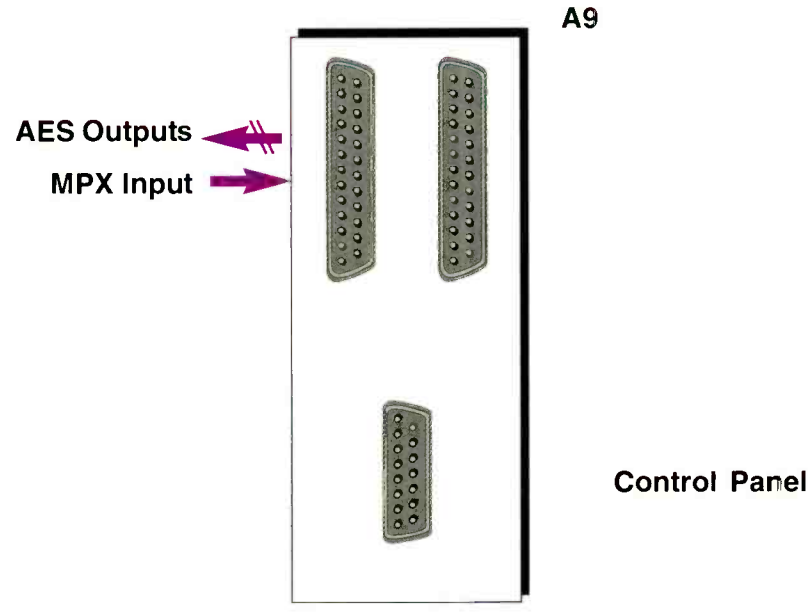
ACD-6081-A9

# AES Digital Audio Multichannel 4:1 Output Adapter

- 110 ohm AES operation
- Audio monitoring output
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Remote control panel option
- Lossless compression process


A9
AES Inputs
MPX Output
Control Panel


A8
MPX Input
AES 1 Output
AES 2 Output
AES 3 Output
AES 4 Output
Control Panel


A9
AES Outputs
MPX Input
Control Panel

Genesis™

ACM-6081-A8

# AES Audio Multichannel Combined 4:1 & 1:4 Adapter

- 75 ohm AES operation
- Audio monitoring output
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Remote control panel
- Lossless compression process

ACM-6081-A9

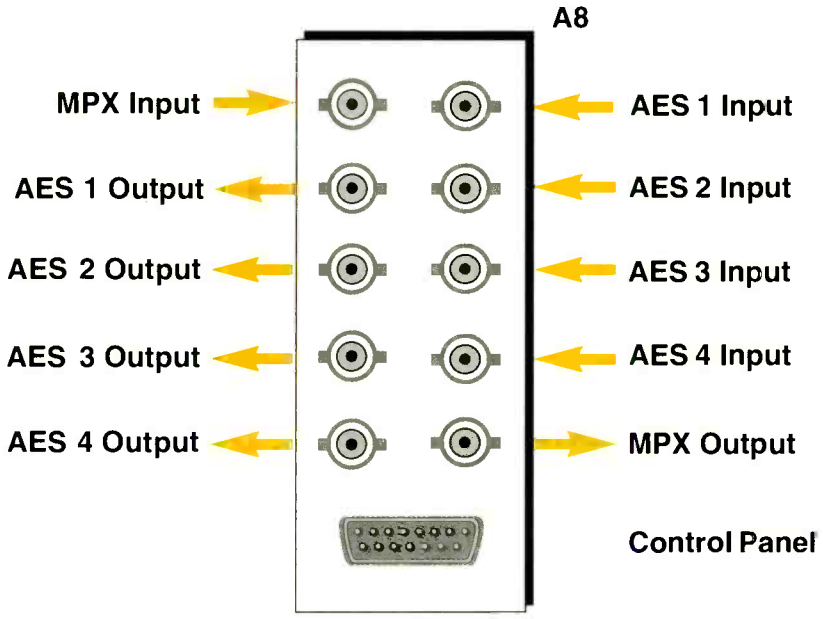
# AES Audio Multichannel Combined 4:1 & 1:4 Adapter

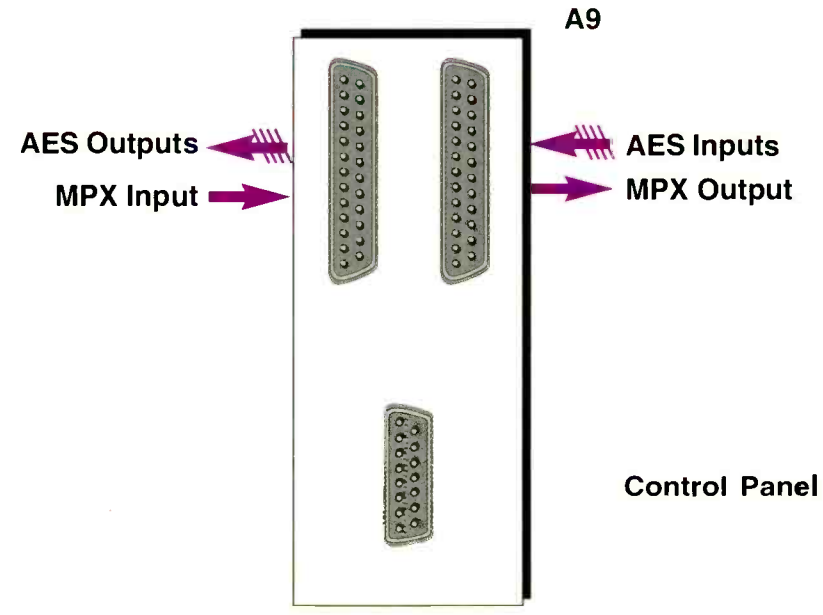
- 110 ohm AES operation
- Audio monitoring output
- Command Control System (CCS) enabled:
  - Support for CCS applications such as Pilot™
  - System discovery/Diagnostics
  - Remote control, configuration, monitoring and secure access
  - Control via remote control panels, RS232/422 or ethernet (IP)
  - Interface with 3rd party equipment and applications through simple, ASCII protocol
- Remote control panel
- Lossless compression process

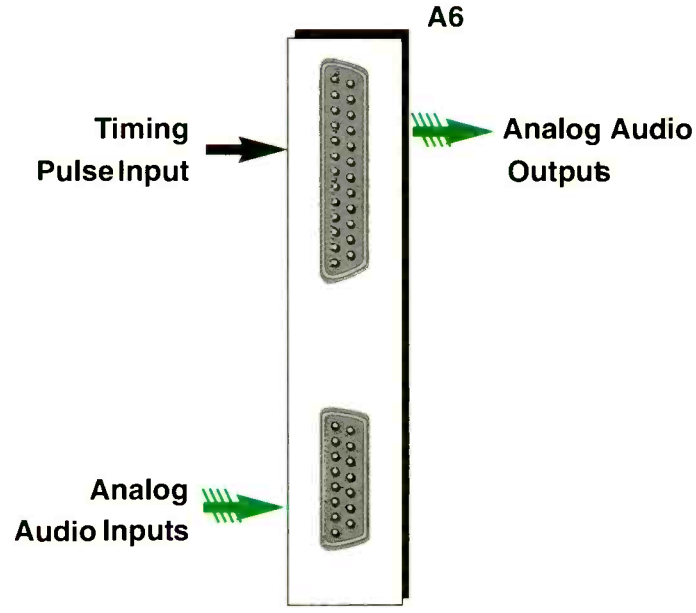
DLY-6081AA-A6

# Analog Dual Channel Audio Tracking Delay

- 2 stereo analog channels
- Framestore tracking delay
- Fixed delay operation
- Audio monitoring output
- Timing pulse input


A8
MPX Input
AES 1 Output
AES 2 Output
AES 3 Output
AES 4 Output
AES 1 Input
AES 2 Input
AES 3 Input
AES 4 Input
MPX Output
Control Panel


A9
AES Outputs
MPX Input
AES Inputs
MPX Output
Control Panel


A6
Timing
Pulse Input
Analog Audio
Outputs
Analog
Audio Inputs

Genesis™

# AES/Analog Dual Audio Tracking Delay

DLY-6081AD-A6

- 2 x stereo analog input
- 2 x AES output
- Frame store tracking delay
- Fixed delay operation
- 2 stereo channels
- Audio monitoring output
- Timing pulse input
- 110 ohm operation

# Analog/AES Dual Channel Audio Tracking Delay

DLY-6081AD-A7

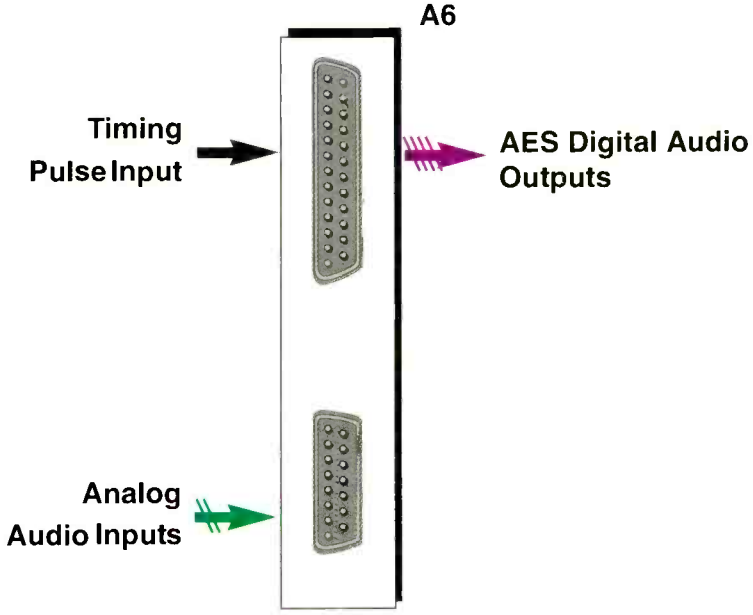
- 2 x stereo analog input
- 2 x AES output
- Framestore tracking delay
- Fixed delay operation
- 2 stereo channels
- Audio monitoring output
- Timing pulse input
- 75 ohm AES output

# AES/Analog Dual Tracking Audio Delay

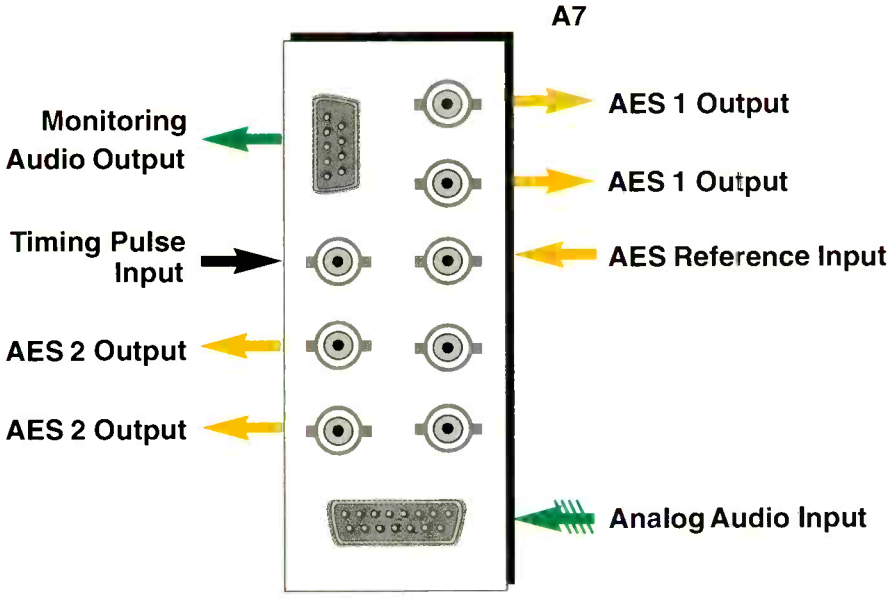
DLY-6081DA-S4

- 2 x AES input
- 2 x stereo analog output
- Framestore tracking delay
- Fixed delay operation
- 2 stereo channels
- Audio monitoring output
- Timing pulse input
- 75 ohm AES input

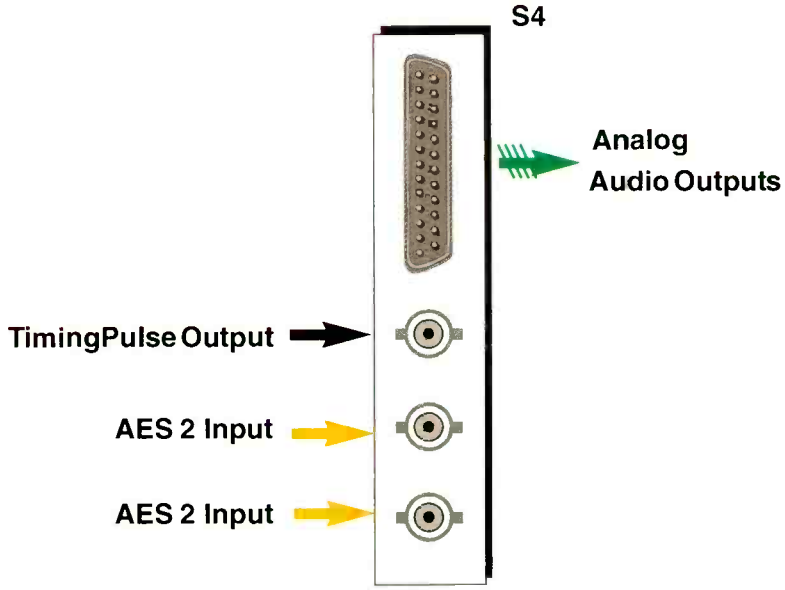
## A6


Timing
Pulse Input
AES Digital Audio
Outputs
Analog
Audio Inputs

## A7


Monitoring
Audio Output
Timing Pulse
Input
AES 2 Output
AES 2 Output
AES 1 Output
AES 1 Output
AES Reference Input
Analog Audio Input

## S4


Analog
Audio Outputs
TimingPulse Output
AES 2 Input
AES 2 Input

Genesis™

## DLY-6081DA-A6 — AES/Analog Dual Tracking Audio Delay

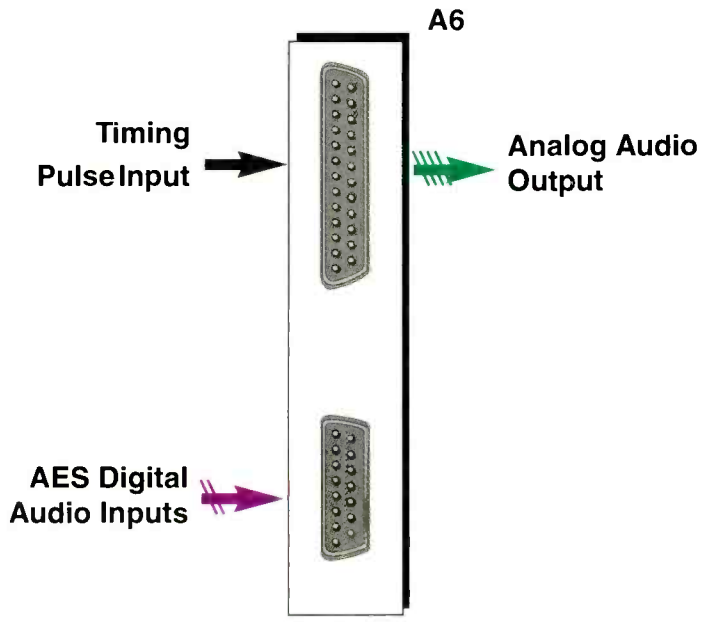
- 2 x AES input
- 2 x stereo analog output
- Framestore tracking delay
- Fixed delay operation
- 2 stereo channels
- Audio monitoring output
- Timing pulse input
- 110 ohm AES input

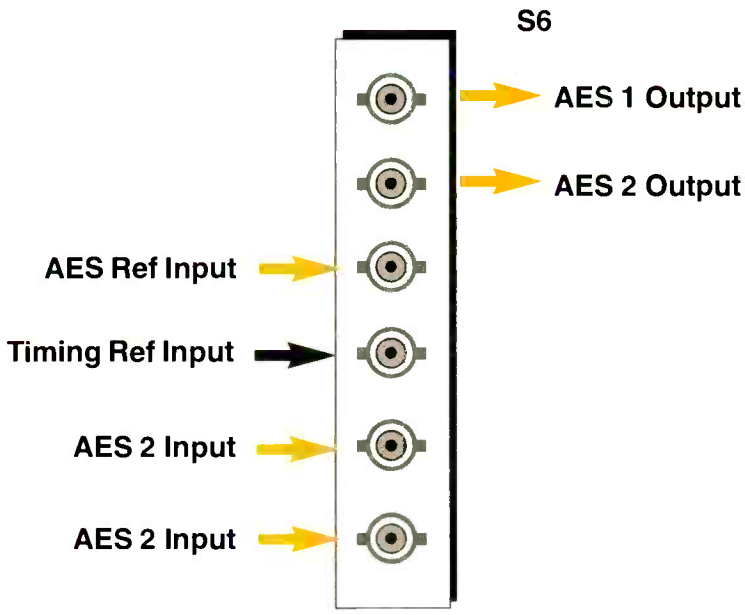
## DLY-6081DD-S6 — AES Dual Tracking Audio Delay

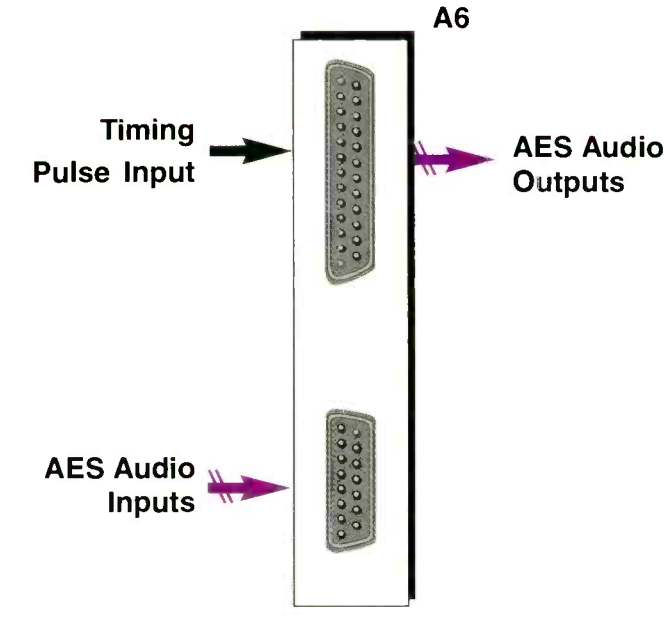
- 2 x 75 ohm AES input
- 2 x 75 ohm AES output
- 20-bit AES
- Framestore tracking delay
- AES resampler operation
- Fixed delay operation
- 2 stereo channels
- Audio monitoring output
- Timing pulse input

## DLY-6081DD-A6 — AES Dual Tracking Audio Delay

- 2 x 110 ohm AES input
- 2 x 110 ohm AES output
- 20-bit AES
- Framestore tracking delay
- AES re-sampler operation
- Fixed delay operation
- 2 stereo channels
- Audio monitoring output
- Timing pulse input


A6
Timing
Pulse Input
Analog Audio
Output
AES Digital
Audio Inputs


S6
AES 1 Output
AES 2 Output
AES Ref Input
Timing Ref Input
AES 2 Input
AES 2 Input


A6
Timing
Pulse Input
AES Audio
Outputs
AES Audio
Inputs

6800
7000

DEC-6801

# NTSC/PAL to 4:2:2 Decoder

- Compact decoder on a DA-size card
- Automatic PAL-M/NTSC switching
- 3-line adaptive comb filter
- 10-bit quantization
- Full bandwidth VITS handling capability
- 4:2:2 frame synchronizer version available

DEC-6804

# NTSC/PAL to 4:2:2 Decoder

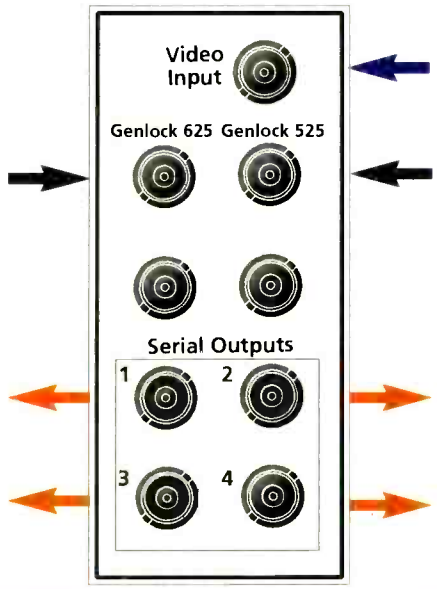
## PRELIMINARY INFORMATION

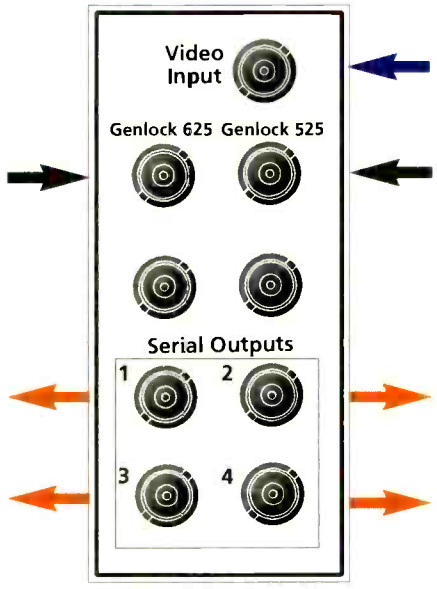
- Composite analog to digital 4:2:2 converter
- Compact 12-bit decoder with new Leitch *PQM™ Technology*
- NTSC and PAL compatible
- TBC capabilities
- 2D adaptive comb filter
- Automatic PAL/NTSC switching
- VBI handling capability
- Vertical line processing
- 12-bit quantization
- Test signal generator
- Colour-locking for genlock

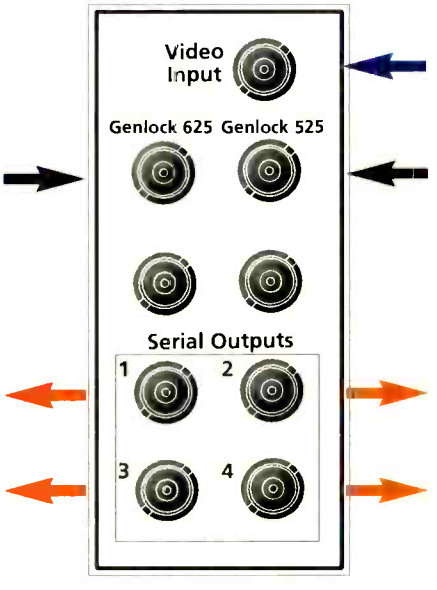

DES-6801

# NTSC/PAL to 4:2:2 Decoder With Frame Synchronizer

- Compact decoder on a DA-size card
- Automatic PAL-M/NTSC switching
- 3-line adaptive comb filter
- 10-bit quantization
- Full bandwidth VITS handling capability
- 4:2:2 frame synchronizer version available


Video
Input
Genlock 625
Genlock 525
Serial Outputs
1
2
3
4


Video
Input
Genlock 625
Genlock 525
Serial Outputs
1
2
3
4


Video
Input
Genlock 625
Genlock 525
Serial Outputs
1
2
3
4

6800
7000

DES-6804

# NTSC/PAL to 4:2:2 Decoder With Frame Synchronizer

## PRELIMINARY INFORMATION

- Composite analog to digital 4:2:2 converter with frame synchronizer
- New slimmer profile allowing for use in all 6800 / 7000 series frames
- Compact 12-bit decoder with new Leitch *PQM™ Technology*
- NTSC and PAL compatible
- TBC capabilities
- 2-D adaptive comb filter
- Automatic PAL/NTSC switching
- VBI handling capability
- Vertical line processing
- 12-bit quantization
- Test signal generator
- Interface for companion audio synchronizer
- Color-locking for genlock


ENC-6801

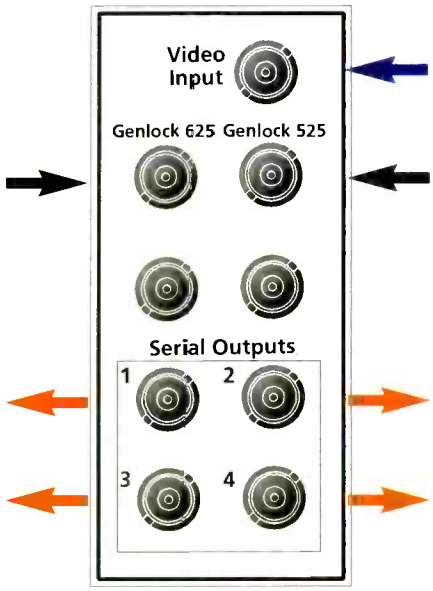
# 4:2:2 to NTSC/PAL Encoder

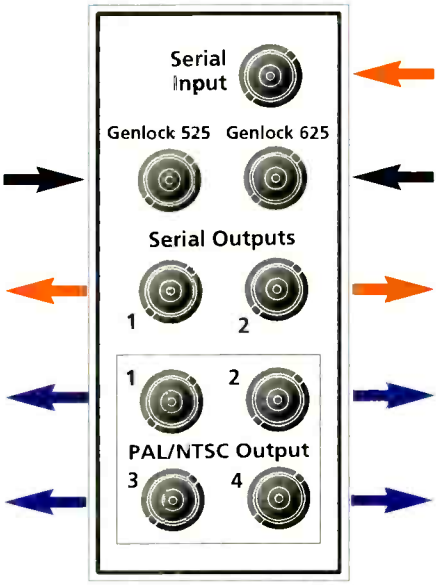
- Jitter removal
- 12-bit digital internal processing
- 2X oversampling
- Automatic standard selection between PAL-B and NTSC or NTSC and PAL-M
- Optional cross color reducer
- 2.9H delay mode or 1 line synchronizer mode (without frame synchronizer)
- External (PAL and NTSC) color black reference inputs
- Output analog video cable pre-equalizer for 300M of Belden 8281

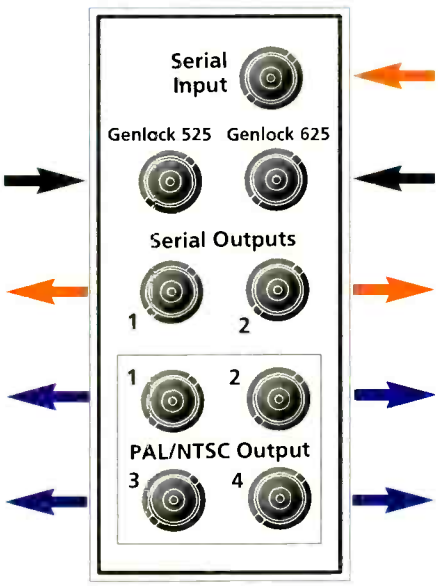
ENS-6801

# 4:2:2 to NTSC/PAL Encoder/Synchronizer

- Jitter removal
- 12-bit digital internal processing
- 2X oversampling
- Automatic standard selection between PAL-B and NTSC or NTSC and PAL-M
- Optional cross color reducer
- Infinite delay
- External (PAL and NTSC) color black reference inputs
- Output analog video cable pre-equalizer for 300M of Belden 8281


Video
Input
Genlock 625
Genlock 525
Serial Outputs
1
2
3
4


Serial
Input
Genlock 525
Genlock 625
Serial Outputs
1
2
1
2
PAL/NTSC Output
3
4


Serial
Input
Genlock 525
Genlock 625
Serial Outputs
1
2
1
2
PAL/NTSC Output
3
4

6800
7000

ENX-6801

# 4:2:2 to NTSC/PAL Encoder/Synchronizer With Cross Color Reducer

- Jitter removal
- 12-bit digital internal processing
- 2X oversampling
- Automatic standard selection between PAL-B and NTSC or NTSC and PAL-M
- Cross color reducer
- 1.1 - 3.9 lines delay
- External (PAL and NTSC) color black reference inputs
- Output analog video cable pre-equalizer for 300M of Belden 8281

ADC-6801

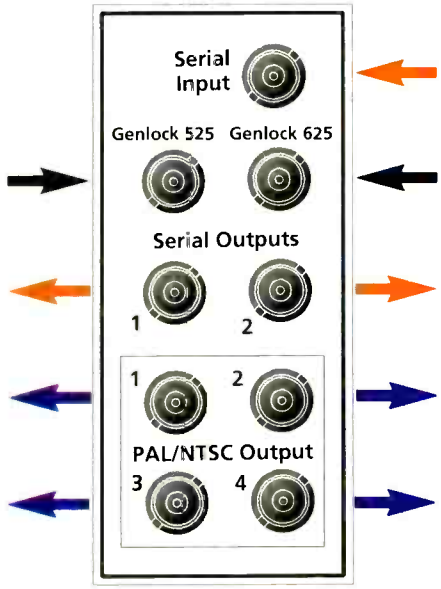
# Component Analog to Digital Converter

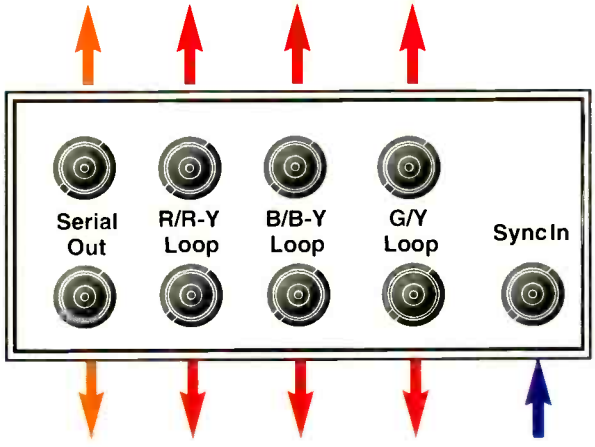
- 525/625 line operation
- 2x over-sampling, 27MHz Y 13.5MHz Cr/Cb
- 10-bit conversion and signal path
- Auto calibration
- Built-in color bars as alignment aid
- Automatic line-standard switching
- Sync on G/Y or external Sync
- RGB, SPMTE/EBU component, Betacam and MII
- Optional 8-bit rounding

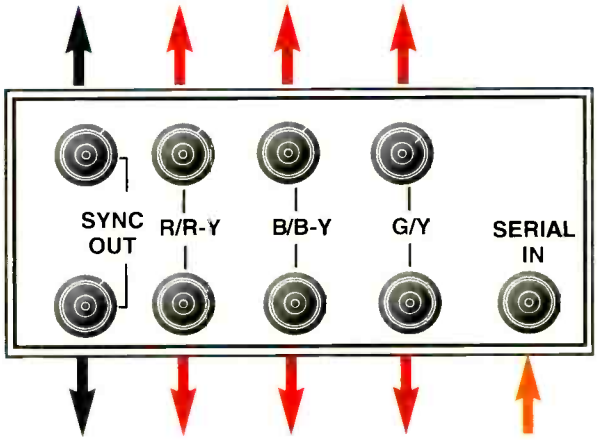
DAC-6801

# Digital to Component Analog Converter

- 525/625 line operation
- 4x over-sampling
- 10-bit conversion and signal path
- Auto calibration
- Built-in color bars as alignment aid
- Automatic line standard switching
- Sync on G/Y or external Sync
- RGB, SPMTE/EBU component, Betacam and MII


Serial
Input
Genlock 525
Genlock 625
Serial Outputs
1
2
1
2
PAL/NTSC Output
3
4


Serial
Out
R/R-Y
Loop
B/B-Y
Loop
G/Y
Loop
Sync In


SYNC
OUT
R/R-Y
B/B-Y
G/Y
SERIAL
IN

6800
7000

DAC-6880-68C

# 20-Bit Digital Audio To Analog Audio Converter

- High-quality, 20-bit D to A conversion
- Versions available for 110 ohm balanced (AES3-1992) or 75 ohm coaxial (SMPTE-276) AES inputs
- Bridging inputs
- Dual stereo analog audio outputs (2 outputs per channel; 2 left and 2 right)
- Can be housed in 6800 and 7000 Series frames
- Mixes digital video & audio modules in same frame

DAC-6880-70C

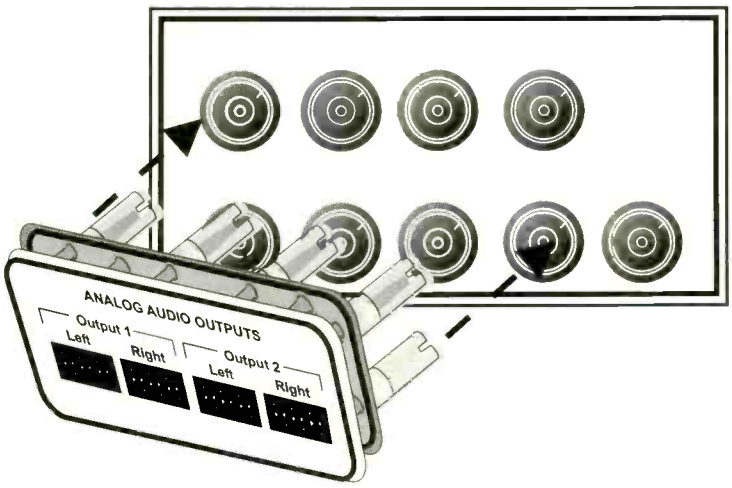
# 20-Bit Digital Audio To Analog Audio Converter

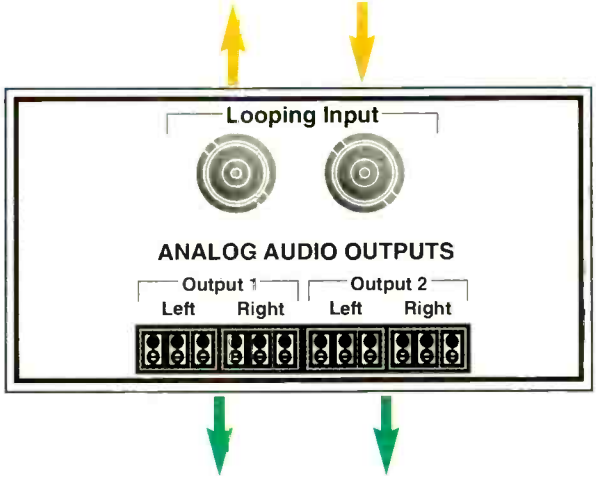
- High-quality, 20-bit D to A conversion
- Versions available for 110 ohm balanced (AES3-1992) or 75 ohm coaxial (SMPTE-276) AES inputs
- Bridging inputs
- Dual stereo analog audio outputs (2 outputs per channel; 2 left and 2 right)
- Can be housed in 6800 and 7000 Series frames
- Mixes digital video & audio modules in same frame

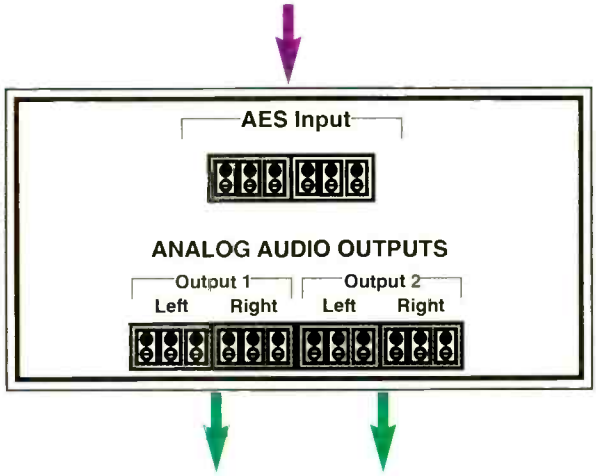
DAC-6880-70B

# 20-Bit Digital Audio To Analog Audio Converter

- High-quality, 20-bit D to A conversion
- Versions available for 110 ohm balanced (AES3-1992) or 75 ohm coaxial (SMPTE-276) AES inputs
- Bridging inputs
- Dual stereo analog audio outputs (2 outputs per channel; 2 left and 2 right)
- Can be housed in 6800 and 7000 Series frames
- Mixes digital video & audio modules in same frame


ANALOG AUDIO OUTPUTS
Output 1
Left
Right
Output 2
Left
Right


Looping Input
ANALOG AUDIO OUTPUTS
Output 1
Left
Right
Output 2
Left
Right


AES Input
ANALOG AUDIO OUTPUTS
Output 1
Left
Right
Output 2
Left
Right

6800
7000

ADC-6880-68C

## 20-Bit Analog Audio To Digital Audio (AES) Converter

- High quality A to D Conversion
- Both 110 ohm balanced (AES3-1992) and 75 ohm coaxial (SMPTE-276) AES outputs
- Looping inputs with wide level range (+16 - +28 dBu for full scale digital) with 'tweak-less' input level adjustment
- Can be housed in 6800 and FR-7001 frames
- Digital video and audio modules can be mixed in same frame

ADC-6880-70BC

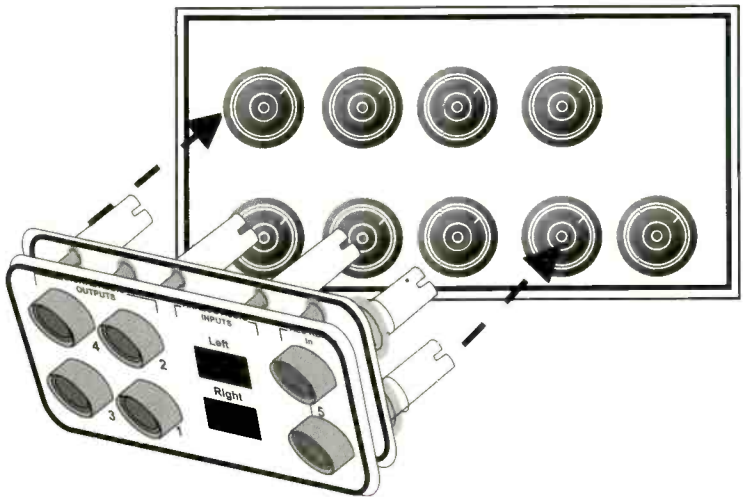
## 20-Bit Analog Audio To Digital Audio (AES) Converter

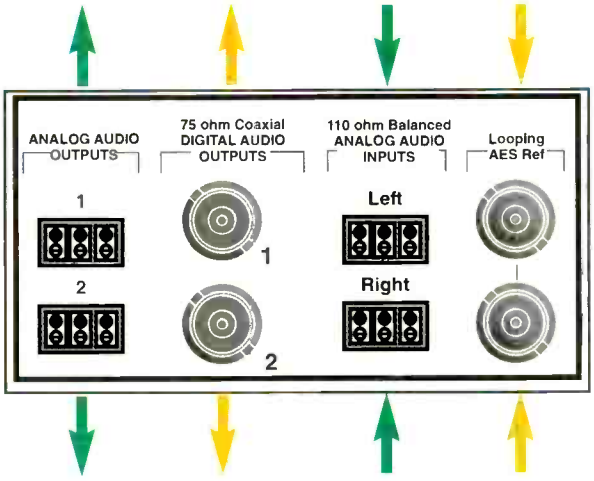
- High quality A to D Conversion
- Both 110 ohm balanced (AES3-1992) and 75 ohm coaxial (SMPTE-276) AES outputs
- Looping inputs with wide level range (+16 - +28 dBu for full scale digital) with 'tweak-less' input level adjustment
- Can be housed in 6800 and FR-7001 frames
- Digital video and audio modules can be mixed in same frame

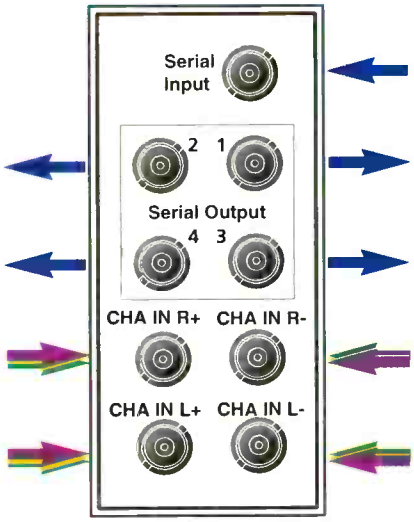
MXA-6801

## Audio Multiplexer

- Multiplexes audio into SDI
- Four versions: balanced 48KHz AES, unbalanced 48KHz AES, and balanced analog (2 or 4 channels)
- For 6800 and 7000 series frames
- 4 SDI outputs
- Full EDH capability
- 20-bit resolution, 24-bit processing


OUTPUTS
INPUTS
Left
Right
4
2
3
1
5


ANALOG AUDIO OUTPUTS
75 ohm Coaxial DIGITAL AUDIO OUTPUTS
110 ohm Balanced ANALOG AUDIO INPUTS
Looping AES Ref
1
2
1
2
Left
Right


Serial Input
2
1
Serial Output
4
3
CHA IN R+
CHA IN R-
CHA IN L+
CHA IN L-

6800
7000

ADM-6800

# Audio Multiplexer/DA

- Provides audio demultiplexing for up to 4 channels of audio
- Versions with SDI and analog audio outputs
- Versions with SDI and AES/EBU audio outputs
- Versions with analog and AES/EBU audio outputs
- 18-bit analog audio outputs
- 20-bit AES/EBU audio outputs
- Supports composite (143Mb/s) and component (270Mb/s) inputs
- Independent channel swapping for main and monitor outputs

ADM-6800-C

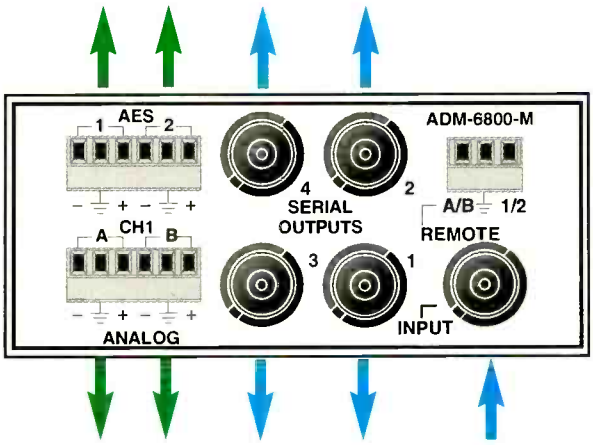
# Audio Multiplexer/DA

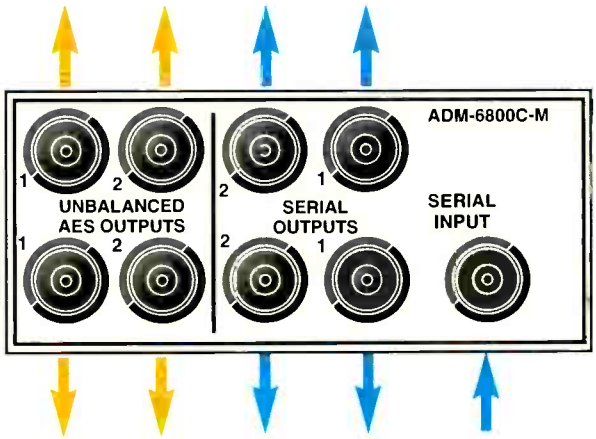
- Provides audio demultiplexing for up to 4 channels of audio
- Versions with SDI and analog audio outputs
- Versions with SDI and AES/EBU audio outputs
- Versions with analog and AES/EBU audio outputs
- Excellent quality 18-bit analog audio outputs
- 20-bit AES/EBU audio outputs
- Supports composite (143Mb/s) and component (270Mb/s) inputs
- Independent channel swapping for main and monitor outputs

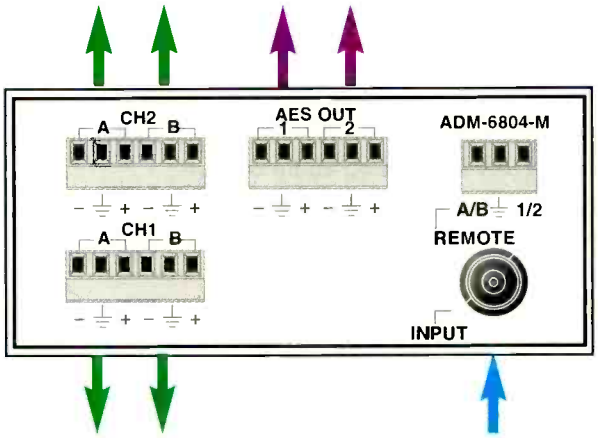
ADM-6804

# Audio Multiplexer/DA

- Provides audio demultiplexing for up to 4 channels of audio
- Versions with SDI and analog audio outputs
- Versions with SDI and AES/EBU audio outputs
- Versions with analog and AES/EBU audio outputs
- Excellent quality 18-bit analog audio outputs
- 20-bit AES/EBU audio outputs
- Supports composite (143Mb/s) and component (270Mb/s) inputs
- Independent channel swapping for main and monitor outputs


AES
1
2
ADM-6800-M
4
2
SERIAL
OUTPUTS
A/B
1/2
REMOTE
A
CH1
B
3
1
INPUT
ANALOG


ADM-6800C-M
1
2
UNBALANCED
AES OUTPUTS
2
1
SERIAL
OUTPUTS
SERIAL
INPUT


A
CH2
B
AES OUT
1
2
ADM-6804-M
A/B
1/2
REMOTE
A
CH1
B
INPUT

6800
7000

ADM-6804-BC

# Audio Multiplexer/DA

- Provides audio demultiplexing for up to 4 channels of audio
- Versions with SDI and analog audio outputs
- Versions with SDI and AES/EBU audio outputs
- Versions with analog and AES/EBU audio outputs
- Excellent quality 18-bit analog audio outputs
- 20-bit AES/EBU audio outputs
- Supports composite (143Mb/s) and component (270Mb/s) inputs
- Independent channel swapping for main and monitor outputs

ASM-6800

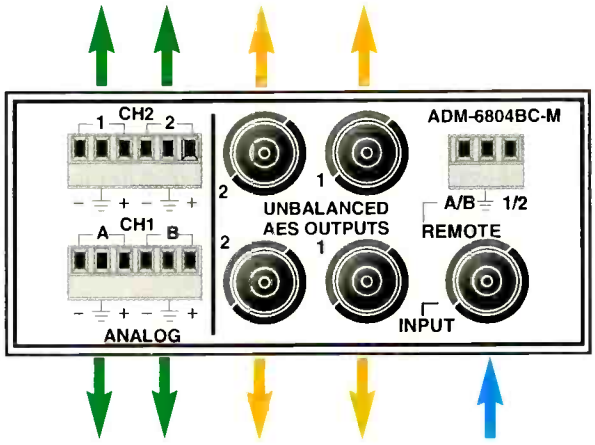
# Audio Multiplexer/DA

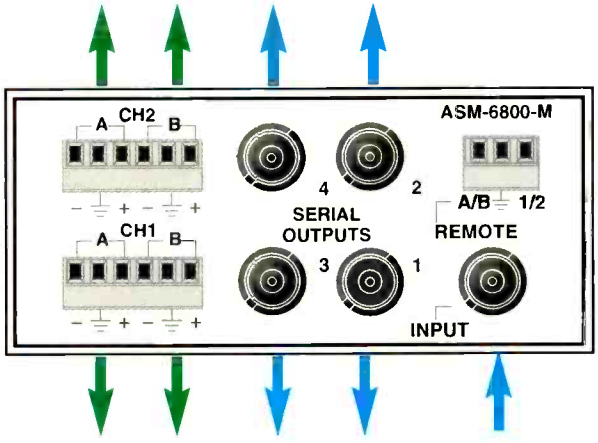
- Provides audio demultiplexing for up to 4 channels of audio
- Versions with SDI and analog audio outputs
- Versions with SDI and AES/EBU audio outputs
- Versions with analog and AES/EBU audio outputs
- Excellent quality 18-bit analog audio outputs
- 20-bit AES/EBU audio outputs
- Supports composite (143Mb/s) and component (270Mb/s) inputs
- Independent channel swapping for main and monitor outputs

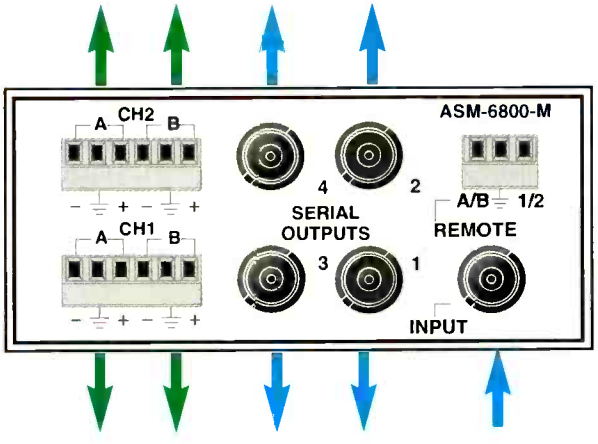
ASM-6804

# Audio Multiplexer/DA

- Provides audio demultiplexing for up to 4 channels of audio
- Versions with SDI and analog audio outputs
- Versions with SDI and AES/EBU audio outputs
- Versions with analog and AES/EBU audio outputs
- Excellent quality 18-bit analog audio outputs
- 20-bit AES/EBU audio outputs
- Supports composite (143Mb/s) and component (270Mb/s) inputs
- Independent channel swapping for main and monitor outputs


ADM-6804BC-M
CH2
1
2
CH1
A
B
ANALOG
UNBALANCED
AES OUTPUTS
2
1
A/B
1/2
REMOTE
INPUT


ASM-6800-M
A
CH2
B
CH1
SERIAL
OUTPUTS
4
2
3
1
A/B
1/2
REMOTE
INPUT


ASM-6800-M
A
CH2
B
CH1
SERIAL
OUTPUTS
4
2
3
1
A/B
1/2
REMOTE
INPUT

6800
7000

VSD-6801

# Serial Distribution Amplifier

- Low-cost 8 output serial DA
- Ideal for fan-out and short distance (<25m) distribution applications
- Compact design: 4 cards in 1RU or 10 in 2RU
- Transparent to all serial video data rates, including the proposed wide screen 16:9 (360Mb/s)
- Automatic input equalization

VSE-6801

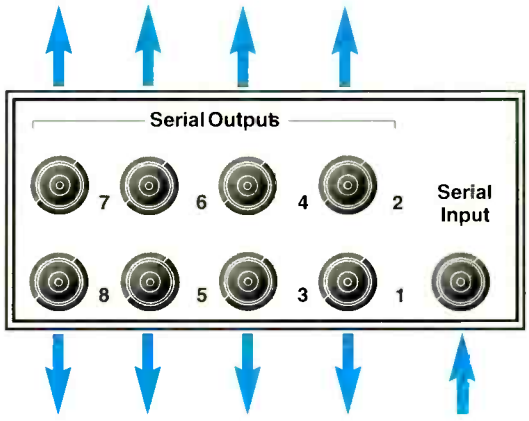
# Equalizing, Reclocking Serial Distribution Amplifier

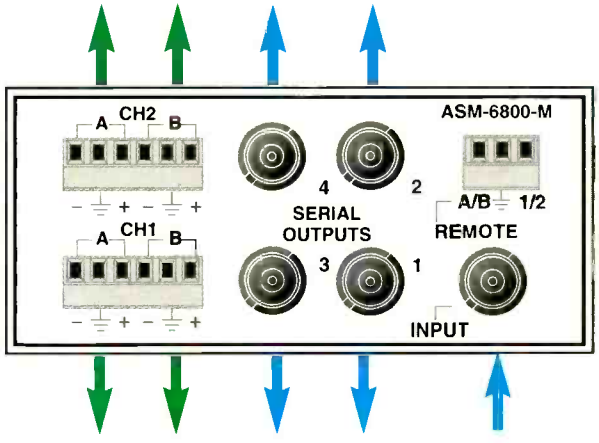
- 8 outputs
- Automatic cable equalization and reclocking
- Provides equalization warning light which indicates when cable length exceeds user-specified maximum
- Automatically selects composite (143 & 177Mb/s), component (270Mb/s), or HD (360Mb/s) standards
- External error warning via contact closure output

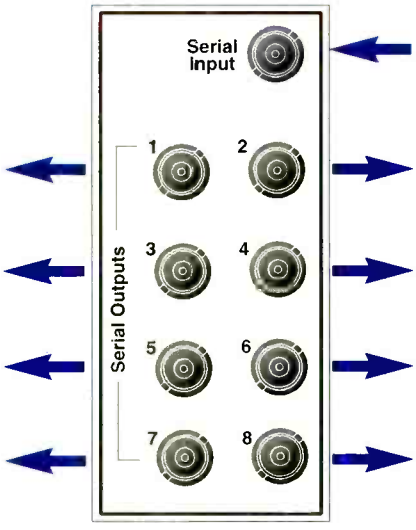
VSE-6802

# DVB/ASI Serial Distribution Amplifier

- 8 output distribution amplifier for Asynchronous Series Interface DVB/ASI standard (DVB_PI_232)
- Also capable of distributing standard SDI signals (SMPTE-259M – 143, 177, 270 and 360 Mb/s)
- Automatic data reclocking of 143, 177, 270 and 360 Mb/s signals
- Will distribute other data rates from 30 Mb/s to 360 Mb/s without reclocking
- Custom data rates possible-call for details
- Transformer coupled input and outputs
- All outputs in-phase
- LED Indicators for:
  - Data presence (Green)
  - Data absence (Red)
  - Unable to reclock data (Red)
  - Data rate indicator per standard DVB-ASI and SMPTE-259M data rates (143, 177, 270, 360 Mb/s)
- Contact closure alarm output for data absence, excess cable length and/or unabl to reclock data
- Compact design allowing 4 modules in 1RU (FR-6801or FR-7001), 10 modules in 2RU (FR-6802, FR-6804, or FR-6804-1) or a single module in the Mix Box (FR-7000MB


Serial Outputs
7
6
4
2
Serial Input
8
5
3
1


CH2
A
B
CH1
A
B
ASM-6800-M
4
2
SERIAL OUTPUTS
3
1
A/B
1/2
REMOTE
INPUT


Serial Input
Serial Outputs
1
2
3
4
5
6
7
8

6800
7000

VSM-6804

# Serial Monitoring Distribution Amplifier

- 4 NTSC/PAL/PAL-M analog composite color outputs
- 4 reclocked equalized 4:2:2 serial outputs
- Mounts in standard Leitch Serial Frames
- Selectable color frame ID input
- Ideal for monitoring serial component signals in composite analog monitors
- Encoded outputs suitable for dubbing

VSM-6802

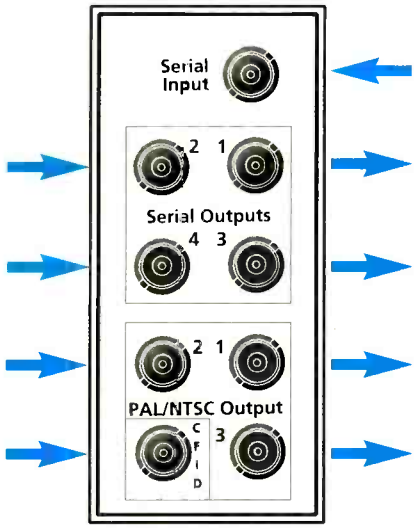
# Composite Serial DA/D:A Converter

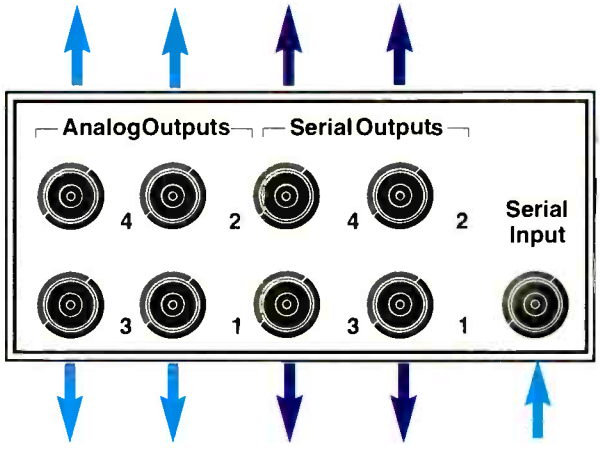
- 4 NTSC composite analog color outputs with high quality D to A
- 4 reclocked equalized 4fsc serial outputs
- Ideal for monitoring serial composite signals with analog monitors
- Mounts in standard Leitch Serial DA frames

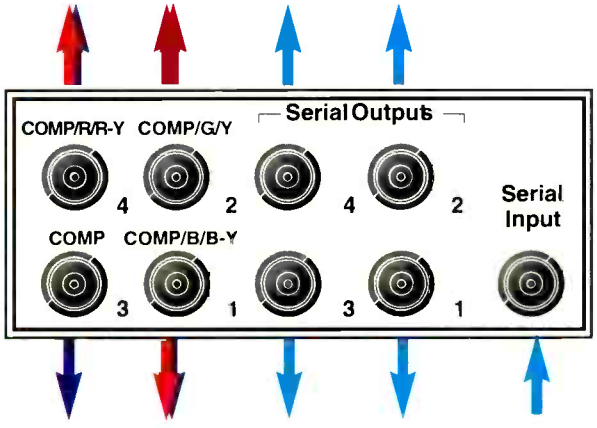
USM-6800

# Universal Encoder/DA/D:A

- PAL/NTSC Monitoring Encoder
- Selectable outputs: NTSC/PAL Composite Analog
- 1 RGB or YUV and 1 composite analog
- 1 YC and 2 composite analog
- 525/625 line auto switching 4 equalized, re-clocked serial outputs


Serial Input
2 1
Serial Outputs
4 3
2 1
PAL/NTSC Output
C F I D
3


Analog Outputs
Serial Outputs
4 2 4 2
Serial Input
3 1 3 1


COMP/R/R-Y
COMP/G/Y
Serial Outputs
4 2 4 2
Serial Input
COMP
COMP/B/B-Y
3 1 3 1

6800
7000

EDH-6800-2

# Detection and Handling Serial Distribution Amplifier

- EDH (Error Detection & Handling) check word encoder/analyzer
- Compact design: 4 cards in 1RU, 10 cards in 2RU
- 8 equalized and reclocked serial outputs
- Standalone version for testing
- Auto selection of 143, 177, 270 and 360Mb/s serial formats
- Audible alarm
- Ideal for 'injecting' EDH within distribution system

VDA-6830

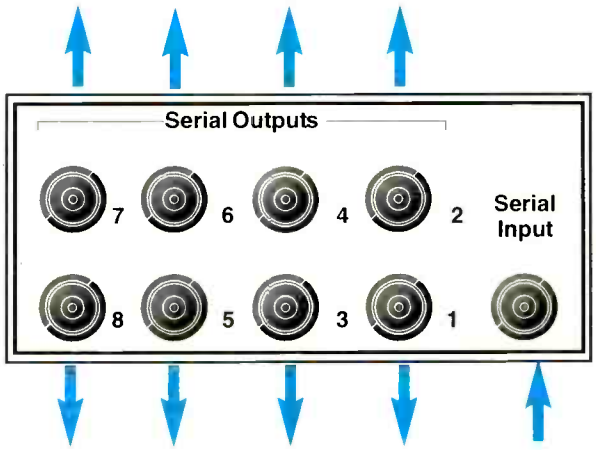
# Analog Video Distribution Amplifier

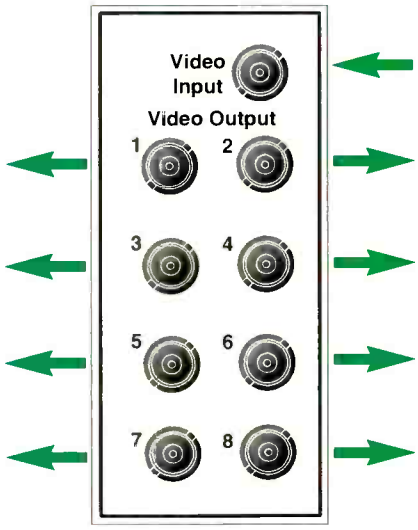
- Analog video amplifier for digital frame
- Composite/non-composite video or subcarrier distribution
- Differential input
- 8 outputs
- >30MHz bandwidth

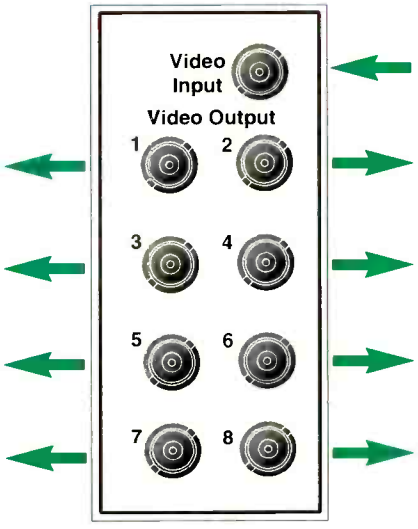
VEA-6830

# Analog Video Equalizing Amplifier

- Analog video equalizing for digital frame
- Differential input, 30 MHz bandwidth and ±3 dB gain range
- 8 outputs
- Continuously variable equalization for up to 300 m (1000 ft) of coaxial cable


Serial Outputs
7
6
4
2
Serial Input
8
5
3
1


Video Input
Video Output
1
2
3
4
5
6
7
8


Video Input
Video Output
1
2
3
4
5
6
7
8

6800
7000

VEA-6840

# Analog Video Equalizing Amplifier

- Looping input in 6800 series frames
- Terminating input in 1302/2602 and 6800/7000 series frames (jumper for high impedance, use T-adapter)
- AC or DC coupled (jumper select) differential input
- Jumper for Clamp Off / Hard / Soft
- Optional removable gain/EQ controls (VEA-684-RMV)
- Optional cable types

VPD-6830

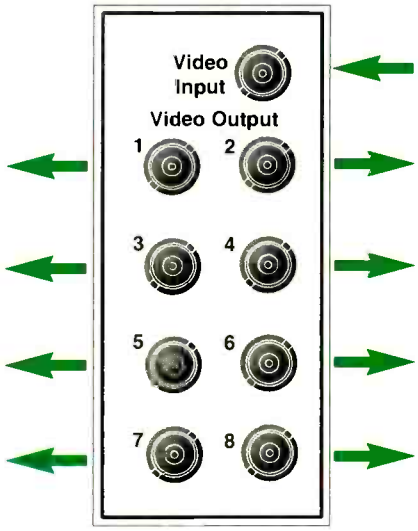
# Analog Video Programmable Amplifier

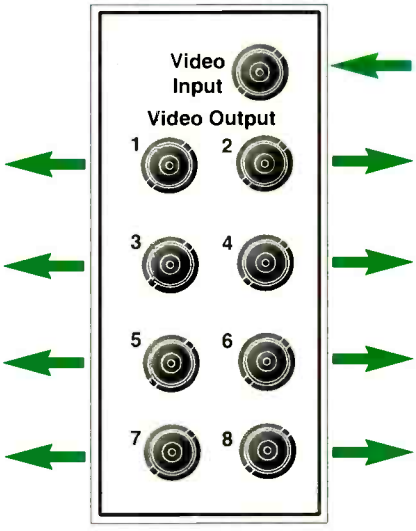
- Differential input, 8 outputs
- 30 MHz bandwidth (-3 dB)
- Jumper selectable Soft back porch clamp
- Jumper-selectable AC or DC coupling

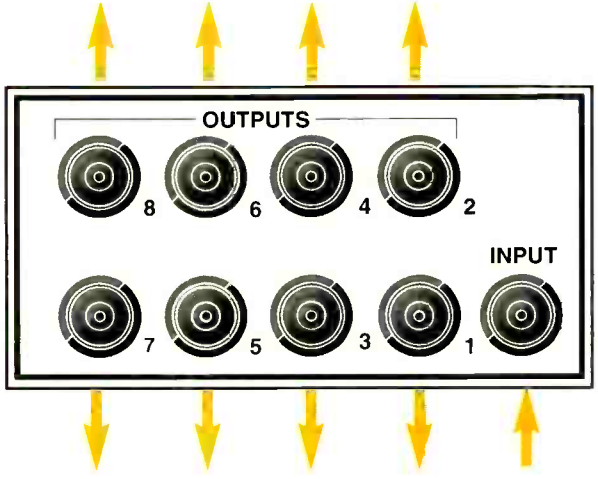
AES-6880

# AES/EBU Distribution Amplifier

- Meets SMPTE 276M interface standard for distribution of AES audio on 75 ohms coax
- Manual or automatic equalization modes
- Data reclocking provides jitter reduction
- EQ and reclock provide extended (>5000ft) cable compensation
- LED indication for input lock & important errors
- External indication of error condition using contact closure output


Video
Input
Video Output
1
2
3
4
5
6
7
8


Video
Input
Video Output
1
2
3
4
5
6
7
8


OUTPUTS
8
6
4
2
INPUT
7
5
3
1

6800
7000

LGI-6801

# Serial Digital Logo Generator/Inserter

- 525 / 625 line formats supported (auto detect)
- TARGA, TIFF, JPEG, PICT file formats supported
- GPI control interface

DSK-6801

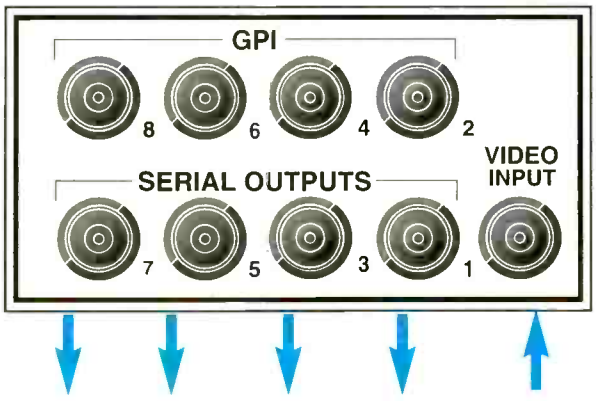
# Downstream Serial Keyers

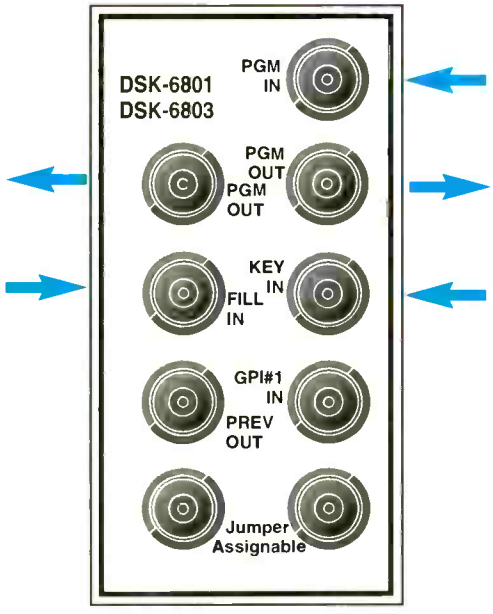
- Full 10-bit program path
- MIX and ADDITIVE keying modes
- Built-in simple chroma keyer
- Control via card edge controls or GPI contact closures
- RS232/422 serial port for automation and editor control

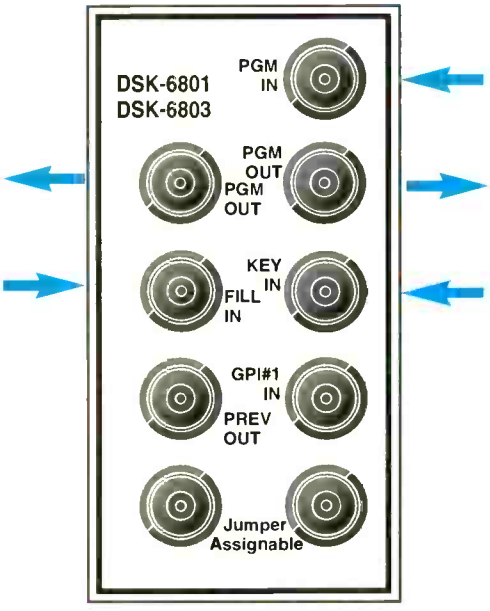
DSK-6803

# Downstream Serial Keyers

- Full 10-bit program path
- MIX and ADDITIVE keying modes
- Built-in simple chroma keyer
- Control via card edge controls or GPI contact closures
- RS232/422 serial port for automation and editor control


GPI
8
6
4
2
SERIAL OUTPUTS
VIDEO INPUT
7
5
3
1


DSK-6801
DSK-6803
PGM IN
PGM OUT
PGM OUT
KEY IN
FILL IN
GPI#1 IN
PREV OUT
Jumper Assignable


DSK-6801
DSK-6803
PGM IN
PGM OUT
PGM OUT
KEY IN
FILL IN
GPI#1 IN
PREV OUT
Jumper Assignable

6800
7000

VES-6801

# Component Serial FLASH Slide Modules

- Available in single channel (VES-6801) and dual channel (VES-6801-2) models
- Storage for two 8-bit or single 10-bit images per channel
- Four serial digital 270Mb/s outputs, all with embedded EDH
- Analog reference input (black or sync) provides genlock capability
- Infinite phasing relative to reference, s/w controlled V and H adjust
- Supports both 525- and 625-line standards, and can accommodate slides of both standards on a single module
- Card edge controls for timing and slide selection
- GPI input (contact closure) for slide selection
- Fully compatible with complete set of Logo Graphics Utilities (LogoWIN and LogoDOS)
- Front PCB-mounted DB-9 serial port for image downloading. RS232 also available on two BNCs

DSK-6801-2

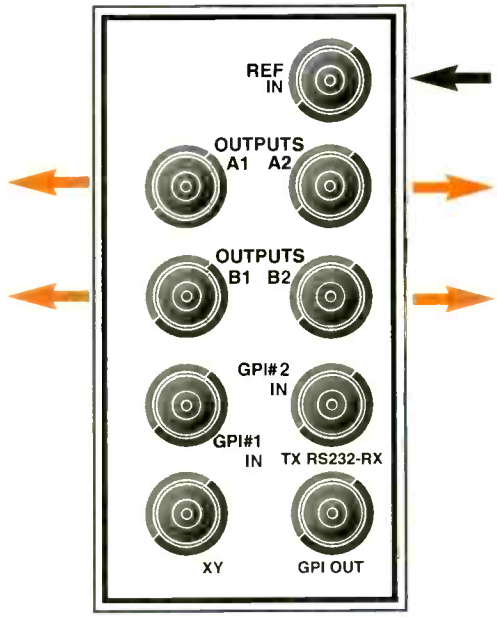
# Component Serial FLASH Slide Modules

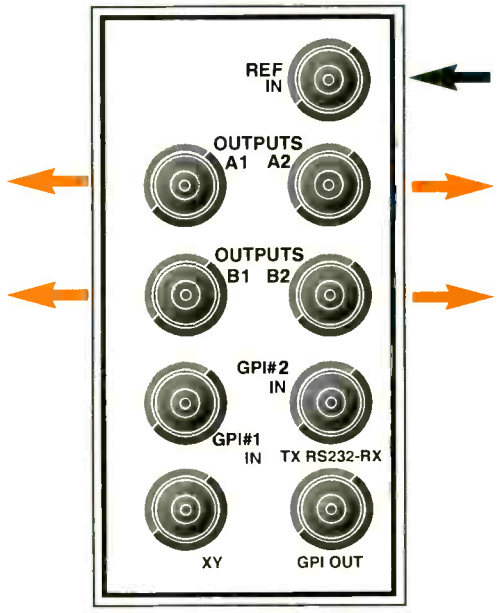
- Available in single channel (VES-6801) and dual channel (VES-6801-2) models
- Storage for two 8-bit or single 10-bit images per channel
- Four serial digital 270Mb/s outputs, all with embedded EDH
- Analog reference input (black or sync) provides genlock capability
- Infinite phasing relative to reference, s/w controlled V and H adjust
- Supports both 525- and 625-line standards, and can accommodate slides of both standards on a single module
- Card edge controls for timing and slide selection
- GPI input (contact closure) for slide selection
- Fully compatible with complete set of Logo Graphics Utilities (LogoWIN and LogoDOS)
- Front PCB-mounted DB-9 serial port for image downloading. RS232 also available on two BNCs

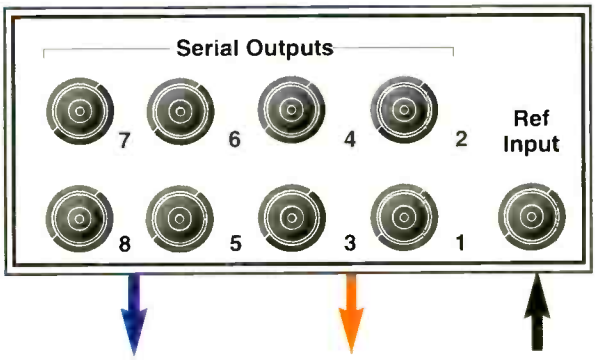
VTG-6801-1

# 4:2:2 Serial Test Signal Generator/Inserter

- Up to 32 selectable 4:2:2 digital test signals (10 bit)
- Compact module can house 4 in 1RU or 10 in 2RU
- 8 serial outputs
- Optional embedded digital audio (AES/EBU) test signals
- Optional embedded EDH check words in test signal
- 4:3, 270Mb/s interlaced
- Free run or genlock operation
- Infinite timing range


REF IN
OUTPUTS A1 A2
OUTPUTS B1 B2
GPI#2 IN
GPI#1 IN
TX RS232-RX
XY
GPI OUT


REF IN
OUTPUTS A1 A2
OUTPUTS B1 B2
GPI#2 IN
GPI#1 IN
TX RS232-RX
XY
GPI OUT


Serial Outputs
7
6
4
2
Ref Input
8
5
3
1

6800
7000

DAR-6880

## AES/EBU Digital Audio Reference and Test Generator

- Locks to video or AES audio
- Auto detects PAL/NTSC
- Provides 8 digital audio reference signal (DARS) outputs:
  - 5 DARS outputs with card edge selection of tone or silence
  - 3 dedicated DARS outputs (1-tone, 1-silence, 1-word clock)
- Generates self clocking AES grade-2 reference at loss of sync or in free-run mode
- Versatile DARS tone signal
- Output level adjustable from 0 to 31 dBFS in 1dB increments

VFS-6801

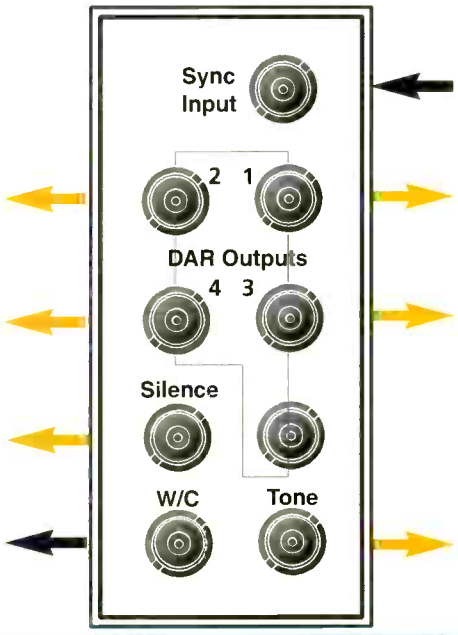
## Frame Synchronizer

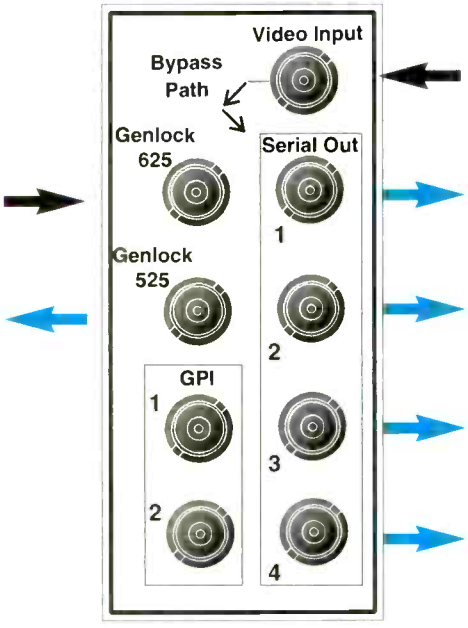
- For 6800 series frames
- Full featured 10 bit serial 4:2:2 frame synchronizer
- Removes low frequency jitter from 270Mb/s video
- Infinite phasing relative to reference
- Passes all ancillary data including embedded audio and EDH

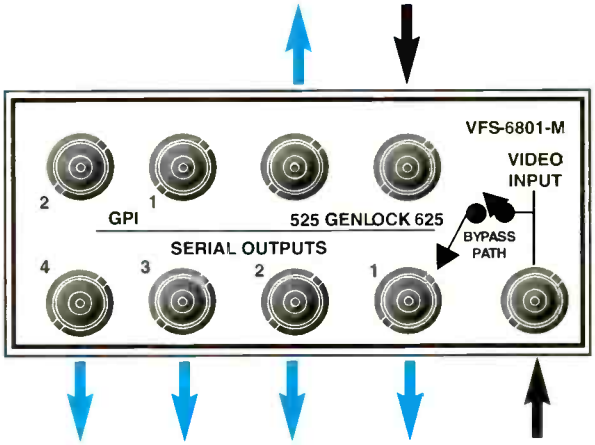
VFS-6801-M

## Frame Synchronizer

- For 7000 series frames and MIXBOX
- Full featured 10 bit serial 4:2:2 frame synchronizer
- Removes low frequency jitter from 270Mb/s video
- Infinite phasing relative to reference
- Passes all ancillary data including embedded audio and EDH


Sync
Input
2
1
DAR Outputs
4
3
Silence
W/C
Tone


Video Input
Bypass
Path
Genlock
625
Serial Out
1
Genlock
525
2
GPI
1
3
2
4


VFS-6801-M
VIDEO
INPUT
2
1
GPI
525 GENLOCK 625
BYPASS
PATH
SERIAL OUTPUTS
4
3
2
1

6800
7000

VSR-4041

# 4x1 Serial Digital Router Module

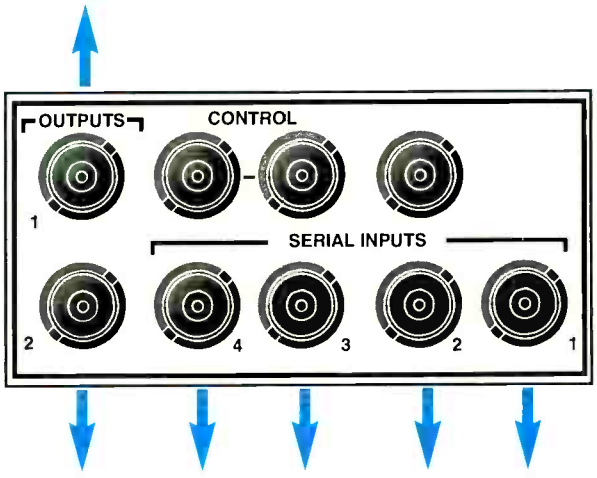
- 4x1 serial digital video router module
- Digital component or composite video
- Two reclocked serial outputs
- Local and/or remote operation

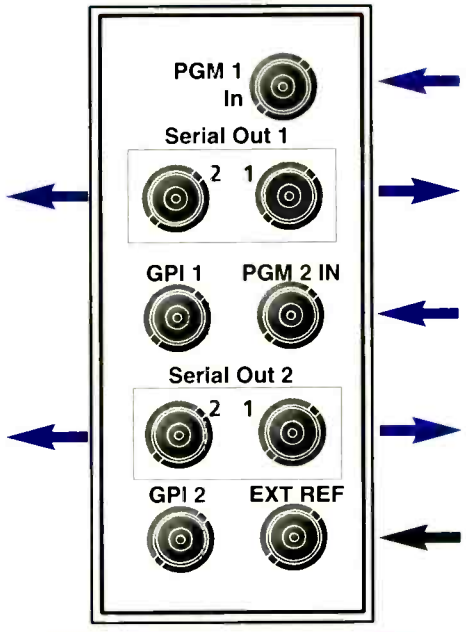
VTS-6801

# Video Timer Switcher

- Line delay / synchronizer
- Back-up SDI video switch
- 2 serial digital inputs
- Re-timing to an external analog reference or a digital input
- GPI control for video switching
- Horizontal phase adjustment
- Dual delay line mode
- Auto-changeover feature provides hot-switch capability

# MORE FEATURES ANL



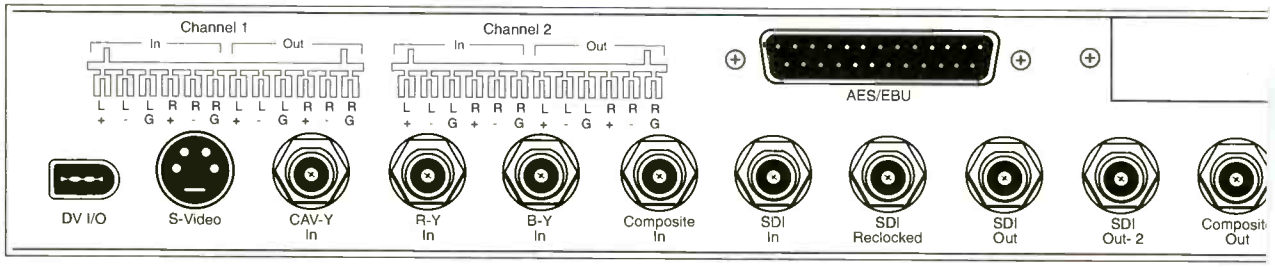




# FUNCTIONS TO COME...

# DPS 575 Digital Processing Synchronizer

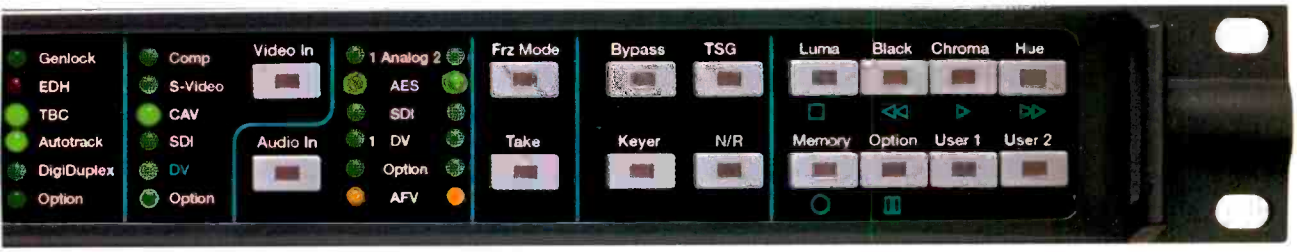

DPS-575

- *AV Synchronizer*
- *Audio Embedder/ De-Embedder*
- *Bi-Directional Analog/ Digital Transcoder*
- *Auto Switch Time Base Corrector*
- *Graphics Framestore*
- *Linear Keyer*
- *Video AGC*
- *VITS Inserter*
- *Video Test Signal Generator*
- *Audio Test Signal Generator*
- *Animated Logo Inserter Option*
- *Digital Noise Reduction and Digital Bandwidth Filtering Option*
- *Audio Limiter Option*
- *DV (IEEE 1394) Transcoder Option*
- *Built-in HTTP Server for Web-Browser Control*
- *Choice of Local or Remote Control Panel Options*
- *CCS Control (Early 2003)*



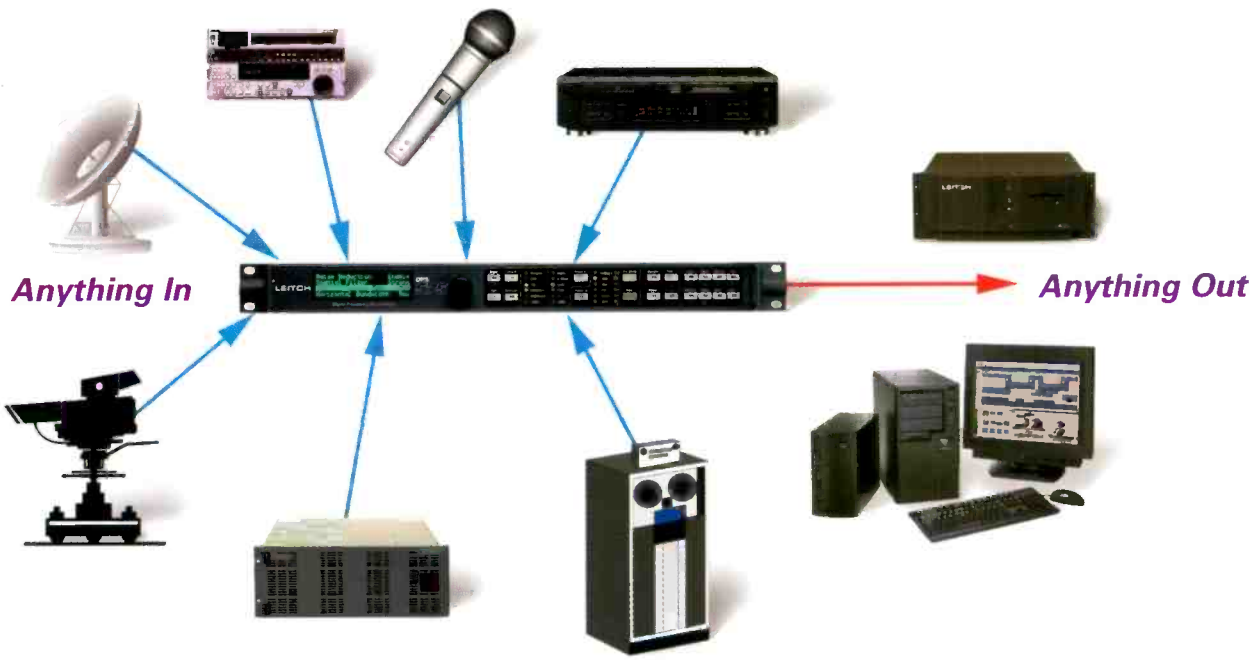

*Four video input and output formats are standard: Composite Video, Serial Digital Video (SDI), Component Analog Video (Betacam) and Y/C (S-VHS/Hi-8). A separate RGB output supports sync on green or RGBS*

# "ALL-IN-ONE" SYSTEM



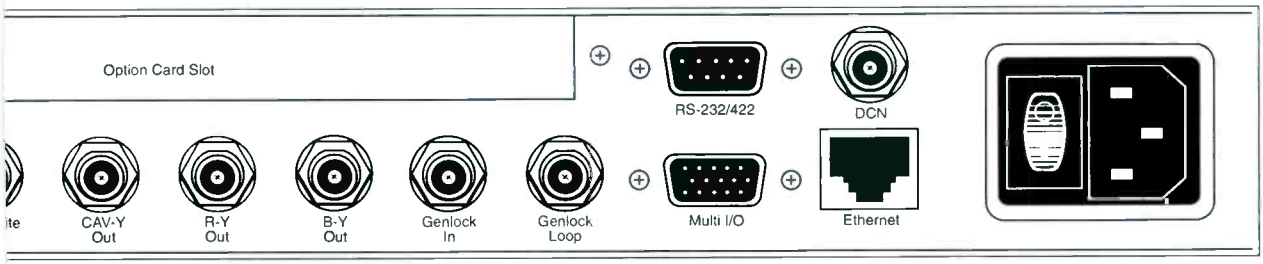

## Applications Facility-Wide

Offering maximum functionality and flexibility in a single unit of rack space, the DPS-575 Digital Processing Synchronizer is equally suited for use in analog, digital or hybrid facilities. Fully capable of bridging analog video signals (such as satellite and microwave feeds) to digital facilities, these dexterous devices are the ideal choice for broadcasters beginning the transition to digital.




## Applications Worldwide

The DPS-575 is available in either video only or audio/video configurations and is an auto-sensing, dual-standard (PAL/NTSC) device.




*modes and is ideal for driving video projectors. The RGB output can also be configured to provide an additional composite video output.*

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