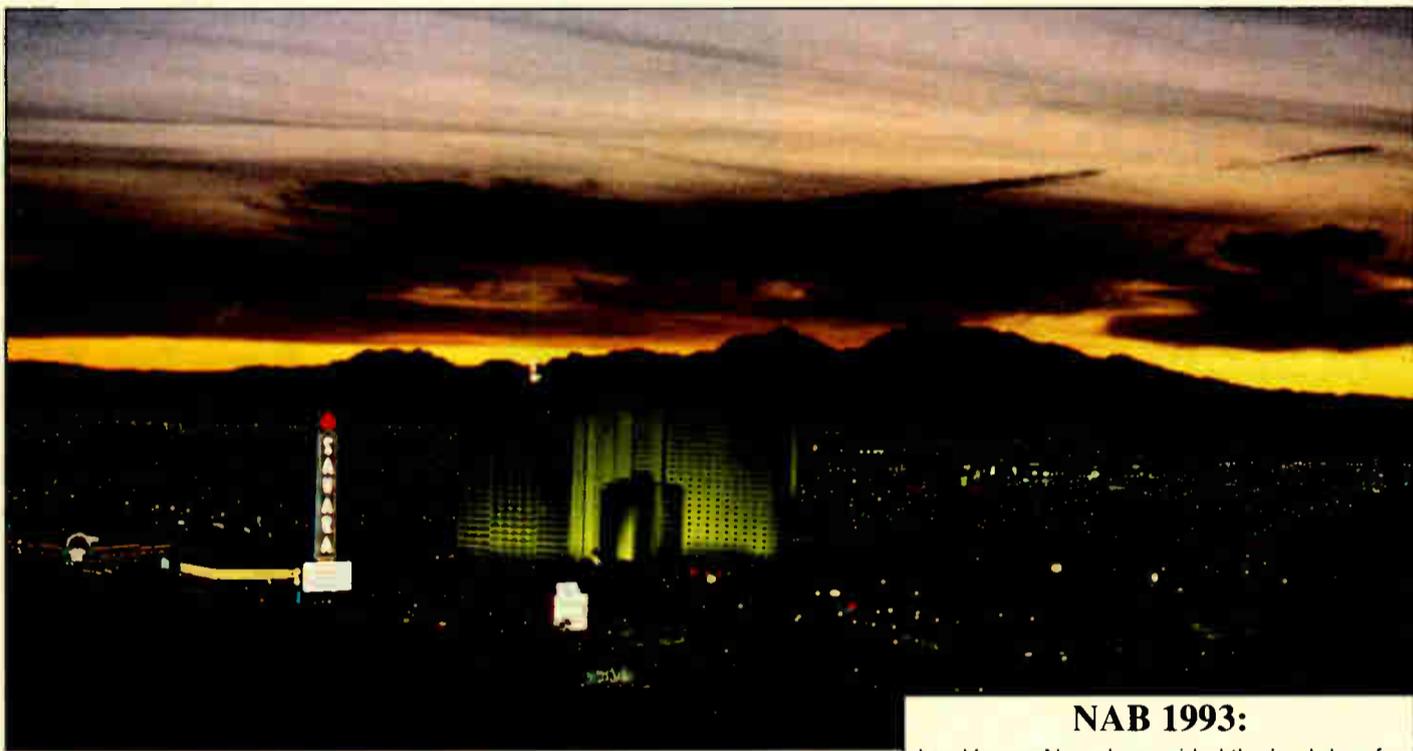


# TV TECHNOLOGY™

International Edition

Buyers Guide:  
Antennas & RF Equipment  
See page 15

## Industry Pace Picks Up at NAB



by Arthur Cole

**LAS VEGAS, Nevada** A record crowd sparked by strong international attendance and an overwhelming perception that the U.S. broadcast industry is pulling out of an economic slump helped make the 1993 National Association of Broadcasters convention, 19-22 April, one of the most successful ever.

Attendance, as of 20 April (the second day, on which registration figures are compared year-to-year), hit 64,510, a 22 percent increase over last year's record of 52,704.

### Overseas invasion

International attendance continued its upward swing, hitting 11,523, a jump of 33 percent over last year's 8,651. International attendance made up about 18 percent of the total.

The strong sense of an economic recovery was evident from comments across the industry, from the presidents of leading manufacturers to engineers and operators of local stations.

"Clearly, the industry is gearing up for tremendous growth," said Charles Steinberg, president of Sony Business and Professional Group. "March was the best month in Sony's history."

While show attendees tended to be a little more cautious in their optimism, the feeling was that the industry has turned a corner.

"I think it's picking up again," said Bill Hartness, manager of

Editech Post Production, Omaha, Nebraska. "I'm sure some of it is hype, but things are looking pretty good."

The association's continued interest in drawing attendees from overseas was evident by the presentation of a number of European HDTV-related sessions.

Dr. Ulrich H. Reimers, of the Technical University of Braunschweig, Germany, presented the status of the European Launching Group's attempt to mount a terrestrial digital HDTV service. Although in its infancy, the group has determined that a multi-layered system capable of delivery by cable, satellite and over the air is preferred. It should also be compatible with stationary and fixed antennas.

Also available was a discussion of the HD-DIVINE project, a European terrestrial digital system announced last year.

Satellite delivery of HDTV signals was also touted by Mario Cominetti, of Italy's RAI network, who proposed a plan to deliver HDTV at 12 GHz without having to alter international treaties.

From the Far East, major manufacturers such as Sony and Matsushita rolled out their latest digital advances, namely new component digital tape formats.

(continued on page 7)

### NAB 1993:

Las Vegas, Nevada provided the backdrop for a convention at the forefront of technology.  
See page 8 for exhibit coverage.

## Sydney's Jtec Invests In Copper ADSL

Part Two

by Phil Muscatello

**SYDNEY, Australia** As readers may recall from my report last month, Australian pay-TV legislation is in a shambles. It is lucky then that technological innovation marches ahead, leaving the legislators behind in their horses and buggies.

Sydney company Jtec has been licensed to incorporate AT&T Paradyne's transmission technology into a system which will allow telephone companies to deliver new high speed services over existing copper wires.

### Committed to ISDN

Australia is in a unique position to develop this new technology. Telecom Australia has made a major commitment to an Integrated Services Digital Network (ISDN).

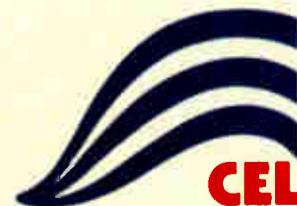
Traditional twisted pair phone lines can carry 9.6 Kbps. ISDN has increased that to 144 Kbps. Asymmetric Digital Subscriber Line (ADSL) takes this capacity to 2 Mbps and beyond.

This latter technology developed by AT&T Paradyne is carrierless amplitude and phase (CAP) transmission. CAP is a bandwidth efficient two-dimensional line code that is closely related to quadrature amplitude modulation (QAM) line code. It is simpler to implement digitally on DSP or VLSI chips.

Jtec was chosen as a licensee because of its experience with ISDN. The main aim is to shrink the black box home transceiver to a commercially viable size and to concentrate on working with the PAL

(continued on page 2)

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## BUSINESS

## Pesa Tapped for Televisa Transmitter Installation

**MEXICO CITY** The new Mexican Televisa network recently signed several major contracts.

Pesa Electronica S.A. has been awarded a US\$50 million contract to provide 67 television transmitters to the network.

Design and installation is expected to be completed in June 1994, although the first transmitters are expected to be on the air up to a year earlier.

The transmitters will be all solid-state and will range from 2 kW to 60 kW. The numerous configurations include dual drive systems up to 30 kW and parallel operating

systems at the 40 kW and 60 kW levels.

Of the total order, 33 transmitters will be VHF at 2 to 30 kW, and 34 will be UHF at 2 to 60 kW. The contract also provides for test and monitoring gear, coaxial switching systems, dummy loads and waveguides.

Towers and antennas are to be obtained elsewhere.

"We believe the high power, 60 kW UHF all solid-state transmitter is a first in the industry," said Peter Lance, vice chairman of Pesa's U.S. operations. "Now that we have transmitters in Mexico...perhaps it is time we looked north."

Meanwhile, BTS Broadcast Television Systems has begun to deliver on a US\$80 million equipment purchase.

In its bid to become the world's first all-digital mass media organization, Televisa has called on BTS and a number of other high profile manufacturers to supply all of

the necessary equipment.

BTS will supply Televisa with all studio and routing switchers for the project, including more than 10 Venus model serial digital routers. The company also will supply more than 120 LDK 9SR studio cameras and LDK 91SR CCD studio/EFP cameras, as well as three DCR-500 D-1 component digital video recorders and other peripheral digital equipment.

BTS's additional function is to be the network's prime contractor, through which more than 140 vendors will supply serial digital and/or serial digital-compatible equipment.

Other high profile contributors to the project include Panasonic, Barco, Canon, Chyron, Colortran, the Grass Valley Group, Philips, Sennheiser, Sony, Tektronix and Vinten.

Televisa has adopted Panasonic's D-3 dig-

ital composite format videotape recorder as its primary VTR format. The VTRs will be supplied by BTS under its new global systems integration agreement with Matsushita Electric Corp. of Osaka, Japan.

## Avid Technology Acquires DiVA

**BOSTON, Massachusetts** Avid Technology has acquired DiVA (Digital Video Applications Corp.) for an undisclosed sum in a move apparently aimed at bringing Avid closer to the consumer, education and office markets.

Founded in 1990, DiVA has built a sizable market in the prosumer and educational fields. Its VideoShop 1.0 allows Macintosh users to create digital Quicktime movies, and the company is currently developing an entry-level editor, as well as tool kits and Version 2.0 of VideoShop.

Under the agreement, DiVA will become a wholly-owned subsidiary of Avid and will continue to operate out of its Cambridge, Massachusetts facility using its existing management, distribution channels and strategic relationships. Products will continue to be marketed under the DiVA name.

## Jtec Looks to Copper ADSL

(continued from page 1)

television standard and the CCITT telecommunication standard. Jtec hopes to export these products to countries with these systems.

### No TV-telco regulations

In Australia, there are no existing regulations for the delivery of pay-TV via telephone lines (yet). Telecom Australia has called for expressions of interest from providers of such technology. If legislators can see past short-term political gains, companies like Jtec will take Australia's manufacturing industries into the 21st century. This is because the great advantage of ADSL is that it does not require a huge capital investment in changing over to optic fibers.

The services provided by telephone companies will only be limited by the imaginations of the software providers. Imagine being able to dial up a movie and to be billed for the time that you have used, or being able to access the best surgeon from a particular specialization.

The obvious losers in this new scenario are the current free-to-air TV owners. Major sporting event organizers need not sell their television rights. They can provide that service themselves on a pay-per-view basis.

John Riedl, the executive chairman of Jtec, sees great export opportunities for ADSL. He says that even though it is transition technology before the advent of optic fibers, there is still a huge investment in copper wires which will be with us for a number of years.

Australia is a world leader in ISDN technology. Jtec is now taking that challenge to build on this comparative advantage and develop an exciting new product that has the potential to change the way we think about the media and information technology.

*Phil Muscatello is co-owner of Really, Really Big Productions in Surry Hills, Sydney, Australia.*



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# STAR-TV Opts for Serial Digital

Part Two

by Morris Lee

**HONG KONG** It started as an ordinary night shift in the master control room of STAR-TV in Hong Kong. Then, again, nothing about STAR-TV is ordinary. To recap last month's article, STAR-TV (Satellite Television Asia Region) went, in just a few months, from six people with a dream to a media giant producing and programming five different advertiser-supported television services and transmitting all of them, in both NTSC and PAL, to a potential audience of roughly three billion people, using a satellite that had been sent from earth to space twice.

In STAR-TV's master control room, on the ground floor of an industrial building near the Hong Kong Harbour in Hung-hom (HH), 45 monitors displayed all outgoing feeds, heading towards the earth station teleport facility some distance away in a typhoon-sheltered nature preserve at Clearwater Bay (CWB), as well as return signals from the satellite. On this particular shift, the monitors indicating satellite returns began to go blank.

## Strange occurrences

This was not the first time strange things occurred at night at STAR-TV. A few weeks after broadcasting began, the late-night shift operator in the control room of MTV-Asia music television, one of the programming services, heard what

Phil Braden, STAR-TV's vice president of broadcast operations & engineering, characterized as "a loud WHUMPTHUD-CRASHTINKLE."

STAR-TV operates one of the world's largest and busiest robotic tape playback facilities, and, in this case, in one of the library management systems (LMS), "the entire elevator assembly had fallen off the elevator arm and hit the deck, causing an awful mess," according to Braden.

Fortunately, another LMS was available to carry the load, and no programming was lost, thanks, in part, to STAR-TV's policy of efficiently used personnel. The complete operation, from studio camera operators to electronic graphics artists to tape loaders to master control operators, is run, 24 hours a day, by just 160 people, carefully selected by broadcast operations manager John Fernandez after reviewing roughly 10,000 resumes and conducting 900 interviews.

Instead of merely killing time waiting for computers (or their remote-controlled elevators) to crash, STAR-TV's operators are almost constantly performing tasks. The theory is that their busyness helps keep them alert, and the theory seems to work in practice.

On the shift when the monitors began to go blank, there was no loud noise to alert the operator. Nevertheless, it was only a few seconds before a call to the satellite facility certified that all was well there. STAR-TV's original production and origination center, at HH, is connected to the transmission center, at CWB, by fiber-optic links supplied by Hongkong Telecom, a mixture of FM and mildly-compressed digital video. Since there did not appear to be any problem with the transmission equipment, the operators switched to a different fiber, and all was well—until the next monitor went blank.

## A fiber diet

Again, there was a quick call to ascertain that all was well, and, again, a different fiber was selected. The next day,

Hongkong Telecom found that there was, indeed, a fiber problem. A famished (or vandalous) rat had chewed through the armored fiber optic cable and was proceeding to floss its teeth on the hair-thin glass fibers within. Fortunately, it did not manage to snap enough fibers to knock any service off the air, but it sent a clear message about the vulnerability of a sin-

*Even before joining STAR-TV, Braden was convinced that serial digital interconnection at 270 Mbps was the way to go.*

gle path from HH to CWB (and Hongkong Telecom had no redundant path available).

## The plan

In fact, it had always been the plan for STAR-TV's origination facilities to be co-located at CWB with the transmission facilities. Unlike the cramped space at HH, the CWB building was constructed specifically for STAR-TV, including two large, floating production studios. Unfortunately, it was not completed in time for the initiation of broadcasting in 1991.

For that matter, when broadcasting began, the equipment planned to be used in STAR-TV's technical operations also did not exist.

Even before joining STAR-TV, Braden was convinced that serial digital interconnection at 270 Mbps was the way to go. It would be an international standard. It would be capable of handling 10-bit signals uncompressed. It could be used for both 4:3 normal aspect ratio pictures and 16:9 widescreen. With mild compression, it could be used for HDTV. And it would carry component digital signals through a single cable and a single routing matrix crosspoint.

That last characteristic was of critical importance to STAR-TV. Since all of its

programming is transmitted both in NTSC and in PAL, the use of either form of composite encoding prior to transmission would necessitate decoding and re-encoding (as well as standards conversion) for the other system. By remaining digital component from start to finish, the necessary conversion could be as gentle as possible.

## Digital Betacam delivered

Today, of course, serial digital equipment is widely available. In fact, STAR-TV started taking delivery in May of Sony's first large order of Digital Beta-

cam equipment—60 VTRs—to be used to add subscription channels to the current advertiser-supported offering. Back at the beginning of 1991, however, there was no such thing as Digital Betacam; there wasn't even an analog Betacam deck with a serial digital interface available.

Braden and the senior design team, Tim Wight (who became STAR-TV's broadcast engineering manager) and James Snelling (who could end up designing the only Hong Kong facility to compare with STAR-TV if his employer, Wharf Cable, is given the territory's cable TV franchise), decided to go for serial digital interconnection anyway, hoping that the industry would catch up with them someday.

Each analog Betacam VTR was equipped with analog-to-digital converters and serializers prior to being fed into the serial digital matrix. Alpha Image provided the matrix, serializers, and A/D converters (and, where necessary, deserializers and D/A converters). Snell & Wilcox provided specially designed PAL encoders, accepting 270 Mbps digital inputs and providing analog PAL outputs. Standards conversion is also Snell & Wilcox's, and Braden is eagerly awaiting the phase correlation upgrade to the

(continued on page 4)

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## SHOW LISTINGS

Upcoming conventions, meetings and exhibitions:

### 1-5 October 1993 — International Broadcast '93

Jakarta, Indonesia. A broadcast-only exhibition to be held in Jakarta at the Kemayoran Exhibition Center. Exhibition planner is PT MultiMedia Promo.

### 18-21 August 1993 — KOBA '93

Seoul, Korea. The 1993 Korea International Broadcast & Audio Equipment Show will be held at Koex Center in Seoul. Organizers are The Hankook Ilbo, The Seoul Kyungje and The Korean Broadcast Engineers & Technicians Association. For more information contact The Hankook Ilbo at +82-2-738-1048.

### 10-14 October 1993 — VISION '93

Olympia, U.K. A new broadcast, film and video equipment show for the U.K., VISION '93 is the result of a collaboration between the IABM, the BKSTS, Single Market Events and Philbeach Events. For information contact Orlando Kimer: +44-71-830-8447/8.

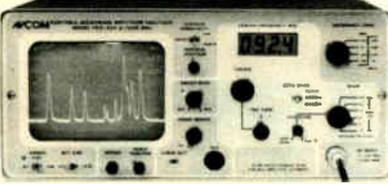
### 18-20 October 1993 — European Cable Communications '93

London, England. Following the success of the 1992 show, the Cable Television Association is expanding the size of the 1993 show. To be held at Olympia 2, London. For more information contact Sharon Chapman, Manager ECC '93, The Cable Television Association, 5th Floor Artillery House, Artillery Row, London, SW1P 1RT, England. Telephone: +44-71-222-2900; FAX: +44-71-799-1471.

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# STAR-TV: Planning Ahead of Technology

(continued from page 3)  
Alchemist models.

In its early days, STAR-TV sometimes received European soccer games via a Prime Sports satellite feed from the U.S. Shot in PAL, the games would be standards converted to NTSC, fed to Hong Kong, decoded, standards converted to 625/50 component, passed through the system and, eventually, for the NTSC version of Prime Sports-Asia, reconverted and encoded to NTSC, a total of three standards conversions. Some viewers in PAL countries receiving AsiaSat's north (NTSC) beam might suffer yet another standards conversion prior to viewing. Braden managed to avoid the first two conversions by getting

PAL feeds sent to STAR-TV in their original standard, "but there are still some unavoidable multiple conversions," thus the critical need for motion-compensating standards converters.

## Committed to serial digital

The serial digital design philosophy has not changed. The move of origination facilities from HH to CWB (without losing any transmission time) and the addition of new subscription channels involves the alteration of only a few specifics from the original plans. Now that they are available, for example, Utah Scientific's MC601 master control switchers are replacing the original Grass

Valley 21CVs, and Braden plans to replace STAR-TV's 100 analog Betacam decks with Digital Betacam as they wear out. The first such newly equipped control room went on-line in April.

## Video compression pioneer

The change to Digital Betacam and serial digital master control switchers means STAR-TV's operation is now serial digital from the inside of the tape machines all the way to the inside of either the standards converters or the PAL encoders. The subscription service will be digital even farther: all the way to a viewer's set-top decoder (STAR-TV is a world pioneer in digital video compression technology). Since some production, graphics, and post production facilities remain in HH, that serial digital path now includes those tasty rat delicacies, the fiber optic connections between the sites.

The FM and compressed digital transmission systems that had been used were adequate for encoded NTSC and PAL signals

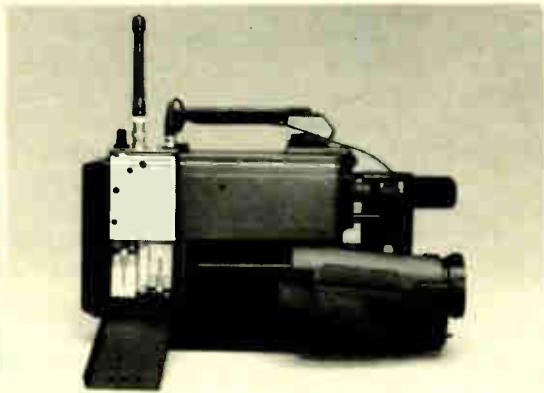
but not for pre-encoded serial digital component signals. Although there is no international telecommunications standard at 270 Mbps (the closest is the North American hierarchical 4th-level, 4.032 telephone calls carried in 274.176 Mbps), STAR-TV, after locating the necessary transmission equipment, convinced Hongkong Telecom to lease it 270 Mbps fiber optic service, probably the first such leased circuits anywhere in the world. Thus, the output of a post production suite can be fed, via the HH routing matrix, through the fiber circuits, and into the CWB matrix without ever leaving the serial digital domain.

And, even if the rats get very hungry, all they threaten are links between the production facilities and the origination facilities. Since the origination facilities are now co-located with the transmission facilities at CWB, no service will be knocked off the air no matter how many fibers snap, proving that serial digital video is not only more humane than rat poison but also provides better pictures.

## PRODUCTS & SERVICES SHOWCASE

For more information on the products shown below, circle the appropriate Reader Service No.(s) on the enclosed Subscription/Reader Service card or contact the advertiser directly.

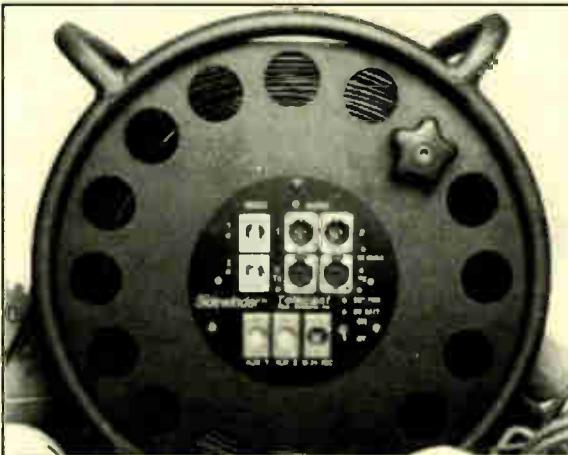
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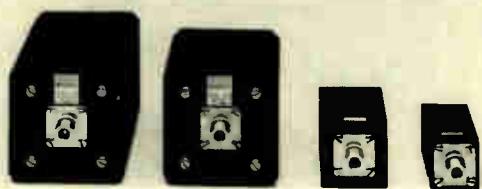
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# Global Harmony in Digital Television

by Nicholas Negroponte

In 1969, Japan did the wrong thing for the right reason. The country developed a next-generation television based on analog techniques, more or less scaling up TV as we knew it. Nevertheless, the motivation was correct: a new breed of television. Japan paid the price for being too early.

In 1986, Europe did the wrong thing for the wrong reason. It continued with an analog approach despite entering the process 17 years later. Motivation can only be attributed to protectionism, with technical justifications deteriorating rapidly and finally failing within less than seven years.

In 1990, America did the right thing (finally) but for the wrong reason. Recall that all of the U.S. proposals were analog until less than three years ago. When the U.S. adopted a digital approach, it did so with the continuing and faulty premise that resolution is the key issue in advanced television.

With all the benefits of hindsight, can the world now do the right thing for the right reason? Specifically, can we build a global, general purpose, digital television system for all transmission media—one that can grow and change over time? The right reason is the internationalization of one of today's most important communications media.

## Now or never

Like a celestial rarity, the stars of television research and development are suddenly lined up in near perfect order to create a global television system for the future. As little as six months ago,

Europe, Japan and the United States were vehemently determined to proceed in totally different and incompatible directions with regard to the next generation of TV. Then, in February 1993, the television landscape changed. But will we seize the opportunity to converge on a world standard, or will nationalism and short-term business interests divide us and ultimately eclipse this unique and golden opportunity?

Slowly, during the past few years, a realization and deep belief has grown that the next evolutionary step in television is being digital, a significant step that far overshadows issues like high definition and aspect ratio. It is also true that, when asked, many well-informed people will say they are advocates of a world standard. Even Mr. Timmer has called it "a dream."

At the same time, others—equally well-informed—will say it is utterly impossible to obtain world harmony in television because of the immense political interests. Let me remind you that the same kind of statements were made concerning both the Berlin Wall and the Iron Curtain.

## What is different today?

1. The EC has abandoned HD-MAC and all pretense that an interim analog system makes any sense whatsoever. Among oth-



er things, this allows a wide range of very excellent European technology to come out of the closet. Europe has been stubborn—but not stupid—and there are many pockets of digital excellence throughout the continent and within the U.K. In fact, Europe has many more sophisticated modulation techniques than does the United States.

2. Japan is acknowledging that Hi-Vision is obsolete, not just on the front page of newspapers but in most board rooms. Japan's NHK has the opportunity to downconvert existing MUSE signals to deliver broadcast quality NTSC to the home, to amortize its investment and to provide a wide audience with better picture quality during an interim period. Overall, Japan has made a strong commitment to digital recording and multimedia computers.

3. The United States finally recognized that none of the four systems proposed to the FCC were good enough. Basically, the FCC told all of them to go back to the drawing boards. Then, a few days later, the FCC urged a "Grand Alliance," speaking of international objectives and setting 1 April as a target date for doing so.

The "Grand Alliance," in my mind, is less important for reasons of combined qualities from each system and, perhaps more importantly, because Philips and Thomson are players in the FCC process. With Sony out of that particular race (at the moment), Philips and Thomson are the only participants in the current FCC line-up making global decisions.

Together, they employ approximately 16,000 workers in their television receiver

and TV-related facilities in Indiana, Tennessee and Ohio. They account for 33 percent of all U.S. color TV sales, according to the most recent market share survey by Television Digest. Even more encouraging for world harmony is an increasing emphasis on MPEG, the major international standards initiative, by satellite and some cable operators. This is to say that some players come to the table with a potentially international strategy as well as the means to implement it in Europe and the United States.

## With all the benefits of hindsight, can the world now do the right thing for the right reason?

Japan is not asleep, and Sony is actively lobbying in Washington. Japan is unique because, unlike the United States and Europe, Japan appears to have little national ego vested in the final specifications of digital television. Of all nations, they are prepared to be the least chauvinistic concerning TV.

So, globally we are on a somewhat straight course toward harmony. Locally, across transmission media, the stars are less aligned.

## Need to unbundle the problem

In terrestrial broadcast, everyone got off on the wrong foot when the shot was heard announcing the development of advanced television. First we were side tracked by high definition, later by aspect ratio. Part of the difficulty stems from a natural but erroneous belief that the issue at hand only concerns television, as we know it. However, it is not about the delivery of frames at a certain rate, resolution and aspect ratio. It is about radiating bits—which may or may not be frames and, when they are, should be at variable rates, resolutions and aspect ratio—sometimes in real time, sometimes not.

Even if we confine our thinking to run-of-the-mill television, we must separate image representation from signal delivery, if only to accommodate the multiple paths of image communications (via satellite, cable, twisted pair, package media and terrestrial broadcast).

For example, to make a special case for a compression scheme for terrestrial broadcast so it can accommodate signal attenuation guarantees an unnecessary schism between over-the-air and other communications channels. We must unbundle the solution, treating image representation separately from data communications. In the specific case of terrestrial transmission, for example, where there is sudden signal fall-off, solve the problem on the transmission side of the equation or, perhaps, design the system to use such fall-off as a feature in the sense of cellular television.

## Next steps

The single biggest step would be for the G7 to state loudly and clearly that the future of television is of major global, economic and cultural importance. This is crucial to remove an illusion that any one

country can set a de facto world standard, and to encourage companies to work together on the international landscape. I am sure that there are those at AT&T who believe their scheme can become another UNIX and those at General Instrument who wish theirs will become like MS-DOS. Forget it. This is bigger than any one company and more like the MPEG process.

Two additional smaller steps include:

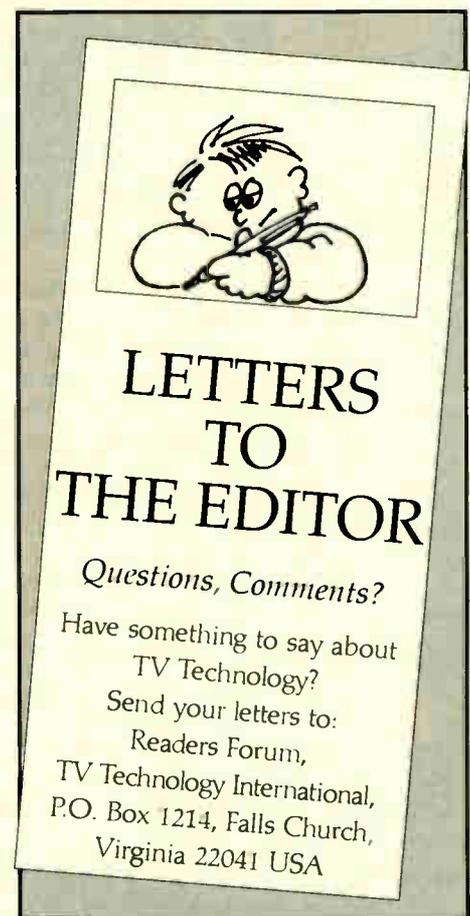
1. Expanding the FCC process to include a wider corporate mix, among it the likes

of IBM, Sony, HP, Apple and Hughes. This is important to gain, among other things, a stronger computer presence, thereby leading to a more sophisticated view of intelligence in the receiver.

2. Inducing MPEG to reinstate some of its earlier aspirations for systems that can grow and change. Concepts of extensibility, scalability and interoperability have been reduced to mere shadows by pressures from the cable industry to move fast and at the lowest possible chipset cost in today's dollars and volumes.

But of these actions, none is more important than your perseverance for world harmony. If enough people conclude it is important, then the fatalism which has made television technology recklessly nationalistic will be replaced by a larger common good for all populations of the world. Without your desire and belief this will not happen.

*Nicholas Negroponte is director of The Media Laboratory at the Massachusetts Institute of Technology in Cambridge, Massachusetts.*



## TV TECHNOLOGY

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# MARKETPLACE



### Signal level meter

Comex Worldwide Corp. (CWC) has a new MMDS operator's meter called MOM. It is a compact, synthesized tuned signal level meter, specially configured for MMDS applications. Power for the downconverter is provided by MOM. MOM is battery powered and housed in a molded, weather-resistant case.

For more information, contact CWC at +1-305-594-0850; FAX: +1-305-591-7298, or circle **Reader Service 32**.



### Digital video analyzer

Advanced Audio Visual Systems (AAVS) introduced the S310 All-Format Digital Video Analyzer, which can performance test and troubleshoot any digital video signal or system to ensure it conforms to all international standards. It can be left in the signal path to perform continuous, real time, on-line monitoring, and provides quantitative results. User selectable alarms provide instant warning of signal parameters failing to meet standards.

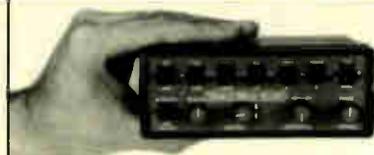
For more information, contact AAVS at +33-48-57-21-64; FAX: +33-48-57-33-58; or circle **Reader Service 91**.



### Camera microwave link

Multipoint Communications' TM1700 is a microwave link for ENG cameras. Key features include a manual or tracking base station; return vision, talk back and camera control, and multi-channel Tx/Rx capability from the camera battery. It rejects multipath and ghosting, and retains lock during fast movements. The link is available in 2.5, 10, 12 and 13 GHz frequency bands.

For more information, contact David Harper at +44-376-510881; FAX: +44-376-502233, or circle **Reader Service 25**.



### Portable scope

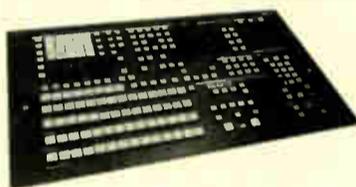
The Hamlet Micro Scope from Feral Industries is a 24-ounce, portable waveform and vector scope suited for ENG/EFP applications. It uses NiCad batteries or external 12 VDC, and is accurate within 1 percent, 1 degree. It displays individual or combined signals on any standard monitor, LCD or camera viewfinder. Waveform functions include H, 2H, H Mag, Chroma Pass, Low Pass filtering and flat, vertical and horizontal shift and gain magnification.

For more information, contact Feral at +1-913-831-1791; FAX: +1-913-831-3427, or circle **Reader Service 130**.

### Image sequence storage system

DVS' ISP500 is a solid state image sequence storage system with 10-bit video ADCs and DACs and a digital video color space processor with oversampling, digital filters and de-matrix to achieve optimum quality for Y, RGB and YUV color signals. It is equipped with multi-standard analog component video input and output devices. The ISP500 system kernel has up to 2GB RAM capacity and supports up to 450MB/s multitasking I/O capability.

For more information, contact DVS at +49-511-678070; FAX: +49-511-630070, or circle **Reader Service 65**.



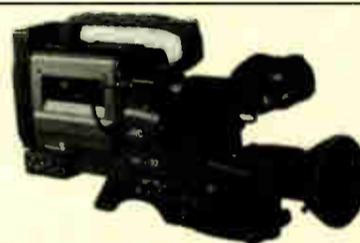
### Production switcher

BTS's "Diamond-digital" Series component digital production switcher consists of four switchers: the DD-5, DD-10, DD-20 and DD-30.

All models are constructed with ASIC technology to reduce the size and dimensions of the systems. All offer M/E architecture and use the "next-transition" mode.

The DD-20 and DD-30 offer a switchable M/E architecture-to-layering capability.

For more information, contact BTS at +49-6151-8080; FAX: +49-6151-894463, or circle **Reader Service 67**.



### Low-light camera

JVC introduced the KY-27U, a low-light 2/3-inch three-CCD high-resolution camera that can produce pictures in light as low as two lux with 100 percent video level.

The camera achieves a total of 30 dB gain with low noise and picture degradation by combining 24 dB of electrical gain with an additional 6 dB. It is designed with 360,000 pixels, with a microlens over each pixel.

For more information, contact JVC at +81-33-245-0810; FAX: +81-33-245-1402, or circle **Reader Service 29**.



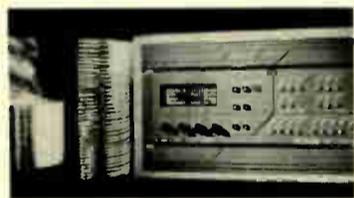
### Pan-and-tilt heads

Vinten introduced the new generation CLASSIC MK 7B pan-and-tilt head, while maintaining the 250-pound capacity of the MK 7.

The head's lubricated friction drag system has been upgraded, with one control knob for pan and one for tilt; both knobs are now on the same side of the head. For panning, drag has been increased by 75 percent.

The MK 7B also has a new "park" feature. When put in the park position, the cams are raised up, off the rollers, to help prevent premature wear to the rollers.

For more information, contact Vinten at +44-284-752121; FAX: +44-284-750560, or circle **Reader Service 15**.



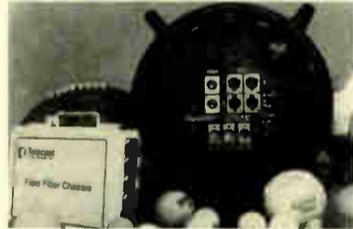
### HDTV upconverter

The new HD5100 HDTV upconverter from Snell & Wilcox was designed as a transition between conventional standards and high definition.

The HD5100 allows HDTV programmers to seamlessly incorporate low definition material into their productions without originating everything in HDTV.

Accepting 525 or 625 inputs in composite or component form, the unit provides HDTV outputs in both 1125/60 and 1250/50.

For further information, contact Joe Zaller at +44-705-268827; FAX: +44-705-241252, or circle **Reader Service 13**.

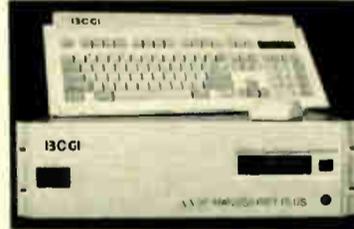


### Fiber optic 'snake'

Telecast Fiber Systems Inc., has added the Sidewinder XL to its family of "snake" fiber optic systems.

The Sidewinder XL replaces over half a ton of copper cabling with less than 40 pounds of fiber optic cable, according to the company. The XL version extends cable capacity to over 3,000 feet on one reel, and allows signals up to 30,000 feet without repeaters or equalizers.

For further information, contact Richard A. Cerny at +1-508-754-4858; FAX: +1-508-752-1520, or circle **Reader Service 109**.



### Character generators

The Brek Connor Group's AVS Graphics' Manuscript family of dedicated character generators offer features such as "AGT" fonts, instant resizing, transparency, anti-aliasing, motion and international languages.

The Manuscript SPEED subtling system uses any IBM PC-compatible for text preparation. The Manuscript Plus Grab & Paint option includes a 32-bit framestore and image editing package.

For further information, contact Randy Steele at +1-801-972-5900; FAX: +1-801-975-0970, or circle **Reader Service 68**.

### IFB transmitter

Swintek Enterprises' Model 2000D/CT IFB transmitter connects to a hard-wired intercom to provide wireless cueing to a talent receiver. Any inexpensive FM receiver covering the upper VHF television channels (7-13) can be used. The Model 2000D/RJ is a four-channel IFB transmitter that also includes a DTMF keypad allowing a director to make or take telephone calls.

For more information, contact Swintek at +1-408-727-4889; FAX: +1-408-727-3025, or circle **Reader Service 96**.

Send new product press releases along with black and white photographs to: Marketplace Editor, P.O. Box 1214, Falls Church, VA 22041.

# Video Industry Pace Picks Up at NAB

(continued from page 1)

Although news of Sony's Digital Betacam was released in Europe last year, this was the first time it was presented to the U.S. Matsushita, through its Panasonic subsidiary, unveiled its D-5 format, which records signals without compression.

Meanwhile, U.S.-based Ampex threw its support behind its own DCT component format, which it unveiled last year, and has picked up several followers in Australia and Europe.

NHK, the Japanese network, which first brought its technological showcase to NAB in 1991 but declined to attend last year, returned in 1993 with a number of upgrades. The network showed a 44-inch version of a prototype plasma display and offered a number of advances in high definition format conversion.

## Digital evolution

Digital technology in general also continued to evolve, from its start as a handful of digital machines designed for analog facilities to full end-to-end digital

*The . . . continued interest in drawing attendees from overseas was evident by the . . . number of European HDTV-related sessions.*

technology. The exhibit floor was filled with digital encoders, decoders, processors, switchers and everything else required to remain in digital form throughout the production and distribution process.

For those actively pursuing an all-digital facility, the NAB presented a session on designing a serial digital plant that examined the various options available. Discussed were such items as whether to embed audio in the video stream or keep it separate, as well as timing issues in digital switching and error measurement.

In addition to digital audio and video, the NAB presented a discussion on data broadcasting, including a demonstration area set up especially for the topic. Several companies presented plans for transmitting digital information on the vertical blanking interval, while one, WavePhore Inc. of Tempe, Arizona, highlighted its TTVI high-speed data product, which sends data directly with picture information.

At the fourth annual HDTV World portion of the show, designed to highlight the latest in high definition technology, the proponents of the four digital terrestrial transmission systems vying to become the U.S. standard continued to tout their systems to the public. A system was expected to be selected in February, however a new round of testing was scheduled instead. Still, the system proponents showed off new filtering and error-correction technologies.

Although HDTV World was smaller

than in past years, several manufacturers opted to show new HDTV equipment on the main floor, marking the continued acceptance of HDTV as a current technology, not something reserved for the future.

As for the NAB's newest section, Multimedia World, some of the top names in computer technology were present, including Silicon Graphics, IBM and Apple. Multimedia World is expected to become a regular feature at NAB as the popularity of computer-based video post production brings more users into the field.

The NAB's strong interest in multimedia and computer video was illustrated by its choice of keynote speaker, Apple President John Sculley, who gave his vision of the "information superhighway" and broadcasters' role in it.

All the digital technology on the main floor and at HDTV World and Multimedia World was not lost on the crowd. Of those interviewed at random by *TV Technology*, many said digital was the major trend of the industry.

"The industry is going digital, definitely," said Brian Nupnau, an engineer at Chicago's Sight and Sound. "I am

impressed with the compression technology even though the quality doesn't seem to be quite there yet. It's close; maybe in a year or two it will be ready."

"I'm seeing a lot of interesting items here, particularly in the areas of non-linear editing and DDRs," said George Csanin, director of engineering at KXAS-TV Fort Worth, Texas.

All in all, it appears the 1993 show was a milestone for the NAB as the record attendance, coupled with the evolution of digital technology and the improved business outlook, brought some life back into the industry.

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# The Solid State of Transmitters at NAB

by Roy Trumbull

LAS VEGAS, Nevada New transmitter products made their usual effort to advance the cause of television transmission at NAB '93.

Acrodyne has been promoting its ADAM—Advanced Digital Amplitude Modulation—in recent ads. A prototype was demonstrated at NAB. The concept is both simplistic and novel.

## Picture this

Picture a string of hybrids with the output of one feeding into the input of the next. The output of a Class C amplifier, which is gated off, is connected to each remaining input. The video goes through an A/D converter and each output drives a gallium arsenide switch, which controls one of the RF amplifiers. Each amplifier can be turned on to full output in 15 ns. Because of the nature of hybrid addition, the RF modulation produced retains the relative weight of the original analog signal.

Modulation produced from the first 7 bits of a 10-bit word does not amount to much. The bulk of the power is in the most significant 3 bits. For that reason, the lower order bits are D/A converted and applied to a conventional modulator. Only the top 3 bits are digitally modulated, yet that is enough to achieve a significant improvement in efficiency. Acrodyne has a number of patents on ADAM. At this time it is uncertain at what power level the first deliverable transmitter using the technique will operate.

Available immediately is the company's TR series of 5 kW to 30 kW tetrode-equipped transmitters. The units' Thomson tubes are specified to produce corrected intermod distortion of -54 dBv or better, while tetrode linearity minimizes output filtering.

In 1992, Harris Allied introduced a solid

state UHF transmitter. This year, PESA, Larcen and Thomson showed solid state UHF designs.

The PESA solid state transmitter was developed for a large project in Mexico for Televisa. A second television channel is being installed in 67 communities with powers ranging from 10 kW to 60 kW.

The technical write-up showed transmitter groupings to achieve the required power levels. Each amplifier group consists of eight modules to achieve 5 kW output. The amplifiers operate well below their rated output. In the rear, one switching supply is offered per two modules. The input drive can be disconnected from the front. All

## This year, PESA, Larcen and Thomson showed solid state UHF designs.

modules are built with isolators. There are adjustments for gain and phase on the front of each module, along with a diagnostic connector. The combining of the two 5 kW cabinets is accomplished by an external combiner from MCI, which also provides all external filters.

## Bipolar transistors

The Larcen transmitter is a 10 kW model using bipolar transistors. Each module is capable of 1 kW and has its own self-contained switching power supply. While most of us cringe at switching supplies, Larcen designed its own from scratch to meet the demands of the module. The company also hedged its bets, for while the present module runs at 28 V, the supply is capable of higher voltages if future devices require them.

The modules themselves are pretty

This year's NAB focused heavily on new digital technology.



beefy, but offer a built-in test connector to which a portable flat panel diagnostic unit connects to give you all the vital signs. While the module is out, a mechanical damper drops into place to seal off the air flow so that the cooling of the other modules is not diminished.

The smallest sub-unit is a board containing two bipolar devices and biasing controls. This is removed when parts replacement is necessary. Bipolar amps require matching devices, so while field replacements are certainly possible, they are not quite as easy as changing FETs in the Larcen VHF transmitters.

In the base of each 5 kW cabinet are two blowers. Should one fail, there is an automatic power cutback so that the amplifiers can operate well within their limits with the reduced airflow. The combining of the five modules per side takes place via a form of ring combiner.

## Third generation

Comark introduced the third generation of its IOT transmitter, the IOX line. Features of the inductive output transmitter series include Class A solid-state drives, new modulator-exciter with broadband linearity correction, including patented aural carrier correction, opto-isolated C-MOS control logic, positive pressure cabinet cooling, internal AC distribution and switching, flexible HVPS config-

urations, international safety standard compliance and tube protection circuitry.

The IOX line is offered in all common UHF power levels, starting at 15 kW. It is fully D-HDTV compatible and the extensive use of common amplification technology guarantees that the IOX meets the requirement for dual use service.

Also showing an IOT transmitter was Harris-Allied, which introduced its Sigma series at power levels from 15 kW to 240 kW. The Sigma series provides full RF redundancy, IPA headroom and the ability to make field upgrades to increase power.

Harris also introduced new solid state VHF transmitters in its Platinum series. The HT EL units are available in 500-, 1,000- and 2,000 watt versions and include a combination visual/aural exciter and visual/aural power amp module housed in a single cabinet.

The air-cooled units use four identical FET (Field Effect Transistor) amplifiers that provide 1,000 watts peak visual or average aural power.

Television Technology Corp. (TTC) also introduced a line of IOT transmitters, the HDR series. The units range from 10 kW to 360 kW using TTC's new XLS-5 exciter/upconverter.

Meanwhile, the Thomson UHF solid state transmitter has the finished look of a product made to be delivered to the customer. Modules are grouped in sets of eight to produce 5 kW. Each module is rated at 1,100 W, so they were being run very conservatively. Each module has a diagnostic jack. For an average APL picture, the required input power for the 10 kW model was stated as 32 kW. This transmitter is already in service in Europe.

Those trying to keep an old transmitter alive should note that ITS has an amplifier rated at 500 W, the Model 365B. Two amps plus a hybrid would be enough to replace the IPA stage in a low band RCA F line.

And speaking of tubes, let me introduce Svetlana of St. Petersburg, Russia. The name means light, based on the company's original 1913 product—light bulbs. Today it is the maker of many premium-quality power tubes. Its American marketing venture is headquartered in Huntsville, Alabama. Vice President and Director of Marketing George Badger has more than 25 years experience in the industry, much of it with EIMAC. He will attempt to introduce some tube types widely used in Russia, as well as a number of familiar tube types to fill out the product line. Svetlana employs 3,000 in its development and manufacture of vacuum tubes. Other divisions employ an additional 27,000.

Roy Trumbull is ACE of KRON-TV in San Francisco, California, and is a frequent contributor to TV Technology. The opinions expressed above are the author's.

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# Cameras Address the Shooter's Needs

by Craig Johnston

**LAS VEGAS, Nevada** Having begun in this business as a news photographer, I know the feeling among news shooters is that they get no respect. At the 1993 NAB, however, some equipment manufacturers proved they have been listening to the news photographers.

Two camera makers rolled out super-sensitive field cameras. JVC's KY-27 is capable of boosting camera sensitivity a full 30 dB.

In a revolutionary change from the standard technique, the KY-27's first 24 dB of gain is not added in lump quantities of 6

or 9 dB at a time, but instead is fed automatically in 256 steps. This way, the cameraman uses the minimum amount of boost to get the picture and adds the least amount of noise as well.

The final 6 dB of gain is added through what is called an additional horizontal pixel readout system, which adds no noise but slightly decreases resolution. An auto white tracking system continues to white balance the camera as lighting conditions change.

Another feature on the KY-27 is the extended electrical iris, which allows the photographer to lock an iris setting while the camera automatically adjusts the shutter to adjust exposure. This feature, simi-

lar to the shutter priority function on high-end 35mm SLR cameras, will be of particular interest to EFP shooters who want to control depth of field without employing neutral density filters.

JVC's KY-27 is a three-CCD dockable camera head yielding 750 lines of horizontal resolution.

Hitachi showed the Z-ONE-C, capable of boosting sensitivity a total of 36 dB. The increases in sensitivity are added in 3 or 6 dB increments up to 24 dB. The final 12 dB is achieved through an extended sensitivity feature of the CCDs, which adds no noise but causes a slight decrease in resolution.

The Z-ONE-B also features Lock Scan, which adjusts the shutter speed to match computer monitors of various scan rates.

Hitachi also introduced the SK-F38, a 600,000-pixel FIT CCD camera yielding 900 lines of vertical resolution. The dockable portable camera has an enhanced resolution feature that brings vertical resolution to 450 lines.

## Improving skin tone

A skin tone detail function allows video control to reduce detail in the skin tone of a particular anchor talent, removing the on-screen "undesirable" effects of age.

Sony's two camera introductions are more affordable versions of its top-of-the-line BVP series equipment. The BVP-370A studio camera has all the features of the BVP-375, except for the imager. The BVP-370 yields 700 lines of horizontal resolution.

Among the features from the higher-end camera are an Enhanced Vertical Definition System bringing 450 lines of vertical resolution, and advanced triax transmission.

Similarly, the BVP-70 portable camera has all the features of Sony's BVP-90 except the imager. It, too, yields 700 lines of horizontal resolution.

The camera, which can be used as a stand-alone camera or docked with a recorder, exhibits 450 lines of vertical resolution and has a variable shutter rate to facilitate shooting computer monitors.

Also from Sony was the DXC-537A, a new version of the dockable DXC-537 three-CCD camera. Sony reports that a new optical filter system allows an increase in resolution to 750 horizontal lines while simultaneously reducing aliasing and stepping along diagonal edges.

## Two camera makers rolled out super-sensitive field cameras.

Amplex introduced the CVC-70, which is assembled from Sony parts and is identical to the BVP-70.

## A digital portable model

Ikegami premiered its HL-57 10-bit digital portable camera. The high performance FIT CCDs achieve 750 lines of horizontal resolution, and a Super V feature allows vertical resolution ranging from 400 to 480 lines, while minimizing loss of sensitivity.

In the HL-57, Ikegami has added a number of features dealing with the detail circuits. Among them is the previously described ability to reduce the detail in skin tones. Additionally, the camera generates diagonal detail edging, has the ability to slim by half the detail edge without changing the detail boost, and has a soft-detail feature that more closely duplicates the "film look."

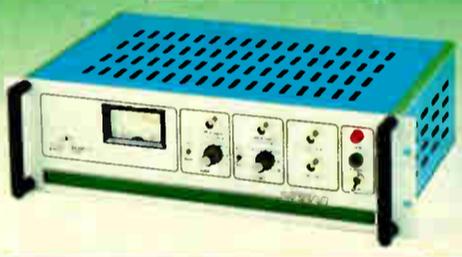
The camera also comes with continuous variable shutter speed, which can be adjusted from 1/30.5 to 1/1350 seconds to match a wide range of computer monitor screen rates. Another handy feature is the electronic horizontal level indicator built right into the rear of the camera (in the event you have broken the bubble level on

# LINEAR

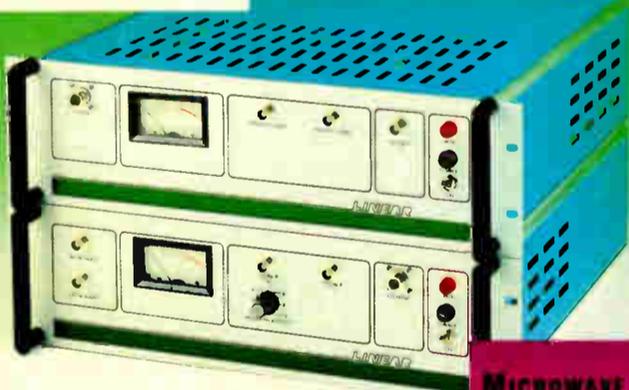
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100 W  
AMV

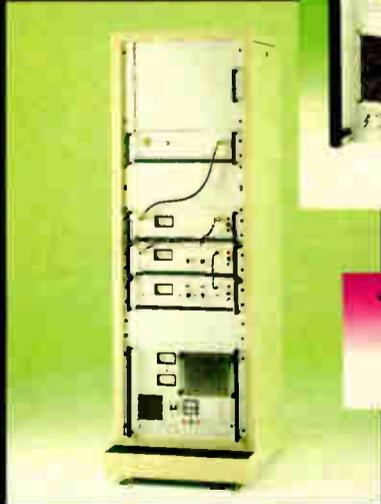


MICROWAVE LINK  
TX  
MICROWAVE LINK  
RX

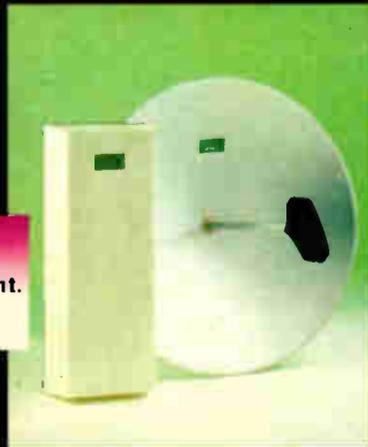
TV AMPLIFIER  
200 W  
AMV



TV AMPLIFIER  
1500 W  
AMV



PARABOLIC  
ANTENNA .7÷1.5 mt.  
TV PANEL UHF



*JVC ran impressive low-light demonstrations of its KY-27 camera.*



the tripod).

Ikegami also introduced the HK-377P, a portable companion to the HL-377 studio camera. It has all the same features as its larger sibling.

The HL-377 has also been upgraded with picture-in-picture capability in the viewfinder and a redesigned rear of the camera for more intercom flexibility. It also has an auto-hue detect function, where the video operator can place the cursor over an anchor person's face and soften the detail in that individual's skin area whenever they appear on camera

throughout a production.

And to its HL-355 camera, Ikegami is now offering a retrofit to the existing optical block to enable the camera to produce in a 16:9 format.

#### **Studio-style portable**

BTS introduced the LDK 9P, which the company touts as the only portable camera with all the camera control capabilities of a studio-style camera. The triax-equipped portable camera has such studio camera features as two microphone channels, teleprompter feed, two-level on-air

signal, five discrete viewfinder signals and a private data channel.

The camera is digital-ready, with a base station option allowing 10-bit component digital output. It has a variable speed shutter to allow shooting computer monitors, and it is dockable with field tape machines. Upgrades to the LDK 9, as well as on the new LDK 9P, include skin detail and soft detail.

BTS's Series 9000 Universal Camera Control introduces some ergonomic features including gain control of several cameras simultaneously to the same control, allowing, for instance, a video operator at a sports event to ride iris up and down on a number of cameras at once as the sun peeks in and out of the clouds.

The BTS control station can also transfer one camera's setup information to others in the system, speeding setup and guaranteeing uniformity.

#### **AQ 225 advancements**

Panasonic has made a number of improvements to its AQ 225 digital processing cameras, including new software for more flexibility and a better fiber optic cable connector. Panasonic is also previewing a new generation of the camera, unnamed at this point. It is switchable between 4:3 and 16:9 format with the flick of a switch. The model on display was a PAL version. The NTSC model is expected to be available at next year's NAB.

Panasonic also upgraded its WVF 700 to an "A" version, yielding an improved 800 lines of horizontal resolution. It has a low-cost coaxial control system capable of cable runs of 1,000 feet.

And for the graphics department, Panasonic unveiled a digital processing three-CCD multipurpose camera, with electronic exposure control for fixed lens use on the copy stand.

Thomson Broadcast showed its new 1544 DIGIPIX studio camera, incorporating a digital pixel correction system that enables it to render full richness in areas of shadow and affords the dynamic range of high contrast pictures.

The camera also features dynamic lens correction, which automatically identifies lens types and offers correction for vignetting and color aberrations due to focal length and aperture of the optics. It also allows shooting in a 16:9 format, achieved by limiting the number of active horizontal lines.

On the Hi8 front, Toshiba showed its TSC 200 with Decklink. The camcorder uses a Hi8 deck, but a camera cable output allows recording of the 700 line signal to a 1/2" professional field deck as well. Thus the same camera might be used for both news (Hi8) and EFP (Beta, M-II or what-have-you).

The three-CCD camera can record two hours of Hi8 material per battery. The camcorder weighs 12.6 lbs, including lens.

Canon again showed its single CCD LX-100 Hi8 camera, which accepts interchangeable lenses. It offered a new 10:1 zoom lens.

*Craig Johnston is production manager at KDRV-TV in Medford, Oregon. He may be reached by writing TV Technology. The opinions expressed above are the author's.*

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# New VTR Formats the Talk of the Show

by Karl Paulsen

**LAS VEGAS, Nevada** As suspected, there were no one-inch format VTRs for sale at this year's NAB. So one question arises "Is Analog Gone?"

Granted there were 3/4", S-VHS and Betacam machines, but the quest for the right digital VTR is in full swing. However, with the switch to digital VTRs comes the digital component video format battle between Ampex, Panasonic and Sony.

The battle, which began in earnest at IBC in July 1992 when the DCT, D-5 and Digital Betacam formats were first announced, is well underway. With digital come new issues that include videotape cassette format and facility compatibility.

Panasonic strongly suggests that compression technology for professional use is still changing too rapidly to lock one's future into any form of recorded compression scheme. Today, Ampex DCT and Sony Digital Betacam both offer mild forms of bit rate reduction for component digital. But tomorrow, said Panasonic, the industry may see fractal and wavelet compression schemes changing the focus once again.

The desirability of a future need for 18 MHz sampling for future widescreen pictures is still an issue. The EBU has been unable to show that, following transmission and reception, there are any demon-

strable benefits to using 18 MHz sampling. The EBU Statement D72-1992 says "the EBU considers that present CCIR recommendations 601 and 656 are adequate for 16:9, 625-line production for D/D-2-MAC, the anticipated performance of PALplus and the probable performance of an enhanced SECAM system."

#### The user base

Sony, with its introduction of Digital Betacam, is most interested in safeguarding its established user base, offering compatibility, performance and features that exceed those of current analog standards alongside breakthrough features at a cost effective price. To do this, Digital Betacam technology "rises to the challenge of the 20 dB difference" by offering performance and value for today's 525-line, 4:3 broadcast standards, while beginning the transition to ATV and 16:9 television.

Hitachi and BTS are both active in the digital VTR market. Hitachi again showed its D-2 digital composite VL-D500 VTR.

The BTS component digital VTR lineup includes the full featured DCR-500, which allows work in an analog component environment without the need for external A/D and D/A converters. The DCR-500 provides seven inputs and nine outputs, more than any other D-1 VTR, including serial and parallel digital inputs and outputs. It contains composite and component monitor outputs and enables



Panasonic brought its D-5 1/2" digital component VTR to NAB.

production facilities working in widescreen formats to store, edit and transmit 16:9 EDTV images.

Meanwhile, for its part, JVC brought to the show the BR-S525U, the industry's first S-VHS feeder/player to feature still- and slow-motion playback with advanced digital noise reduction. JVC reports the unit was designed specifically for the high-quality post production market. Its tracking system uses two pairs of optically-positioned variable tracking heads to ensure noiseless vari-speed playback at speeds from -2 to +3 times normal.

#### Digital Component Technology

Ampex began shipping DCT equipment to customers in the fourth quarter of 1992. In addition to a full range of post production equipment (switcher, editor and digital effects), the new DCR 700d tape drive and DCT 700i tape cartridges are becoming well established in the industry.

DCT has adopted a 2:1 compression scheme and uses 19mm media. Up to three hours of recording is possible on the large shell cassette. The DCT 700i tape cartridge provides perfect picture quality, even after 30 generations, says Ampex. Conceived, designed and developed specifically to match the operational characteristics of the DCT 700d tape drive, Ampex has specifically targeted the worldwide post production and film-to-tape transfer markets with its DCT product line.

The strength in DCT is that the error correction scheme ensures there is never any error concealment, which can be a problem with D-1. In the 10-bit vs. 8-bit argument, Ampex said that in a majority of cases, in day-to-day work, the additional two bits really carry no additional information, other than noise. Where, however, there is genuine information within those two LSB digits (such as in electronic graphics), they can be handled equally well by sophisticated data rounding methods, which Ampex employs at the input stages to the DCT drive.

Features of the DCT 700d tape drive include switching between 525/625, which eliminates the need for multiple systems. A unique transport system can be physically rotated 90 degrees so that the technician can work on all sides of the

transport casting, even while the system is operational. Ampex also retains its original concept of individually replaceable head elements, which minimizes down time and significantly reduces head costs.

The DCT 700d is the only transport with a built-in 3.5" floppy drive for adding additional features or innovations. Inputs and outputs include parallel digital, with serial digital (including embedded audio) and analog input/output as options. A standard analog composite output is available for creating window dubs without external equipment.

#### Improving quality

In only a short time since its U.S. introduction, sales for Sony's Digital Betacam were expected to top the initial Betacam equipment sales of the 1981 NAB Convention when Betacam was first introduced.

Sony has introduced its own version of compression technology, referred to as "Coefficient Recording." This process, which is completely picture dependent, averages a mild 2.1:1 compression ratio. Coefficient Recording is an intra-field scheme, meaning that all compression algorithms are completed and applied to each field discretely and independently.

Unlike MPEG, which is a motion interpretative scheme, Coefficient Recording does not introduce the kinds of motion artifacts found in other compression schemes. Sony employs a discrete cosine transform (DCT) algorithm that preserves the low-frequency component of the signal and leaves the bit rate unchanged. Therefore, the inputs and outputs, which conform to SMPTE 259M, carry up to 10-bit resolution in the 4:2:2 signal (otherwise known as CCIR-601).

Four new models in the Digital Betacam product line were introduced. Delivery begins in September/October of 1993. All recorders will feature pre-read for audio and video. Recording time on a small cassette will be 40 minutes and 124 minutes on large cassette. Digital Jog comes standard, with audio pitch correction for playback as an option.

The DVW-A500 recorder, which plays back analog Betacam and Betacam SP, has a suggested list price of US\$54,000. This is the top-of-the-line machine because it permits dual-format operation and full studio support including dynamic tracking and frame-accurate editing.

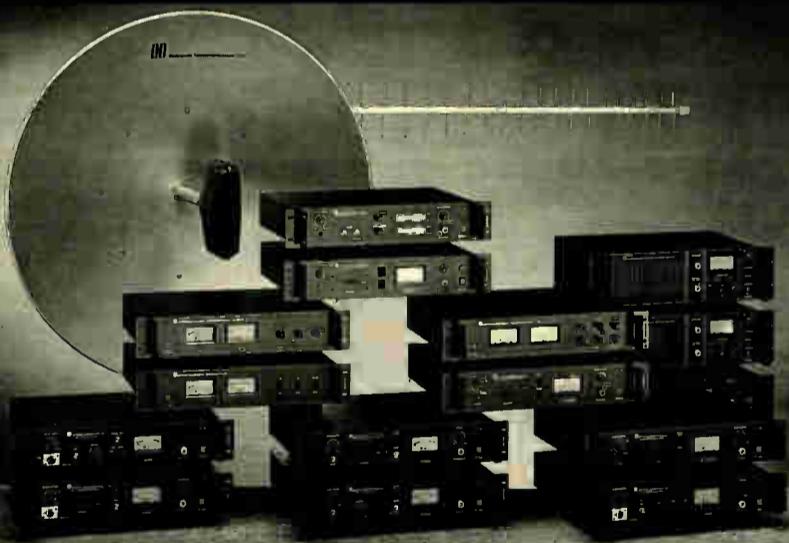
The Digital Betacam lineup is rounded out by the DVW-500 digital-only recorder (with no Betacam SP capabilities), the digital and analog DVW-A510 for playback only, and the digital-only DVW-510. All products include 20-bit AES/EBU digital audio, with XLR interfaces, and embedded serial digital audio.

#### New tape

A new metal tape line was created for Digital Betacam. The BCT-D videocassette has reduced the metal particle size by as much as 85 percent (as compared with Betacam SP tape). This reduces the noise floor while achieving increased output level and a higher coercivity and retentivity. In turn, BCT-D tape has achieved higher recording densities and lower error rates. Small shells range from six to 40 minutes and large shells from 64 to 124 minutes.

Sony has begun to protect the D-2

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investment by showing the DFX-C2 interface adapter for component/composite operation of D-2 transports. This accessory allows a slightly modified host VTR to record and replay a component digital video signal as well as a digital composite signal.

Demonstrations of Digital Betacam showed productions in 16:9 and 4:3, with 100 generation compositing. There was no recognizable degradation in the picture quality. Further user challenges were offered by Sony wherein a user could bring in his own recordings and test the capabilities of Digital Betacam. If sales of this new format are any indication, few people (if any) found any discernible differences in the original and the multiple generation copies of their material.

**To compress or not compress**

The clearest distinction from Sony in Panasonic's D-5 digital component approach is that D-5 does not use compression or bit rate reduction. Panasonic cited "instability of compression technology" as one reason that it has developed both D-3 (composite digital) and D-5 (component digital with D-3 composite digital playback capability) without employing compression of any kind. The company said that "as new compression techniques are proven and introduced, incompatibilities may quickly outdate existing compression schemes."

While not fundamentally opposed to compression, Panasonic says it does not want its customers to experience what it feels may be potential outdating of other manufacturers' VTR formats.

The new Panasonic D-5 VTR was shown in its current 625-line format, which will be available later in the year. Panasonic's Phil Livingston explained that one of the driving forces behind Panasonic's development of D-5 in 625 was the new U.K. Channel 4 project. He expects that an NTSC (525-line) version will be about three months behind the PAL (625-line) version.

All of the new D-5 VTRs will record the SMPTE 259M signal at 270 Mbps 4:2:2 signal in full 10-bit uncompressed form. Pre-read and slow motion are standard, with recording times of up to two hours on a large-shell cassette. D-5 has a recording capacity of up to 300 Mbps, thus providing what Panasonic feels is a logical and cost effective path to recording future HDTV standard(s).

One unique feature of D-5 is its ability to play back a D-3 cassette, decoding the 4 fsc footprint and outputting a SMPTE 259M signal in serial digital component form. This is accomplished by adding extra heads to the D-5 scanner and, for D-3 playback, adjusting the lineal tape speed to half that of the D-5 speed. Thus, the two formats will each record a 20 micrometer wide track pitch, with D-5 making four tracks per 180 degree rotation of the head. It will not be possible, however, to play back a D-5 tape in a D-3 VTR transport.

Panasonic also showed additional D-3 equipment, including the AJ-D310 single-piece camcorder and the AJ-D320 portable field recorder, with greater than 60-minute record capability (available now in a 46-minute version, pending new 11 micron tape). A studio version of the current AJ-D350 camcorder was shown. The new AJ-D340 recoder/player, housed in a smaller case, has most of the production model features except dynamic tracking and editing capabilities. For operations and maintenance activities, the AJ-SF3U, a PC-based diagnostic application, moni-

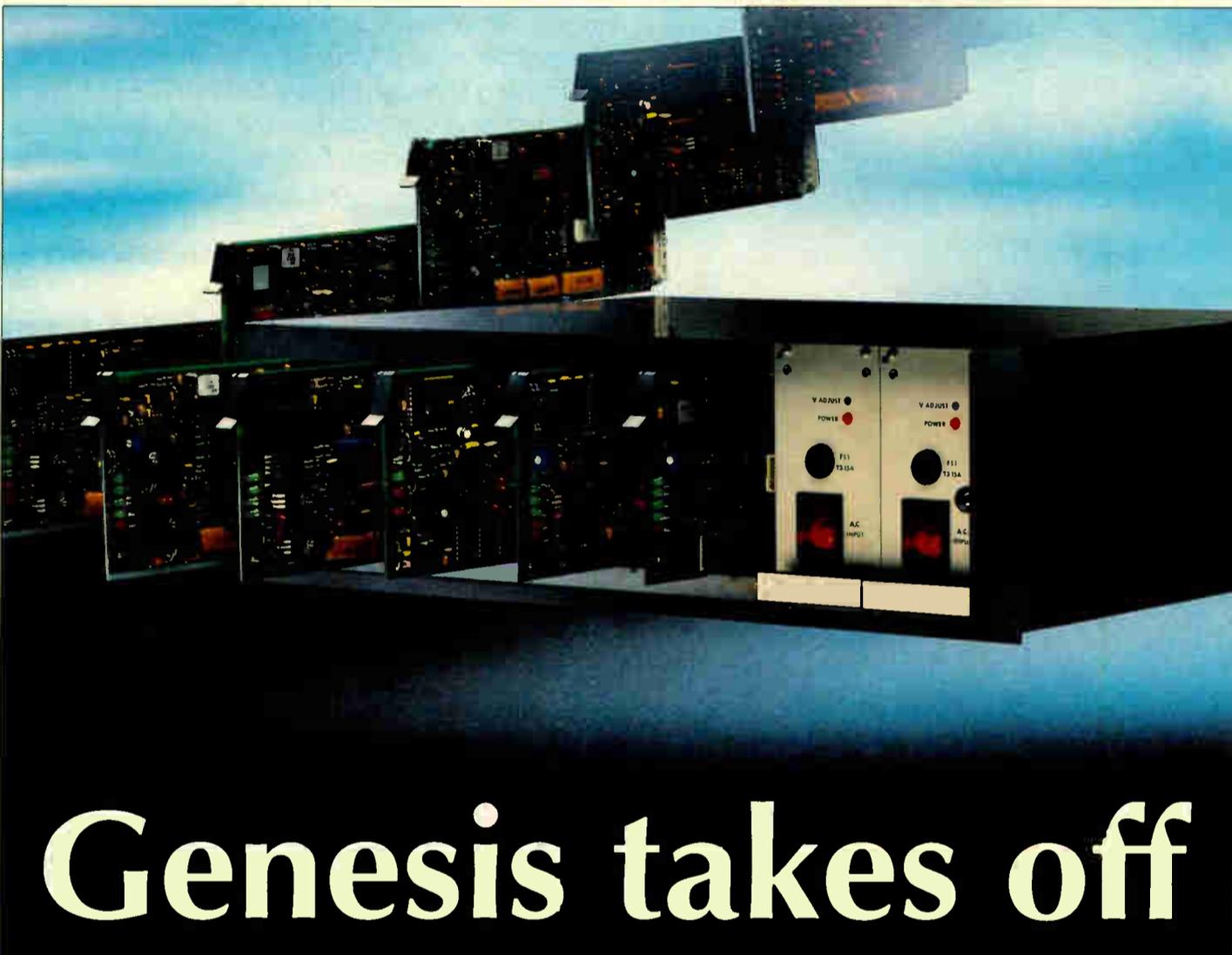
tors up to four machines simultaneously.

All of the imaging displayed at NAB on new-format digital VTRs was impressive and, for the most part, flawless. Judgements that need to be made about them are both economic and technical.

However, one thing is clear: The only real standard to come out of all this new equipment is the component digital "hook up" standard adopted with SMPTE 259M. The choices are many, but the interchange solution is still only one—component digital.

*Karl Paulsen is a consultant in video communications technologies and a frequent contributor to TV Technology. He is an active member of SMPTE and the SBE. Contact him care of TV Technology. The opinions expressed above are the author's.*

Sony presented its Digital Betacam VTR, the DVW-500.



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# BUYERS GUIDE

## Antennas & RF Equipment

# GEC-Marconi B7600: A 'Cool Operator'

by David S. Cope  
Engineer  
GEC-Marconi

ESSEX, U.K. A few short years ago, thermionic tubes were the dominant type of amplifying device used in medium and high power UHF broadcast transmitters. Today, while the thermionic tube is still "king" for high power units, at medium power (1 kW to 20 kW) the trend is undeniably heading toward the use of solid-state devices.

Still, the increased capabilities of higher power solid state devices are not completely free of problems. For instance, they are relatively sensitive to the effects of heat and, having a small "footprint," are difficult to cool efficiently.

### Keeping cool

Part of the cooling problem is due to the fact that the solid state transistors operate at a lower temperature than tubes. Low temperature transistors are more difficult to cool because they retain their level of heat better than higher temperature tubes.

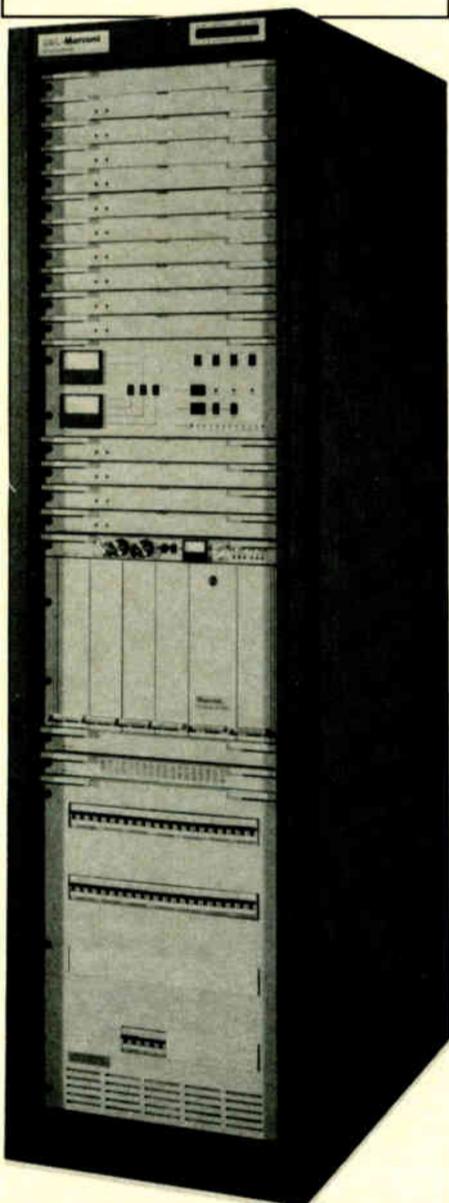
The current method of cooling low power solid state transmitters is to use low pressure air or convection arrangements. But with increasing output powers, the required volume of cooling air has increased considerably, and this has led to a number of problems.

The unit is one of the first solid state transmitters to successfully use liquid cooling. In addition to being more efficient than air cooling, liquid cooling is well matched to the small heat sink apertures of transistors. The coolant can be brought very close to the heat-producing component, thus giving excellent heat transfer.

In the B7600's modular design, broadband 500 W nominal RF amplifier modules are combined to achieve the desired output power. Sound and vision can be interchanged, and each module has its own liquid cooling circuit attached to heat-generating components.

The modules can also be removed during transmitter operation, and since all the modules are identical and require no tuning over

GEC-Marconi's B7600 series UHF transmitter uses liquid cooling.



their broadband 470 to 860 MHz range, any one can be substituted for any other.

In operation, the transistor junction temperatures are found to average 10 degrees Celsius cooler than those of typical air-cooled transmitters, effectively doubling the MTBF of the B7600's RF amplifier transistors compared to air-cooled models.

The equipment is also virtually silent and much more compact than forced air or convection mechanisms.

The elimination of an air distribution

network inside the transmitter enhances the space-saving advantages of solid state. In fact, with a 5 kW transmitter occupying one 19-inch rack cabinet, a 10 kW unit occupying two cabinets, and a 20 kW unit in three cabinets, the liquid-cooled models are less than half the size of similarly rated air-cooled transmitters.

The cooling plant is also much smaller.

The B7600's cooling system is a low pressure, closed-loop operation in which heat from the RF stage is transferred to a remote air-blast heat exchanger. The system operates with ordinary tap water or a variety of other liquids.

A small circulator pump with a magnetically-coupled impeller drives the system. For single transmitter installations, a dual pump system is available for added protection.

In addition to liquid cooling, the B7600 has a number of other distinctions.

Each RF amplifier module utilizes a correction circuit that removes thermal time constant and other linearity problems. With Class AB amps, the amount of power dissipated in the device changes when the picture level changes. This causes localized heating and cooling of the transmitter junction, which in turn affects performance.

Previously, this problem was corrected by applying pre-distortion measures based on how the transistors are expected to react with different waveforms. But since transistor performance can be affected by many other factors, particularly instantaneous ambient temperature, it is extremely difficult to correctly set up equipment to meet the specifications laid down by national broadcasters. And there is little or no margin to allow for transmitter drift.

### Modular monitoring

However, the B7600's active RF correction arrangement on each module constantly monitors the state of the amplifier output and makes adjustments in real time. The module input is sampled by amplitude and phase, and the output waveform is fed back for comparison.

When necessary, phase and amplitude modulation is applied at RF to make the output waveform the same as the input. This allows the effects of temperature, linearity and differential phase and gain to be corrected easily.

Basically, this correction system converts the class AB amplifier into a class A look-alike. Using a separate corrector for each module maintains the overall correction of the transmitter, even during a failure.

Another distinction is the use of a patented high-isolation wideband "N-way" combiner that combines the outputs of up to 24 amplifier modules. The unit is basically a single level "star" type combiner.

Along with fast acting VSWR protection circuitry on each module, the N-way combiner eliminates the need for circulators on module outputs, a major source of signal loss.

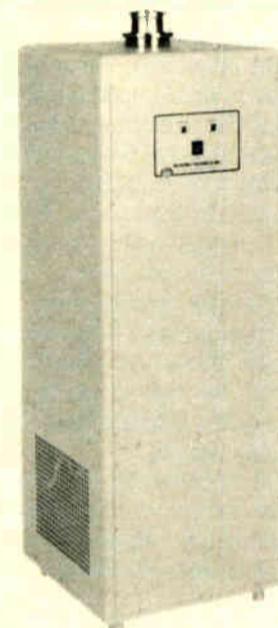
With solid state encroaching further and further into all levels of transmitter power,

it is clear that liquid cooling is the best way to take full advantage of the technology.

David S. Cope is an engineer with GEC-Marconi. For more information, contact the author at telephone +44-245-353221; FAX: +44-245-275985, or circle Reader Service 71.

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# Panel Antennas Offer Control

by Raymond J. Carnovale  
Vice President of Engineering  
Baton Broadcasting Inc.

**TORONTO, Canada** For well over 30 years, broadcasters in Canada have been allowed to "short-space" VHF television channels to optimize available spectrum.

Procedural rules define the undesired-to-desired (U/D) ratios of interfering signals permissible at the Grade B contour of existing stations. These ratios are a function of channel (low-band or high-band) and offset (non-offset or offset). For offset channels, the use of precision frequency control allows an increase in interfering signal of 7 dB.

Panel antennas, such as those manufactured by Kathrein-Werke KG of Germany, allow an extremely high degree of control of the radiation pattern.

But for the most optimal design, a number of planning steps are necessary.

First, the permissible effective radiated power (ERP) in the directions of protected stations should be determined. These calculations should take into account the effective height above average terrain (EHAAT) toward the protected station and the allowable U/D ratios. The actual protection is, in fact, an arc, as the distance to the protected contour varies.

Next, the available aperture needs to be determined. For an existing tower, this may be an iterative process because of the limited additional wind load that may be placed on the tower. In most cases, the antenna aperture is determined by the maximum permissible additional loading, not by the desired gain of the antenna array.

Third, the geometry of the tower should be analyzed. The tower's face width and orientation, as well as the location of guys, are critical factors that affect the final antenna design.

For panel antennas, the depth of nulls in the horizontal pattern is a function of panel spacing and orientation, as well as phasing. It is desirable to keep the panels

as close to the tower face as possible to avoid deep nulls and to minimize torquing of the tower under gusting winds.

When designing the actual antenna, the major lobes of the antenna pattern should generally be in line with the aiming azimuth of the panel. Therefore, the first iteration of a panel antenna design should start with the panels aimed toward the areas of target coverage, while signal toward the protected stations should be minimized.

For each panel, the following parameters should be kept in mind: azimuth, distance

(from array geometric center), offset (left or right of the aiming azimuth), phase and power ratio. Kathrein has a computer program in which each of these parameters is entered and each new iteration can be viewed superimposed over the previous one.

Having determined the available aperture, the vertical gain of the antenna and the transmitter power required to achieve the maximum required effective radiated power (ERP) can be estimated. But it should be kept in mind that as the maximum ERP increases, the depth of the nulls must also increase to keep the radia-

tion toward the protected station constant.

During the iterative process, it is necessary to scale the protection arcs relative to the maximum ERP. In designs involving several protections over wide arcs, optimization of one protection will often lead to violation of another.

Given that the typical VHF antenna has three panels per level, there are at least 15 parameters that can be varied, and an experienced design engineer develops an intuitive feel for which parameters should be varied.

Figure 1 depicts an optimized design. The panel antenna protects four other television stations, the closest of which is only 63 miles away (co-channel, and with precision frequency control), while achieving a maximum ERP of 66.4 kilowatts. In this particular instance, a happy coincidence was that the panels were virtually flush to all three faces of the tower.

For antennas that do not have equal power to each panel, some economies can be achieved by using what is known as a "panel-split." In Figure 1, a power ratio of 9:9:1 was required, and this was achieved by using six panels on two faces, and two on the third face. Note that the ratio of panels is the square root of the power ratio required, i.e. the square root of nine is three.

When it comes to voltage standing wave ratio (VSWR) optimization, that topic can consume an entire article. In simplest terms, it is desirable to have all reflected voltage vectors add to zero at the main power divider. This is easily achieved if three panels are fed 120 degrees out of phase, or if pairs of panels are fed 90 degrees out of phase.

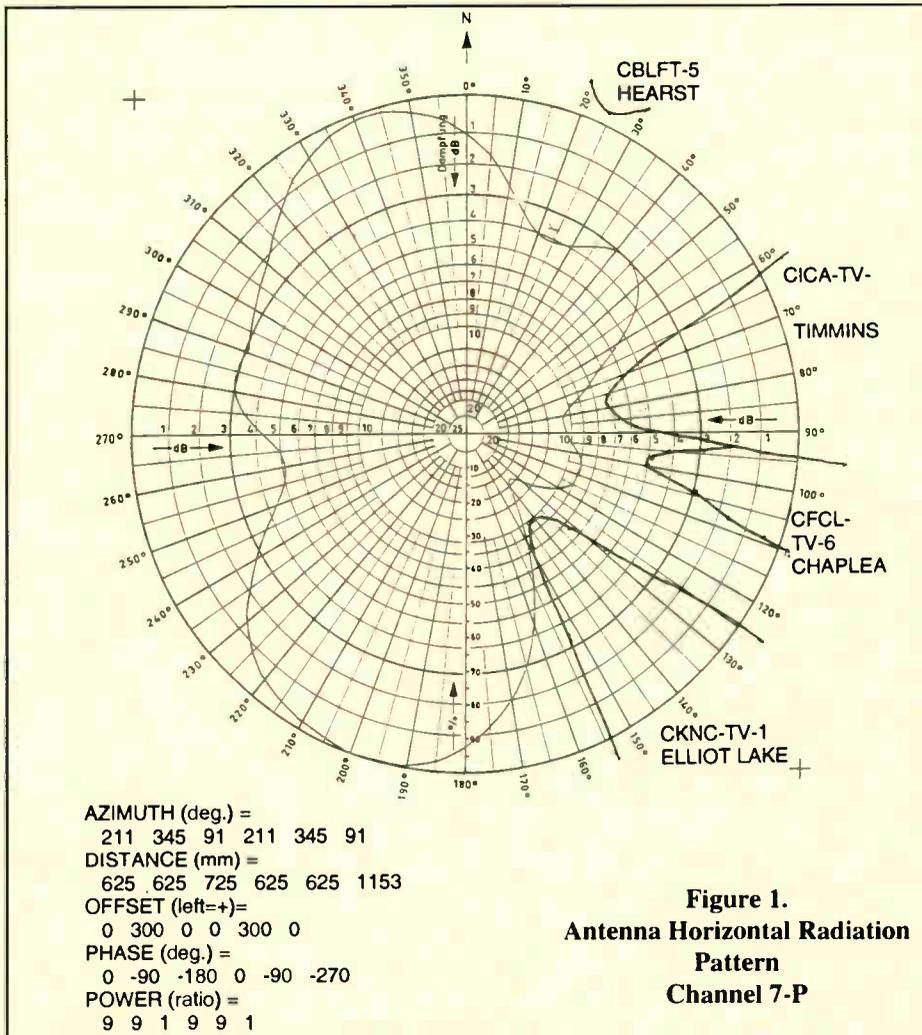
When a design calls for a pair of panels to be fed in phase, the desired result can be achieved by staggering one bay outward by 90 electrical degrees (thereby advancing the phase of the panels of that bay by 90 degrees) and then adding an extra 90 degrees of delay in the cable harness.

Clearly, panel antennas offer an excellent degree of control over radiation pattern design, and an experienced designer can optimize the design taking into account tower geometry and available aperture, the constraints of protection to other stations, the target market area, and affordable transmitter power levels.

While I have used a Channel 7 installation as an example, the same techniques are applicable in all television frequency bands, as well as the FM broadcast band.

*Editor's note: Raymond Carnovale has been a broadcaster for 25 years. He joined Baton Broadcasting Inc., through a subsidiary company in 1979 and was made vice president of engineering in 1985.*

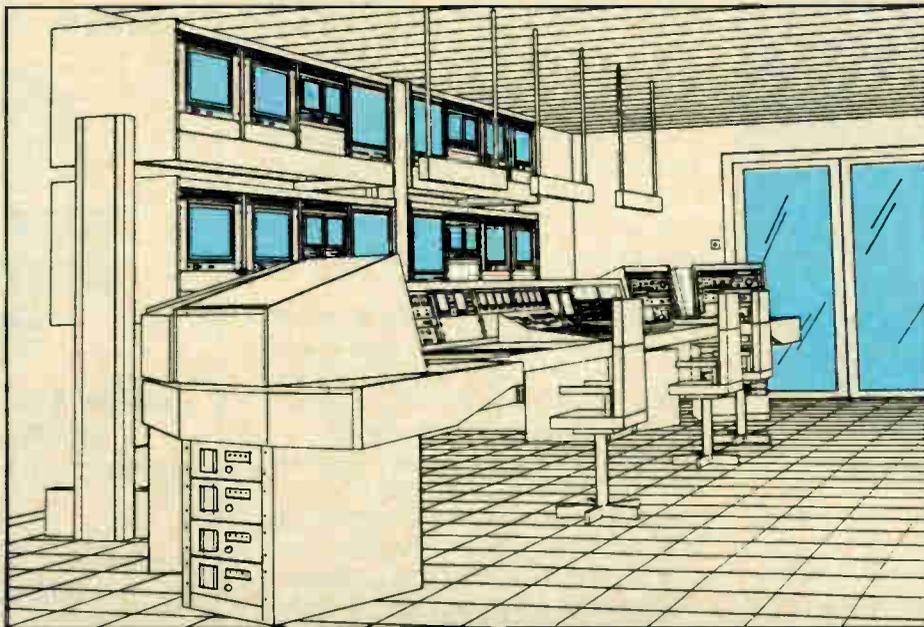
*The opinions expressed above are the author's alone. For further information on the Kathrein-Werke line of antennas, contact Dr. O. Gotthard (Telephone: +49-8031-184401; FAX: +49-8031-184495), or circle Reader Service 61.*



**Figure 1.**  
**Antenna Horizontal Radiation Pattern**  
**Channel 7-P**

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# Acrodyne Introduces Its New ADAM Technology

by Timothy P. Hulick  
Vice President of Engineering  
Acrodyne Industries

**BLUE BELL, Pennsylvania** In the summer of 1987, switching RF power sources on and off at a rate sufficient enough to synthesize video modulation onto a carrier without distortion was just an idea.

But today, after five years of development, it is a reality in the form of Acrodyne's Digital Amplitude Modulation (ADAM).

ADAM is a totally new digital approach to the generation of amplitude modulation at essentially any carrier frequency. The system utilizes a power combiner to bring together selected RF amplifier outputs to synthesize an instantaneous envelope according to the bit word derived from each sampled video point.

Of course, sampling must meet the Nyquist criteria, meaning it must be at least 8.2 MHz for television. Acrodyne's analog-to-digital converter samples at

with overshoots and ringing non-existent. Video correction is unnecessary except for the group delay correction required by the diplexer and VSB filter.

The performance of the ADAM-based transmitter depends on the binary power relationship among the gated power amplifier sources. The highest power or most significant bit generates half the sync power peak of the trans-

mitter, while the other half comes from the cumulation of all of the bits.

For a 1 kW transmitter, the most significant bit provides 500 watts, the next bit provides 250 watts, then 125 watts, and so on. Their relationship is maintained by an AGC circuit for each bit tied to a common reference.

The full carrier ADAM-based

transmitter can be thought of as a high level balanced modulator. For HDTV of the QAM type, it is a matter of considering I and Q channel signals in their polar form. An ADAM-based transmitter is modulated by amplitude, while phase modulates the carried generator.

An ADAM-based HDTV

transmitter with a different A/D section. It is expected to be fully developed in about a year.

With digital technology improving the power efficiency and specifications of television transmission, it will not be long before the broadcast realm is fully digital in both the transmission format and the actual make-up of the RF portion.

## TECHNOLOGY UPDATE

transmitter following the ADAM-based NTSC TV transmitter design is on the drawing board and, in general, should turn out to be nearly the same

*The opinions expressed above are the author's alone. For further information on ADAM-based transmitters, contact Joseph Wozniak at Acrodyne (Telephone: +1-215-542-7000; FAX: +1-215-540-5837), or circle Reader Service 121.*

*Basically, the modulator is replaced by an analog-to-digital converter.*

14.32 MHz, four times the color burst frequency.

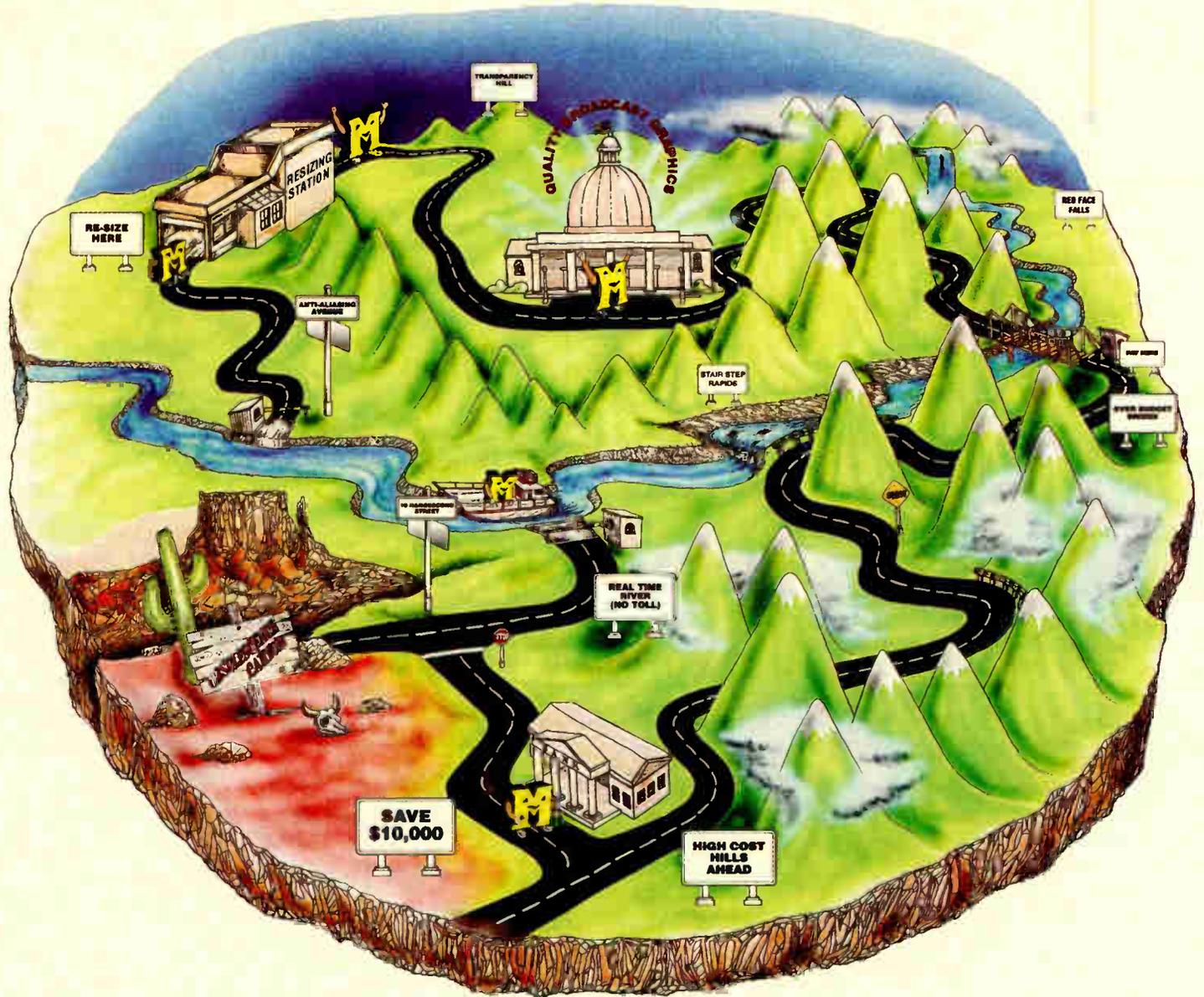
Basically, the modulator is replaced by an analog-to-digital converter. There is no IF since the visual carrier is modulated directly.

Linear amplifiers are not necessarily used in ADAM-based transmitters because they do not carry video modulated RF signals. Each low level drive is simply gated on or off by a GaAs switch controlled by the A/D converter.

This means that the power amplifiers can operate Class C for much higher efficiency than their linear counterparts. In fact, transistor collector efficiency for the high power stages is boasted at 65 percent. The AC line power efficiency will be 50 percent greater than the most efficient transmitters used today.

Power efficiency seems to be the most important benefit of ADAM, but there is another benefit that is nearly as significant. With a 10-bit video word defining 1024 discrete steps, video resolution is beyond that necessary for current television. In fact, specifications of things like differential gain, phase, low frequency linearity, pulse response, etc., are nearly perfect,

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# Harris Uses IOT Technology for Sigma

by Greg Best  
TV Product Line Manager  
Harris Allied Broadcast Division

**QUINCY, Illinois** With Harris Allied Broadcast Division's new Sigma series of UHF transmitters, the potential for energy cost savings has risen dramatically.

Using Inductive Output Tubes (IOTs), power consumption typically declines 70 percent while still maintaining the same output power.

The new Sigma transmitters are available in models from 15 to 240 kW. Each Sigma transmitter uses a common exciter cabinet.

### Control cabinet

This cabinet contains a system control panel, system monitoring, power metering and single or optional dual exciters. Sigma's all-solid state control and monitoring circuits contain no electromagnetic relays, and standard remote control interfaces match the requirements of many commercial remote control systems.

A single Sigma exciter cabinet will

accommodate up to six power amplifier (PA) cabinets for high power applications. Sigma transmitters use identical PA cabinets for 20, 40 or 60 kW IOTs.

Also, cabinet components are designed to accommodate higher voltages should there be a need for a future power upgrade. A high voltage power supply is outfitted for each PA cabinet.

Because IOT collectors can be air- or water-cooled, Sigma transmitters accommodate either type of cooling system. The 20 kW IOT is air-cooled; the 40 kW IOT may be air- or water-cooled, and the 60 kW IOT is water-cooled. The water/glycol cooling system employs redundant pumps, and heat exchangers may be used with either distilled water or a water/glycol mixture.

Sigma transmitters incorporate simple, non-interactive precorrection, which will ensure the level of linearity needed to handle the digital television signal of the future.

The Sigma exciter features a single-drawer design. Hinged modules maximize accessibility and eliminate the need

for extender cards. Video processing circuitry is provided for white clipping, sync stripping and re-insertion, and other modules provide IF precorrection for amplitude and phase.

### Crosstalk removal

Crosstalk to the aural carrier that occurs in the IOT is removed by an aural precorrector, while a stable crystal local oscillator upconverts the signal to the RF channel.

Following the exciter stage is the RF chain, which has a broadband intermodulation corrector, as well as a broadband

## TECHNOLOGY UPDATE

IPA and an IOT. One broadband RF intermodulation precorrector is provided for each IOT employed, and an AGC circuit stabilizes transmitter gain and provides VSWR (Voltage Standing Wave Ratio) foldback.

To ensure adequate IPA reserve, important for common amplification, a 1 kW

Class AB IPA is used. Emerging as a standard in IOT transmitters, the Class AB IPA improves efficiency and has a low number of components.

Using high power transistors, the IPA produces enough power and linearity to drive the highest power IOT while still allowing a full 2 dB of reserve. This reserve gives broadcasters the flexibility to use higher power IOTs in the future and makes the unit more reliable for current operations.

### Staying in line

The Sigma IPA features a patented dynamic linearity corrector, which compensates for changes in average picture level without adjustments and tuning requirements. Amplifiers are protected by a cutback circuit that provides rapid protection, and IPA outputs are protected by circulators.

Like other tubes, IOTs need to be protected from internal arcs. The crowbar device that provides this protection senses a rapid increase in current and deactivates the beam supply before any damage occurs. Sigma transmitters use a two-stage thyatron, which requires only a few hundred volts for triggering and has a switching delay of approximately one microsecond. To date, it provides the fastest possible way to divert stored energy from the IOT.

During tests at 30 kW visual and 3 kW aural, typical intermodulation performance was -60 dB for both in-band and out-of-band signals. Additionally, transmitter output cross-modulation performance of less than 2 percent and phase modulation of 50 dB down (referenced to 25 kHz deviation) was achieved.

With its flexible and intelligent architecture and Harris-patented technologies, we think Sigma transmitters provide a superb solution for current and anticipated requirements.

Greg Best is TV product line manager for Harris Allied's Broadcast Division in Quincy, Illinois. He may be reached at telephone +1-217-222-8290; FAX: +1-217-224-1439, or circle Reader Service 4.

# Florida Station Looks to Larcan

by Bernie Wimmers  
Director, Technical Operations  
WCIX-TV

**MIAMI, Florida** In the early hours of 24 August 1993, WCIX suffered a broadcaster's worst nightmare. Hurricane Andrew took down our 1,800-foot tower and destroyed our transmitters.

After the storm, which tore through south Florida leaving thousands of people homeless, we looked at what was left of our original transmitters and sent them to the junk pile.

Luckily, we received emergency permission to use a tower near Miami that was still standing and were able to borrow an older-model transmitter from Harris-

down, and there are no on-air glitches.

The transmitter contains two identical sections with a central cabinet housing the power supplies and exciters. All the output modules are identical and are completely interchangeable.

With no interlocks, the back doors can be opened on the air, which makes it easy to troubleshoot. And with only 50 volts back there, danger is minimal.

Larcan puts the main cooling blowers on top of the transmitter. It keeps them quieter, but we will have to see how much of a problem it may be to change one.

### Climate control

In the "get-it-on-the-air" crunch we had problems getting the proper air flow and temperature inside the transmitter. There is a 20 degree rise input to output, and Larcan says the input air can be 90 degrees. Personally, I do not think I would want it to get that high; old habits die hard.

Although Larcan gave us a spare parts kit, most of the parts are generic types. In our temporary site, we had a construction dust problem and thought it wise to have a spare main blower, which now sits in the corner.

The physical construction of the transmitter is well done, although a few things are hidden away in hard-to-find places. For instance, we had to trace wires to find the air flow interlock switch, which is behind the top front meter panel.

And although the power supply meter is somewhat small (I like to be able to read meters from a distance), the rest of the metering is easy to read, and controls are simple and well-placed.

Our Moseley remote control system mated with the Larcan very well.

After things settled down from the hectic pace following the storm, we added another exciter so there would be 100 percent redundancy throughout.

So far, our transmitter has been trouble-free, except for a few very minor power-up problems.

A new WCIX transmitter facility is being built at the old site and will be fin-

ished this summer. We will be moving the Larcan to the new site and adding a second transmitter as well.

Most engineers are lucky, or unlucky according to your point of view, to get one chance to design a new transmitter facility. We are going to do everything right with this facility, and our Larcan was a good start.

*Editor's note: Bernie Wimmers began his broadcast career in 1953 and has been director of technical operations at WCIX for 10 years.*

*The opinions expressed above are the author's alone. For further information on Larcan transmitters, contact G.J. Wilson at LDL Communications (Telephone: +1-301-498-2200; FAX: +1-301-498-7952), or circle Reader Service 86.*

## USER REPORT

Allied. Also to our advantage, Dielectric Communications of Maine had a Channel 6 antenna sitting on its loading dock.

### Permanent solution

That was fine as a temporary solution, but for a permanent replacement, Larcan, part of LDL Communications Inc., really came through for us.

The company happened to have a solid state TTS30ML transmitter ready to ship out to a customer for testing high definition television. After working around the clock remodeling it, it was on the air by 13 September.

It is amazing how technology has changed since we purchased our last transmitter. To someone accustomed to hitting the "on" switch and going through several warm-up cycles before anything useful happens, the Larcan's immediate start-up is incredible.

And if a module goes bad, all we need to do is yank out the module while the AGC adjusts power, fix the unit and shove it back in. If the indicator light comes on, the repair was a success; if not, we try again. There is no need to shut

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# JAMPRO SUPERA OBSTACULOS LEJANOS

por Carlos L. Jurado von Buchwald  
Gerente Operativo-Técnico  
Corporación Ecuatoriana de Televisión

**GUAYAQUIL, Ecuador** En un país donde el costo del dinero es demasiado alto y la cuña de 30 segundos más cara cuesta US\$1.300, hacer una inversión de equipo apropiada es cuestión de supervivencia.

Sin lugar a dudas, la pieza de equipo más importante en una estación de transmisión es la antena. No importa que tipo de equipo vanguardista se tenga, si la antena no funciona adecuadamente, toda la inversión efectuada es inútil.

## Un caso especial

En nuestro caso, compramos una antena para canal 2 (0.54-60 MHz) a un fabricante local por un costo de US\$25.000. Finalizada la instalación de la antena empecé a hacer mediciones con el fin de verificar la calidad del producto que acabábamos de comprar.

Verifiqué que se desprendió una muy baja estimación de la ganancia de la antena, que según mis cálculos era de alrededor de 4 dB, contra los 11 dB ofrecidos.

Después de mi reclamo al fabricante en relación con la ganancia y mientras este verificaba mis mediciones con nuestro medidor de intensidad de campo, me concentré en la relación de onda estacionaria de la antena, a la que encontré en 1:1.15 para la frecuencia del pulso de sincronismo. Tras mi reclamo el fabricante hizo varios intentos infructuosos de corregir el problema hasta que finalmente nos notificó que se había solucionado el problema.

Con nuestro limitado generador con barrido de frecuencia (sweeper), generamos portadoras en frecuencias discretas, las que insertamos al amplificador del transmisor midiendo las potencias reflejadas e incidentes para cada frecuencia. Con estos valores construimos un gráfico de la relación de onda estacionaria.

Gracias a esta rudimentaria prueba pude encontrar que la respuesta en frecuencia del acoplamiento de la antena era catastrófica. Probablemente la baja capacidad

de radiar de la antena se debía a su incapacidad de manejar el ancho de banda, sin tomar en cuenta las terribles distorsiones que la alinealidad de la respuesta de la antena estaría ocasionando sobre la señal radiada.

Reclamamos nuevamente al fabricante, quien intentó resolver el problema sin mayor éxito. Como consecuencia de esto recomendé a la compañía devolver la antena y comprar otra de un fabricante con reputación en el diseño y construcción de sistemas radiantes.

A base de una recomendación de amigos hablé con el Ing. Francisco Mestre de Continental Electronics en Miami; compañía que representa a la firma JAMPRO Antennas. Con el coordiné el diseño y construcción de un sistema radiante compuesto de 16 reflectores diedros (corner reflectors) dispuesto en cuatro secciones (bays) en un arreglo omnidireccional, con una inclinación del haz principal de un grado (beam tilt) y sin "Null Fill."

Después de cinco semanas de espera llegó la antena en un contenedor de 40 pies cúbicos. Recuerdo que era un día viernes y que tuvimos que sacar la antena del contenedor sin montacargas, utilizando sólo la fuerza de 10 estibadores. Luego de sacarla la pusimos

sobre dos camiones pequeños que la llevaron hasta el Cerro de Carmen (un cerro de 80m en el centro de Guayaquil, en donde se encuentran nuestras instalaciones).

Luego de destapar los cajones, hicimos el inventario de lo llegado y estudiamos el ensamblaje de los reflectores diedros. Armamos uno en el patio del Canal y sólo después de armado nos dimos cuenta de la gran diferencia estructural que existía entre las antenas Jampro y las antenas rechazadas.

Las antenas del fabricante local estaban hechas de aluminio anodizado, se requerían apenas dos personas para llevarlas y traerlas, mientras que las Jampro difícilmente las movíamos entre cuatro personas.

Con casi cinco metros de alto, tres de largo y tres de ancho, las antenas Jampro no se deformaban un centímetro, en cambio las de aluminio se torcían y descuadraban.

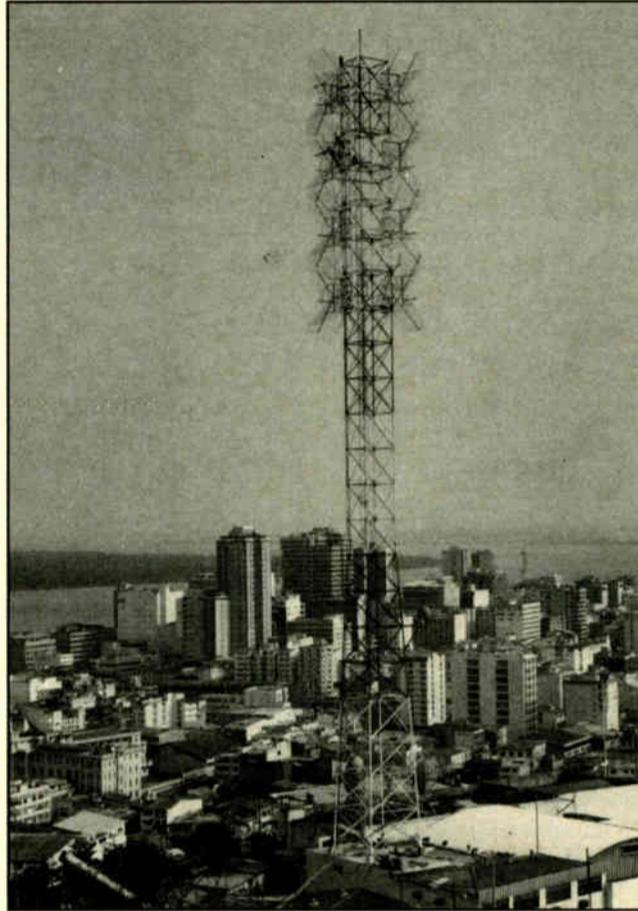
Después de analizar tensiones, esfuerzos y conveniencias, se decidió armar los reflectores sin los alimentadores en el piso y colocarlos armados en posición, empezando por el "bay" y continuando hacia abajo. Una vez terminado esto se colocaron los alimentadores y los conductores coaxiales.

Si bien Jampro nos dió en todo momento un excelente apoyo técnico, hubieron algunos problemas que se debió corregir sobre la marcha. El primero y más evidente fue un defecto en la construcción de uno de los marcos sobre los que se ensamblan las antenas, al que le faltaba un hoyo de dos pulgadas por el que debía pasar uno de los dos tubos de 7/8 de pul-

gada que constituían el alimentador.

Se avisó a la fábrica y se ofrecieron a enviar un marco de reemplazo de inmediato. Esto, sin embargo, no pudo ser tan rápido como lo requerido, ya que este marco medía dos metros por dos metros y pesaba cerca de 500 Kg, por lo que tuvo que ser enviado desde California hasta Ecuador por barco.

En vista que no podíamos esperar tanto



Vista de la antena Jampro que fue instalada en el Cerro de Carmen.

por el marco, se decidió hacer localmente el hoyo, tratando de ser lo más fieles posibles a las distancias y las dimensiones. La idea era colocarlo temporalmente en la torre y eventualmente cambiarlo. Así lo hicimos y pese a que el marco de repuesto nos llegó poco después sin costo adicional, el reparado tiene ya tres años instalado en la torre sin ningún problema.

Otro error que encontramos fue en la marcación de los conectores de flange de 7/8 de pulgada. La solución del problema consistió en arrancar las etiquetas de los conectores y conectarlos según indicaba el sentido común.

## Un gigante de acero

Pese a los pequeños contratiempos que tuvimos debo señalar que ensamblar la antena JCR de Jampro ha sido uno de los trabajos más gratificantes de mi vida. Las piezas de este gigante de acero galvanizado de 20 metros de alto y de casi 15.000Kg, encajaban con una precisión notable.

Todos los materiales que se utilizan en la antena son de alta calidad. Las partes se ensamblan utilizando pernos de acero inoxidable YYY, lo que constituye una garantía para la durabilidad del reflector. El alimentador está construido en línea coaxial rígida de cobre, con ciertos elementos de bronce. El alimentador que tiene una longitud considerable, se mantiene en posición mediante cuatro varillas de una pulgada de fibra de vidrio, sujetas al marco y al alimentador mediante abrazaderas metálicas.

El material del que se encuentra hecha la antena es de importancia vital para nosotros, dado el ambiente húmedo y corrosivo al que debe estar expuesta la torre y la antena por lo próximos años.

En cuanto a la parte eléctrica de la antena, ésta consiste de un dipolo hecho de línea rígida, con un balún, también de línea rígida de 7/8 de pulgada, paralelo a la línea de alimentación. La línea rígida que forma el balún tiene un elemento móvil dentro, que corto-circuita el conductor central con el exterior, a manera de antena corta (stub), permitiendo ajustar la impedancia de cada alimentador de manera muy precisa.

Todos los ajustes de la antena son hechos en fábrica, pero si es necesario hacer algún ajuste menor en sitio, este se puede hacer en forma relativamente fácil. Los tornillos de ajuste, tienen seguro de tal manera que la calibración de las antenas no se pierde por golpes o vibraciones.

La distribución de potencia se hacía de 1 a 2 y de 2 a 8 con dos divisores de potencia hermosamente trabajados en cobre y bronce. No tuvimos ningún problema en armarlo, pues las instrucciones eran perfectamente explícitas.

## Inspección final

Una vez que el sistema radiante estuvo ensamblado y en su sitio, se informó a la fábrica y de inmediato nos confirmaron el inminente arribo del Ing. Pagez y de Jared Seese, éste último ingeniero de campo de Jampro.

Debido a que el equipaje de Jared, con el que venía su 'Network Analyzer', se extravió, aprovechamos el tiempo libre para revisar el montaje de la antena y las conexiones de los cables.

Una vez llegado su analizador hicimos mediciones con y sin cable coaxial de cada uno de los divisores de potencia. Revisando esto encontramos un problema de desacoplamiento en uno de los divisores, por lo que subimos a revisar las conexiones.

Después de descartar varias posibili-

## REPORTE DE USUARIO

dades encontramos que el problema se debía a un mal contacto entre los conectores flange de 7/8 de pulgada de los cables coaxiales y los conectores de los alimentadores. Este mal contacto se debió al caucho de siliconas que se filtró entre los conectores, aislándolos.

Se desconectaron los cables, se limpiaron los conectores y se repusieron los cables en su sitio. La relación de ondas estacionarias que medimos es inferior a 1.01 en toda la banda.

La moraleja detrás de esta historia es que no se puede obtener algo por nada. Pero los US\$100 de diferencia entre la antena Jampro y la del fabricante local se justificó por cada centavo. Es probablemente la mejor decisión de inversión que he tomado en el tiempo que llevo trabajando en televisión.

Debo agradecer que la Presidencia de la empresa para la que trabajo, tuvo la confianza en mí y la visión para invertir en calidad.

Carlos L. Jurado von Buchwald es Gerente Operativo-Técnico de la Corporación Ecuatoriana de Televisión en Guayaquil, Ecuador.

## BUYERS BRIEFS

**Comark Communications Inc.** has released the IOX line of transmitters, a third-generation model utilizing IOT tubes.

The transmitters feature solid state drivers, broadband linearity correction and positive pressure cabinet cooling. They are compliant with the IEC-215 safety standard.

The IOX line is being offered in all world standards starting at 15 kW.

For further information, circle Reader Service 88.

The Omegaline 5880 series of self-contained heat exchangers from **Altronic Research** dissipates power in a water-cooled load.

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## CAMERAS

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JVC KY-17 3-chip camera w/case & 16:1 lens, \$3495; Panasonic AK 30 plumbicon tube camera w/bdct grade plumbicons, recently factory serviced & aligned, hard case, VTR cable, battery, AC adapter, \$2095. D Brennan, Brennan Productions, 3596 Lorna Ridge Dr, Birmingham AL 35216. 205-823-0088.

Sony BVP-30 w/Fujinon 1:1.7/9-108mm w/2x lens, BVV-1A dockable Beta deck, CA-30 camera adapter & VV1A rcdr composite video adapter, \$8500; \$7200 w/o adapters. 612-474-4646.

Sony M3A 15:1 Canon lens, 1w hrs on tubes, complete w/carry case, plate, Sony VO6800 3/4" port rcdr w/Kangaroo case & cable, excel cond, \$4500/BO. M Rose, 212-757-7654.

Panasonic DM7010 MII dock pad syst, complete camera & VCR syst, (3) 2/3" CCD's, 750 lines, 62 db s/n, digital processing, brand new-full warranty, \$13000. Greg, AVS Productions, RD #2 Roots Ln, Owego NY 13827.

NEC SP3A (3) CCD w/Fuji 16:1 Eagle case, manuals, Anton bracket, can be docked to Beta, MII, 8mm, gd cond, \$5500. H Ferguson, Pumpkin Creek Video, 520 Coffey Ave, N Wilkesboro NC 28659. 919-667-7717.

Sony DXC-M3 camera w/all extras, lens, studio controls, \$1200; Sony BVP-330 camera w/Fuji lens, \$1100; Sharp XCA camera w/new Fujinon lens, AC, case, \$1600. G Phipps, 146 E Eureka St, Lima OH 45804. 419-224-2472.

JVC MII KR-M800U modified to work w/S-VHS, like new, new heads, recently overhauled, \$6500/BO. W Keeley, Benu Pro, 626 McLean Ave, Yonkers NY 10705. 914-964-1828.

Panasonic F250B/7450A brand new, used 10 hrs, \$5000/BO. J Barker, Video Man, 9350 NW 16th St, Plantation FL 33322. 305-472-2888.

Ikegami HL95 camera body only, no lens or CA back, 4 pieces, \$1500/ea. J Birch, NBC Sports, 30 Rockefeller Plaza, NY NY 10112. 212-664-6466.

Ikegami HL-95B w/Sony BVV-5, 1w hrs & new heads, \$11000. G Kilgore, Magnolia Video, POB 453, Bakersville NC 28705. 704-688-4053.

Jazz Basic bdct quality digital effects, rotation, shrink, zoom, color, effects, mirror, flips, tumbles, \$5000/BO. J Barker, Video Man, 9350 NW 16th St, Plantation FL 33322. 305-472-2888.

## EDITING EQUIPMENT

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Convergence ECS 90 w/T.C. & type 5 I/F, \$600; Comprehensive PC-2 CG w/IBM system, \$1000. G Phipps, 146 E Eureka St, Lima OH 45804. 419-224-2472.

Sony RM2500 program controller, \$150. G Kilgore, Magnolia Video, POB 453, Bakersville NC 28705. 704-688-4053.

Convergence 103A w/2 Panasonic N-8500 VHS decks, T C reader, sync gen, monitor, complete, \$1500. M Scott, 202-775-6784.

JVC SAK-33 link JVC BRS-822 & 622 S-VHS machine to Sony RM 450 controller, \$195; JVC EI-511 45-pin to Sony 33 pin interface unit, like new, \$175. B Glusic, Wilderness Video, 24200 Alliance, Lomita CA 90717. 310-539-8573.

Sony 2800 3/4" editing syst w/ECS 90 controller, recently overhauled, incl cables, instruct manuals & speakers, \$1495; EPIC Harris controller modified to work w/all formats incl S-VHS, 3/4" & MII. W Keeley, Benu Pro, 626 McLean Ave, Yonkers NY 10705. 914-964-1828.

Sony 2600 A editing system 3/4" Ceasar editor, FREE Convergence editor, \$1200/BO. Joe, 608-838-9533.

Panasonic AG 7500 series S-VHS A/B roll edit system; Panasonic NV-A505 remote search cntrlr; Panasonic AG-A96 edit cntrlr for AG-1960/1970. Call A Zand, 215-645-4285.

United Media 430 only 4 mths old, excel cond, has list management, disc drive, GPI options & monitor, \$4800. B Franco, Endorphin Prod, POB 222242, Carmel CA 93922. 408-372-2308.

Vidlonics Pro-Ed never used (4) editing system w/keyboard, BO. P Goldberg, 718-224-3333.

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For-A FA740S TBC w/remote control. Call A Zand, 215-645-4285.

Nova 502 TBC, \$1000. G Kilgore, Magnolia Video, POB 453, Bakersville NC 28705. 704-688-4053.

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Sony DME-450 switcher w/digital effects, excel cond, must sell, \$2500/BO. Executive Video Productions, 2207 Fawn Glen, San Antonio TX 78232. 210-377-1252.

Panasonic WJ 5500A, 8 input video switcher, gen lock, color bars, luminance keyer, 12 wipe patterns w/joystick positioner, complete set of manuals, extender board & access, \$1750. G Johnson, Stimulus, POB 170519, San Francisco CA 94117. 415-558-8339.

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Sigma SSV-210 routing switcher, \$750; Sony PVM 1220 color monitor, \$500; Comp Video CVA-1B-5 dist amp, \$100; Sony VHS player HiFi mdl SVP-120, MFJ Titrer mdl 1480B, \$100. M Russell, Eye 35 TV, POB 497, Cameron MO 64429. 816-632-7616.

Panasonic WJ-MX-12 (2) SEG's; Panasonic WJ-4600C SEG, new; Panasonic NV-J500 multi-source switcher; Comprehensive VIS 4x4 matrix switcher; Grass Valley group key mem; Sony 2550 SEG, like new. Call A Zand, 215-645-4285.

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JVC KM 1200 used very little, still in carton, \$800. H Ferguson, Pumpkin Creek Video, 520 Coffey Ave, N Wilkesboro NC 28659. 916-667-7717.

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Acrodyne 100W UHF TV xmtr, stereo w/Leaming stereo gen, \$12K. M Russell, Eye 35 TV, POB 497, Cameron MO 64429. 816-632-7616.

TV Transmitter 60KW, chnl 19, RCATTU-60C, pulsar extra exciter. Megastar, 702-386-2844.

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Ikegami HL-791 new, docks direct to Betacam SO Canon J-13, 2x lens, mic & holder, \$12K; Sony BVU-150 3/4" SP rcdr 400 hrs w/Portabrace case, \$2000; Sony BVR-55 TBC remote cntrl, \$100. Jim, 708-289-4569.

Ikegami HC-230 3-chip camera, Canon lens, Docs S-VHS to SP, like new, AC pwr sply, VTR cable to 3/4", pkg \$5400; Sony VO 2610 3/4" VTR, \$350. E Kurtz, 504-821-0420.

Panasonic AG-450 camcorder (3); Hitachi Z31A camera (2) w/Canon 15:1 lens, like new. Call A Zand, 215-645-4285.

Panasonic WV-D5000 chip camera 8x1 AF lens with p/s like new, \$1100; Panasonic AG-6400 port rcdr, like new, \$1100. Call Bob, 714-951-1422.

Ikegami HC230 original owner, excel cond, 12x Canon lens, docked to JVC 410 S-VHS rcdr, \$4900. B Franco, Endorphin Prod, POB 222242, Carmel CA 93922. 408-372-2308.

Sharp XC-800 like new w/Canon J15x9.5 case w/casters, \$975. M Simmons, Apprise Video Prod, POB 339, Milton FL 32572. 904-623-9015.

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**Chyron VP-2**, 8 fonts, needs service, \$1200. G Phipps, 146 E Eureka St, Lima OH 45804. 419-224-2472.

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**Sony BVU-110**, 8 units, lw hrs, \$1500/ea. J Birch, NBC Sports, 30 Rockefeller Plaza, NY NY 10112. 212-664-6466.

**Sony BVH 1000 1"** excel condition, TBC 1000, \$7500; JVC 4900 port 3/4" w/AC charger, less than 100 hrs, \$750. E Stevens, 81 Lancaster Ave, Malvern PA 19355. 215-889-9676.

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**Sony BVU 110 3/4"** recorder & case, \$500. K O'Malley, 804-446-2731.

**Sony VO5600** rcdr, excel cond, must sell, \$750/BO. Executive Video Productions, 2207 Fawn Glen, San Antonio TX 78232. 210-377-1252.

**Amplex BVW-35** Betacam SP portable, new cond, very lw hrs, access & new kangaroo case, \$7000; Sony VO-5800 w/TC, 3/4" playback/record, time code modification for use as frame accurate source w/editing system, excel cond & presently in service, \$2250. G Johnson, Stimulus, POB 170519, San Francisco CA 94117. 415-558-8339.

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**Sony VO-9800** new 3/4" SP rcdr w/BKU-702 interface, \$2600. P Smaller, Media Assoc, 616 National, Mt View CA 94043. 415-968-2444.

**Sony VO 2600 3/4"** rec/play Beta/Umatic, gd cond, \$250/BO. M Kantor, WPOB, 50 Knickerbocker, Plainview NY 11803. 516-937-6373.

**Panasonic AG-7750**, S-VHS, TBC, HiFi, brand new, less than 20 hrs, switching formats & must sell, \$5000. Paul, 319-322-1478.

**Panasonic MII AV-650** variable speed studio rcdr/editor, excel cond, 100 hrs on complete refurb by Panasonic service, \$6500; Hill Soundmix 24 chnl audio console, 24x4x2, \$1500; TEAC 80-8 8 chnl multi-trck studio rcdr w/DBX, \$1200; all in excel cond. B Reid, Air Time Design, Miami FL. 305-666-0925.

**Sony VO 5850**, \$2600; Sony VP 2000 U-matic player, BO; Sony BVU 110 w/timbe code card & Portabrace case, \$950; Betacam video cassettes 3M/PB-60L, new overstock, \$35/each. G Kilgore, Magnolia Video, POB 453, Bakersville NC 28705. 704-688-4053.

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**Sony VO-5850 (2)**, \$2200/ea; Sony BVU-110 port 3/4" w/TC, Portabrace, \$995; JVC CR-4400 portable 3/4", \$300. G Phipps, 146 E Eureka St, Lima OH 45804. 419-224-2472.

# Standards Converters Take Global Approach

by Arthur Cole

**LAS VEGAS, Nevada** Standards conversion showed continued technological improvements over the past year as new motion estimation and compensation technology provided cleaner signals and less jitter.

Greater universality was also a priority, as evidenced by the units displayed at NAB that were capable of converting between all world standards and formats.

And while most of these developments were on the extreme high end of the market, a certain amount of activity was present on lower priced models as well.

One hot product at NAB was Snell & Wilcox's Alchemist featuring the company's Phase Correlation (Ph.C) motion estimation technology.

Ph.C converts each field into a two-dimensional transform and compares them in the frequency domain, rather than the spatial. Alchemist uses a 10-bit, 8:8:8 decoder to convert between all world standards and formats. It also features digital noise reduction and enhancement and a test pattern generator. The unit is available now.

Ph.C is also used in S&W's Gazelle slow motion unit, which will be available later this year. The unit adds frames to slowed video to provide smoother motion. The unit can scale to 1/50x normal play.

Snell & Wilcox also introduced a line of HDTV conversion equipment, namely the HD 5100 upconverter that accepts all current standards and outputs all known future HD standards, and the HD 3100 converters and HD 2100 downconverters. The HD 3100 converts 1125/60 to 625/50 and 1250/50 to 525/60, while the 2100 provides 525 or 626 from either 1125 or 1250.

**HD roots**

Thomson Broadcast brought its TTV 7810 converter, which gained famed last year when it was used by both CBS and NBC for Olympics coverage.

The unit was originally designed as part of the European Commission's research and development program for HDTV.

The company says the unit's pixel-based

motion estimator and motion compensating interpolator is extremely effective for smoothing out fast motion, such as in sporting events, and can handle complex patterns like zoom and rotation.

**A surprise**

One surprise in the area of standards conversion was the announcement by AVS Broadcast that it will support Vistek's PHAME (Predictive Hierarchical Adaptive Motion Estimation) algorithm in its new Cyrus converter. AVS was expected to adopt the Snell & Wilcox method.

Cyrus is a 10-bit unit that can be configured with a linear interpolation system or the added PHAME motion compensation. The unit can convert to and from all standards and tape formats. Processing controls include video and chroma gain, hue for NTSC, black level, freeze frame/field, fade and restore.

Deliveries were expected by June.

AVS has also made improvements to its EOS converter, adding new digital capabilities and noise reduction circuitry that provides up to 17 dB S/N for luma and 21 dB for chroma.

On the lower end, CEL Broadcast, which is now a subsidiary of Snell & Wilcox, introduced the P275 Tetra Compact, the latest in the Tetra line. The unit is a 1RU broadcast quality converter capable of transferring from NTSC, PAL, SECAM and NTSC 4.43 to NTSC, PAL, and SECAM using eight-bit, 4:2:2 full-bandwidth processing.

The unit is smaller than the 4RU Tetra Plus, but lacks some of the larger unit's features, such as proc amp control, test patterns and eight-field storage architecture.

Other products from CEL include the latest in the Worldmaster line: the single output P220 Worldmaster EX10 and the six output P226 Worldmaster EX60.

All three devices are available now.

Meanwhile, Vistek was riding the popularity of the Vector VMC converter, which was making its third appearance at NAB.

The latest model boasted D-1 capability and optional image enhancer and noise reduction circuitry.

## ACTION-GRAM

**Equipment Listings**

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For more information about Alchemist and Alchemist with Ph.C contact:

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# Our Low-Power Television Systems Set Us Apart From The Crowd.



Why? Because only Harris offers complete, low-power television systems. Not just transmitters. Or translators. Or antennas. We provide everything. Including the technical assistance and training you need to start and maintain your broadcasts.

Take a look at our Navigator Series UHF transmitters. They feature 100% solid state design and distributed architecture. And they're available in power levels of 10 W to 1 kW. Nobody offers a more reliable, easier-to-operate UHF transmitter.

You prefer higher-power

transmitters? No problem. We carry them, too, in power levels of 5 kW to 10 kW. And ours feature solid state broadband driver amplifiers, which require no tuning.

Then there's our Navigator Series UHF translators. They boast the same superb quality found in our transmitters. Translation: Why look anywhere else for a UHF translator?

VHF transmitters don't come any better than our EL Platinum Series models. They feature 100% solid state design, and come in power levels of 500 W, 1 kW, and 2 kW.

You'll need an antenna to complete

your system. We've got them. Rugged, field-proven models that generate unlimited patterns, directional and omnidirectional, for VHF and UHF applications.

There you have it – everything that makes our low-power television systems stand out from the crowd. If you want your broadcasts to stand out from the crowd, you know where to look. Harris Allied.

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 **HARRIS**  
**ALLIED**