Vol 11 No 4, April 1993

TV TECHNOLOGY™

International Edition

Buyers Guide: Switchers & Station Automation, page 22

NAB '93: Site of New Technology

by Arthur Cole

LAS VEGAS, Nevada With the U.S. economy apparently heading out of the doldrums, officials at the National Association of Broadcasters are expecting this year's annual convention to be more successful than last year's.

Exhibits and conference sessions are expected to focus on the newest trends in digital technology—such as compression for post production and satellite and terrestrial delivery, channel multiplexing, advanced signal processing and video recording—as well as new nonlinear editing technologies that are currently sweeping the industry.

New heights

The 1993 NAB convention will take place 19-22 April at the Las Vegas Convention Center. The show is expected to draw about 800 exhibitors, while attendance is expected to top last year's 52,704 mark.

"We had a record attendance last year, and I would go so far as to say that we expect an even larger number of attendees this year," said Richard Dobson, senior vice president of conventions and exhibits at the NAB.

And like previous years, the NAB expects growing attendance from other parts of the world, particularly Europe.

"I think the greatest amount of growth outside the U.S. is Europe, and I don't see that changing," Dobson said. "But we're seeing increased attendance from other areas as well. South America is becoming more visible all the time."

With the expected upswing in the U.S. economy, Dobson and others at the NAB expect there will be a lot of sales activity on the show floor this year as facilities resume capital spending plans that were scaled back during the recession.

"There is a tremendous amount of optimism of the purchasing plans of the typical NAB attendee," Dobson said. "Research indicates that the broadcast and post production market will make significant purchases this year.

"The amount of business done at the 1992 show was pretty good. But we have been watching the normal flow of company cancellations for the 1993 show, and we haven't seen any noticeable ones. That's a pretty good barometer."

Three shows in one

This year's convention will feature three conference and exhibition programs. The main conference and exhibit, by far the largest portion of the show, will feature "traditional" products and discussion surrounding current video technology.

Meanwhile, the HD World portion of the show, now in its third year, will display the latest in High Definition Television and will feature a number of panel discussions and papers delving into numerous production, transmission and display issues. Expected to be featured at the event is the winner of the U.S. HDTV runoff for a digital terrestrial transmission system.

New to the show will be Multimedia World, which will highlight the technology of the computer-based video production revolution that is currently sweeping the corporate world. Exhibits for the program will be located at the Las Vegas Hilton next to the convention center, while a host of panel discussions have been scheduled on such topics as multimedia marketing, tools and techniques. John Sculley, president of Apple Computers, is scheduled to address the conference.

Floor navigation

For attendees, a number of logistical changes have been made to the convention. Probably the most notable of these is a new system designed to help attendees locate booths more easily.

While last year's haphazard numbering system drew a round of complaints from attendees and exhibitors alike, the NAB added a color-coded system this year.

"The numbering system is always going to be complicat-

(continued on page 12)

What Does AC Power Have to Do with TV?

by Mario Orazio

SOMEWHERE OUT THERE *You might not have noticed* that it's time to stop letting the future of television be dictated by a crazy Serbian-Croatian electrician. Okay, let me rephrase that last part: a *dead* crazy *genius* Serbian-Croatian-*American* electrician, Nikola Tesla.

Hey, don't stone me! Tesla is one of my all-time heroes, too. I don't have any intelligence tests to back up my contention that he was a genius, but anyone who could formulate the entire world's power distribution systems (to say nothing of his work in motors, generators, clocks, radios, robotics, and a whole lot more) sure didn't have a vacuum between his ears. I can't offer psychiatric testimony about the crazy part, either, so if you'd rather I call a person who regularly used 18 napkins while eating, blew kisses to pigeons, got physically ill in the presence of pearl jewelry, counted his steps, and couldn't enjoy food without first calculating its volume *eccentric*, I ain't got a problem with that.

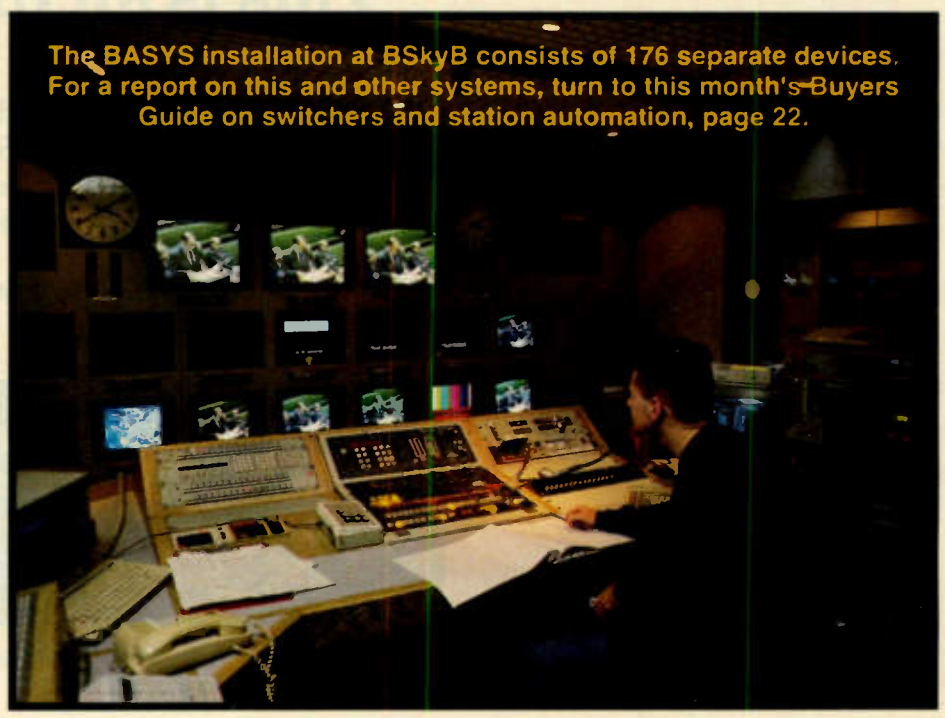
The rest of it I *can* document: Tesla was a Serb, but he was born and raised in Croatia. He became an American citizen in 1891, when he was 35. And he was an electrician. No, scratch that—he was *the* electrician. Tesla made the alternating current electrical distribution system you plug your TV into possible.

Who cares about power?

Here in the good old U.S. of A., we use 60 Hz for distribution to homes and most businesses (there's still a bunch of 25 Hz around for some railroads). A lot of the world is 60 Hz along with us; the rest is 50 Hz. The division ain't even between countries. Japan's both 50 Hz and 60 Hz, and they ain't alone. I ain't too sure if this is still the case, but Mexico City used to have both frequencies within the city limits! I am *not* making this up.

Anyway, when everybody and her brother started inventing television, it seemed like a good idea to synchronize the field rate to the power frequency. The way I

(continued on page 21)



The BASYS installation at BSkyB consists of 176 separate devices. For a report on this and other systems, turn to this month's Buyers Guide on switchers and station automation, page 22.

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AES

Audio Engineering Society Announces Call for Papers

NEW YORK The Audio Engineering Society (AES) convention committee announced a call for technical papers to be presented at the 95th AES Convention, "Audio in the Age of Multimedia." The convention will be held 7-10 October at the Jacob Javits Convention Center in New York City.

AES Convention Chairman Leonard Feldman has named Robert Finger of Matsushita Electric and Ken Pohlmann of the University of Miami Technical Papers Chairmen.

Interested authors should submit a proposed title, 60-word abstract and 300 word precis of the technical paper this month to the respective Papers Chairman in the proposed category.

Session and submissions information for papers in various categories are as follows:

Group A: Architectural Acoustics (Theory and Applications); Audio-related Computer Software; Auralization; Loudspeakers (Theory and Applications); Measurement; Microphones; Recording and Production; Transmission. Submit Group A materials to Robert Finger, Matsushita Electric Corp. of America, Business Engineering Center/ 1E-6, One Panasonic Way, Secaucus, NJ 07094; telephone: +1-201-3487768; FAX +1-201-348-7807.

Group B: Digital Electronics (Theory and Applications); Digital Music; Digital Signal Processing (Theory and Applications); Interfacing Digital Equipment; Perceptual Coding; Psychoacoustics; Multimedia (Theory and Applications). Submit Group B materials to Ken Pohlmann, University of Miami, College of Engineering, Dept. of Electrical/Computer Engineering; Coral Gables, FL 33124-0640; telephone +1-305-284-3351; FAX +1-305-284-4044.

BUSINESS

DPS Inc. Forms New European Subsidiary

SCARBOROUGH, Ontario Digital Processing Systems, Inc., a Canadian manufacturer of video processing products for broadcast television, video production and industrial video, announced it has formed Digital Processing Systems Ltd., based in the U.K.

Company President John Fazackerley noted that the increase in sales in Europe "...reached a level which warrants the opening of the subsidiary, in order to better service European dealers and customers of DPS studio products." He added that DPS Ltd. would also be better positioned to serve the growing list of European dealers and distributors of the "Personal Series" of desktop video products manufactured by DPS Inc.

Although DPS Ltd. initially will be a sales and service facility, the company plans to augment the operation to include the development of PAL standard products.

For more information, contact DPS Inc. in Ontario at +1-416-754-8090, FAX: +1-416-754-7046; or DPS Ltd. in the U.K. at +44-730-233084, FAX: +44-730-266691.

Magyar Television Chooses Sony Serial Digital for OB

HAMPSHIRE, U.K. Hungarian state broadcaster Magyar Television (MTV) has selected Sony serial digital equipment for its new OB (outside broadcast) vehicle, which is also being designed and built by Sony. The 12.5 meter trailer will be used for numerous production and post production projects.

The trailer will feature Sony serial digital throughout. SKI replaces four individual audio cables and a multiway parallel digital video cable with a single coaxial connection that carries video, digital audio and time code information.

Included in the vehicle will be a DVS-8000C vision mixer operating in tandem with a DME-5000 digital multi-effects unit, a DVS-3232 router and a BVE-9100 editor. Four BVP-370P studio/OB CCD camera with CCUs and remote controllers are complemented by two BVP-70ISP EFP cameras. Also, three BVW-75P VTRs and PVM-9044 and BVM-2010 color monitors will be on board. Audio equipment includes PCM-7030 pro-DAT and center-track time code-equipped 1/4" APR-5003 analog recorders, as well as a CDP-2700 compact disc player.

The order is being handled by Sony's U.K.-based systems integration facility, which serves Europe, Africa and the Middle East.

Kudelski, CANAL+ Form Pay-TV Scrambling Technology Venture

CHESEAUX, Switzerland Swiss-based Nagra-Kudelski S.A. and European pay-TV network CANAL+ have formed a joint venture to develop broadcast encoding/decoding technology.

The company, NAGRA+, will be based here, and the technology will be used by the two parent companies.

NAGRA+ will be able to supply turnkey solutions built around the Nagravision/Syster scrambling system developed by Kudelski and CANAL+. The system offers digital signal processing and high quality encoding/decoding features, according to the company. It is already used in more than 2.5 million Syster decoders (manufactured by Eurodec, a CANAL+ subsidiary).

Kudelski, known for its NAGRA line of audio and video tape recorders, developed the Nagravision technology. The Nagravision/Syster technology was the result of work accomplished by the two companies since the signing of a licensing agreement in 1989.

IBM Introducing Graphics Workstations

NEW YORK Computer company IBM recently announced it is launching a series of four digital graphics workstations aimed at the professional graphics animation market.

The PVS (Power Visualization System) machines will compete directly with similar workstations marketed by Silicon Graphics, and are priced in the U.S.$300,000 range.

Software compatible with Sun Microsystems and Silicon Graphics computers is planned, according to the company.

SHOW LISTING

Upcoming conventions, meetings and exhibitions:

19-22 April 1993—IAB '93
Las Vegas, Nevada. The 23rd General Assembly of the International Association of Broadcasters will be held in conjunction with the 1993 National Association of Broadcasters Convention. Three days of meetings will be held at the Las Vegas Convention Center.

19-22 April 1993—NAB 1993
Las Vegas, Nevada. The 1993 National Association of Broadcasters Convention, with exhibits and sessions, will be at the Las Vegas Convention Center. For information write NAB at 1771 N. Street, N.W., Washington, D.C. 20036-2891 USA, or contact at telephone: +1-202-429-5409; FAX: +1-202-429-5343. [Future show: Las Vegas, Nevada—22-25 March 1994].

13-21 May 1993—SVIAZ '93
Moscow, Russia. The 6th biannual Communication, Data Transfer and Processing Equipment Show held in the EXPOCENTR in Moscow. For information on SVIAZ '93 contact Ms. Susanne Hess, Exposition Manager at TNT Productions Inc. P.O. Box 717, Callao, Virginia, 22435, USA; telephone: +1-804-529-5510; FAX: +1-804-529-5057.

10-15 June 1993—Montreux '93
Montreux, Switzerland. The 18th International Television Symposium and Technical Exhibition. For information contact: +41-21-963-3220; FAX: +41-21-963-8851.

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 Kimber: +44-71-830-8447/8.

Send announcements to TV Technology International, P.O. Box 1214, Falls Church, Virginia 22041 USA, or FAX: +1-703-998-2966.

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Taking a Close Look at Nagra-D

by Frank Beacham

Part One of a Two-Part Series

NEW YORK After years of delays, the first generation of professional digital audio recorders are at work in the field.

Hopes have been dashed that a single high-end portable digital acquisition format will encompass the needs of all production, including 35mm film, video, HDTV and music on location. Two format camps have evolved: Fostex and Stellavox support the two-channel DAT format, and Nagra promotes its own digital four-channel open reel concept.

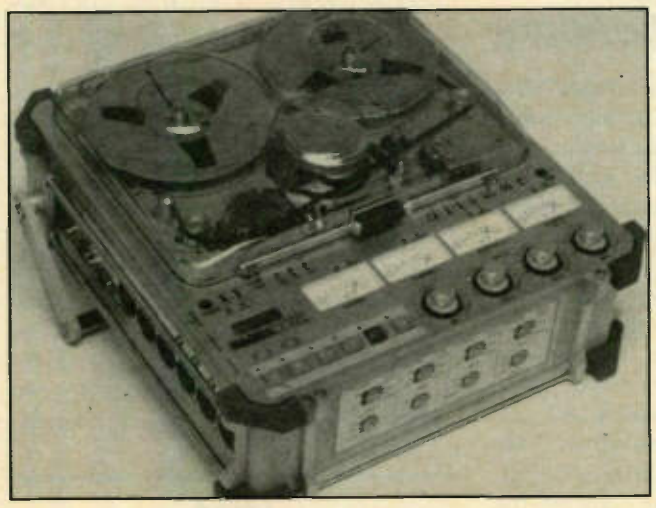
In this two-part article, we will examine the two competing formats and hear from sound recordists who are using the first generation of hardware in the field. In part one, the focus is on the new Nagra-D.

"If you had asked me a year ago I would have said DAT will become the (winning) format," said Danny Michael, C.A.S., a motion picture sound mixer. "At first I was surprised that Nagra came out with an open reel format. But having used the machine and having heard (the company's) reasoning, it does become clearer about the purpose. I think the Nagra-D has the potential of being a great new tool for making movies," he added.

Making music

The same holds true for music, said Peter McGrath, a recordist of orchestral works whose audiophile releases are made with minimalist miking techniques.

"I find the machine to be utterly extraordinary," said McGrath. "It's undoubtedly the finest machine to buy if you want to do serious digital recording in the field."



The Nagra-D format offers four discrete channels of audio

These lavish kudos are sweet sounds to Kudelski SA, the Swiss manufacturer of the respected Nagra tape recorder line. The company, whose analog recorders have long dominated the motion picture industry, developed the digital recorder over a four-year period against difficult odds during a turbulent financial period.

The Nagra-D was designed with the belief that the DAT format, originally developed for consumer applications, is not good enough for serious field recording applications in film, video and music.

"Nagra tried to come up with a format that—unlike DAT, which is pretty 'iffy'—is robust enough to be an archival medium," said Jerry Bruck, a recording engineer who owns New York's Posthorn Recordings, the city's Nagra-D representative. "So the error correction and the redundancy of the signal on the tape is extraordinary. They've taken their real estate and really spread the information out."

The Nagra-D format offers four discrete channels of audio that can be used in a variety of configurations. With a five-inch reel of tape, the machine can record nearly two hours of two-channel audio or nearly one hour of four-channel audio. With a seven-inch reel, recording time is extended to four hours of two-channel and two hours of four-channel sound.

McGrath takes advantage of the recorder's separate analog microphone and AES/EBU digital inputs to experiment with outboard processing when making musical recordings. "With the dual input you can actually run an AES (digital) input into tracks 1 and 2 and then come in through the analog inputs on tracks 3 and 4," said McGrath. "So on the same tape you can compare the internal A/D converters in the Nagra-D with outboard units."

To accomplish this, McGrath splits the output of his Schoeps KFM 6 sphere stereo microphone. One signal goes through his outboard Lexicon 20/20 AD converter into the AES inputs and the other into the analog microphone inputs. "There's an ever so slight difference between them," said McGrath. "The Nagra's internal A/D converter is perhaps one of the best I have ever heard."

In addition to the four digital audio tracks, the Nagra-D format includes a CUE track that can receive a mix of the four audio channels or commentary from an external CUE microphone, a time code track with full SMPTE/EBU time code information for both video and cinema applications and a CONTROL track that can record data for future post production and computer control applications.

Lots of bits

Perhaps the most favored feature of the Nagra-D is its 24-bit per sample recording capability, which is said to provide superior signal-to-noise, dynamic range and headroom when compared to the 16-bit DAT format. Four of the bits per channel are dedicated to command data presented at the AES/EBU digital I/O, leaving 20 bits for actual audio information.

Current Nagra-D machines are being delivered with 18-bit resolution but can be upgraded to full 20-bit capability when lower power consumption A/D converters become available in the near future. To achieve full 20-bit recording, Nagra-D recorders now being delivered must use an outboard A/D converter.

"Another way of looking at resolution is in the more accessible concept of the system's signal-to-noise ratio," said Albert Swanson, a Seattle-based sound recordist and editor of GDAN (Gazette & Digest for the Absolute Nagrist), a newsletter for Nagra users. "In an idealized situation, each bit equals 6 dB of S/N, so that a perfect 16-bit system has 96 dB of S/N.

"However, matters are never so ideal; a system is most often limited by the quality of the initial analog-to-digital conversion, so that it typically performs at around 88-90 dB S/N, or with a degradation of a digital bit or more." Add to that the effects of digital signal processing, Swanson said, which can also introduce noise into digital recordings.

"Increased headroom is a major advantage of the added resolution," he continued. "Much field or remote recording is uncontrolled, with only one chance to get it right. Considering that 1) transient peaks can be 10 dB or more above the average signal level, 2) digital overload distortion is industrial strength, and 3) analog limiters are often taboo, engineers are understandably skittish about recording full scale. This reluctance effectively degrades the resolution yet further."

The principal benefits of 18 to 20-bit recording, said Swanson, come down to two things: to provide the release format with true 16-bit resolution and to provide a margin of professional safety for the engineer.

Nagra tried to come up with a format that . . . is robust enough to be an archival medium . . .

Easy on engineers

All this translates to making the job of the field recording engineer much easier, said Bruck. "With 20-bit architecture you have the dynamic range so you don't have to worry about levels," said Bruck.

The Nagra-D is considerably heavier than its DAT competitors. Loaded with tape and battery it approaches 20 pounds. "This is a machine you put on a cart and do feature films with," said Bruck. "It is not meant to supplant DAT machines in anything but the most serious recording situations. If I were doing a documentary, I would unquestionably take a DAT machine."

The one negative about the Nagra-D, all agree, is its high price. At US$29,900 (US$2500 less without a time code module), the digital Nagra costs more than twice its most fully-equipped DAT challenger. The high cost is a key reason virtually all early Nagra-D recorders in the field were on loan to users from the manufacturer.

"Yeah, it's too expensive," said Michael. "The only limiting thing is its price," said McGrath.

For more information contact NAGRA KUDELSKI at telephone +41-21-731-2121; FAX +41-21-731-4155, or circle **Reader Service 51**.

Video Industry Looks to the Future

by Vish Vasudeva

After the heady days of rapid growth in the 1970's when the video industry enthusiastically adopted new equipment for color broadcasts, the 1980's were a period of consolidation.

During this decade, new products and techniques using digital technology were introduced and quickly accepted, especially for text and graphic generation and picture manipulation. This was an instance where technological advances made new solutions possible even though the final broadcast standard remained unchanged.

Spurred on by demand for more creative freedom of multilayered productions, new digital standards were accepted by higher end facilities and then by others updating obsolete equipment.

GUEST COMMENTARY

Discussion and considerable development effort on higher definition formats for future productions and broadcasts absorbed a lot of attention. However, agreement on an international standard remained as remote as attempts during the 1960's to arrive at a universal standard for color transmission when three basically incompatible formats resulted.

Computer advancements

Within the Pesa group, we believe that the most immediate impact of new technology on the video industry in the next few years will come from advances made by the personal computer industry. This industry, in the last few years, has grown very rapidly and invested heavily in the new generation of 32-bit and 64-bit processors and graphic circuits capable of fast manipulation of complex graphics and even live video for multimedia applications.

The need to store complex graphic images and the growing size of code for PC application software and operating systems with graphical user interfaces has also created an enormous demand for high capacity storage systems in Europe. Availability of such computing power and storage at reasonable costs will allow designers of graphics products to design machines that are multitasking, multifunctional, operate in real time and yet be affordable by even the smallest facility house.

Existing products from Pesa in Europe and from its operating companies in the U.S., such as Chyron Graphics, already follow this trend. They offer far more functionality and speed of response than traditional products. For example, the aptly named CG Plus, designed in Madrid, integrates a fast character generator with a full featured paint system, still store and linear keyer in a single compact unit. And it only costs as much as a traditional product with single functionality. The Chyron iNFiNiT! and Max similarly have options for painting and can even be equipped with a DVE facility.

High speed, lower cost

Future products will offer greater speed of operation, in particular for 3-D, which still remains an off-line task, by platforms utilizing multiple processors. Products are also likely to offer greater functionality and/or be available at much lower costs if they perform the same tasks as present day products. Storage media offered will reflect the component adopted by the computer industry and include read/write optical technology with far higher capacity and data transfer rates.

In recent years the differentiation between different categories of operators, such as those who operate character generators and those who are painting system designers, has virtually disappeared in some establishments. A common user interface to different functions within multifunctional equipment will extend this to 3-D rendering and other systems so that a single operator can perform the tasks allocated to two or three previously.

The effect of compression

The rapid developments in signal compression technology in recent years has already had a marked impact on video editing. Random access non-linear editing, currently for off-line applications, is now almost universally utilized in the video industry. As with graphics and video effects in the 1980's, this has been made possible because compression and decompression of live video at low cost is a reality. Random access storage using high capacity magnetic or optical disks with sufficient storage for live video was also necessary to make this a reality.

The CMX Cinema utilizes these advances in compression and storage media to provide film editors a fast, convenient, electronic means of editing film. The next generation products, which will employ further advances in compression and storage technologies, will offer random access convenience and full quality capability for on-line editing of full length productions. It is also likely that such products may combine effects and graphics all in a single integrated unit and operate to the highest standards demanded by the industry.

. . . the most immediate impact of new technology on the video industry . . . will come from . . . the personal computer industry.

During the 1990's a number of facilities are expected to be gradually converted for HDTV productions. This is likely to be in advance of dates for actual transmission and in many cases as a substitute media for film. This will allow easy conversion of such production to different world broadcast standards without loss of quality.

In such stations, as is increasingly happening now, there are frequently likely to be a proliferation of different production standards—analog, digital, component or composite, 525/625 line or HDTV. At Pesa Switching Systems, we frequently experience this when supplying routing matrices and have met this expected need with a product possessing a 100 MHz bandwidth and the capability to be easily adapted for analog or digital signal.

Vish Vasudeva, as director of corporate marketing for Pesa Electronica S.A., travels extensively to the company's facilities in Spain, the U.K. and the U.S., as well as supports Pesa's worldwide sales activities.

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READERS FORUM

Have something to say about TV Technology? Send letters to Readers Forum, TV Technology, P.O. Box 1214, Falls Church, VA 22041, USA.

Dear **TV Technology**:

I read with interest the article by Ken Hahn about storage formats for sound in video production.

He mentioned cart machines are superior for continuous loops but have many inherent problems with wow, flutter and other audible errors.

What his article failed to mention was the medium of floppy disk cart machines. He did indeed mention samplers, which I agree do have limited storage time, but floppy disk cart machines, which directly replace the functions of the NAB cart machine with a floppy disk and digitally stored audio, have none of the disadvantages of their NAB counterpart and all the advantages of digital quality audio and "processor" control.

There are now (to my knowledge) three manufacturers making such devices in the world. Sonifex with DISCART, ASC with DART (both U.K. companies) and U.S.-based Fidelipac with the DCR1000 (a system that is totally compatible with the ASC DART system).

By carefully selecting sampling rates on the DART/DCR1000 systems, recording times of up to 224 seconds of CD quality audio can be recorded on one floppy disk and a loop can easily and quickly be made that could be invisible to even the most discerning listener.

As he is working with video Mr. Hahn may not necessarily need the audio bandwidth offered by 44.1 kHz sampling, and by selecting 32 kHz sampling frequency his recording time can be dramatically increased to five minutes 10 seconds (these figures are stereo and can be doubled for mono).

Both the DART and DCR1000 systems also permit a limited amount of "editing" of a cut so that the start and end can be adjusted to tighten an effect. The next issue of software will permit "chaining" so that several cuts on the same disk can be linked to play in a certain order from certain edit points. Mr. Hahn's example of steam train incoming, idle and exit is a prime example of the use of chaining. Three cuts are recorded onto the same disk: Cut One train arrives, Cut Two train idle atmos, Cut Three train departs. These are all chained together with Cut Two established as a loop. On pressing the Play button Cut One plays and the Cut Two starts its loop. It continues playing the loop until the Play button is pressed again when Cut Three is played. Thus the train arrives, waits for as long as the producer requires it to wait and departs with seamless audio. This would normally need at least two NAB cart machines or two reel-to-reel tape machines.

The system I have described cues to the beginning of each cut instantly, can have up to 16 cuts per disk (dependent on cut lengths), can have mono and stereo cuts mixed on the same disk, and can have different sampling frequencies mixed on the same disk. It costs no more than a good quality NAB cart recorder/player but has superior audio quality.

The Fidelipac DCR1000 system has been available in the U.S. since February 1992 and DART became generally available in the U.K. in the summer of 1992. It is used by six of the 13 major U.K. TV companies.

What I am trying to explain is that Mr. Hahn's chart is missing an important medium for TV and video post production, a medium that needs no retraining of operators as it has the same simple, three-button user interface as an NAB cart player but a system that is vastly superior to any other system on the market at a similar cost.

Dave McVittie, Sales Manager
ASC Audio Systems Components Ltd.
Berkshire, U.K.

A Primer on Video Compression

by Bruce Randall

Part One of a Two-Part Series

HAMPSHIRE, U.K. It is becoming increasingly apparent that the future of television will be digital. Indeed, it seems that the future of all video-related technologies will eventually be digital.

There are many other benefits in handling video digitally—repeated re-recording or processing without degradation; easy manipulation; ruggedness; flexibility and efficiency in transmission; effective access control—but original studio quality pictures require an enormous 216 megabits per second of data, clearly too much to handle in most practical situations.

Until recently, one digital television service would have had to take up to 10 TV channels worth of space. Using video compression, we can now talk of compressing four or more TV services into one TV channel. Alternatively we can contemplate one very high-quality high definition TV service in such a channel.

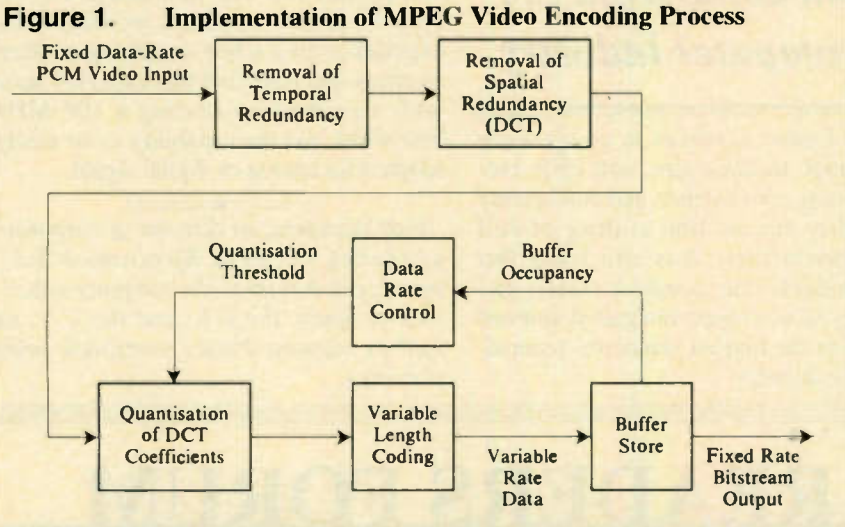
But how do you throw away 95 percent (or more) of the original data without noticing the difference? This is what organizations like NTL have been researching for several years and, with the consensus approach of the Moving Picture Experts Group (MPEG), the way forward is now very clear—and so is the picture.

System architecture

Video compression systems for TV transmission comprise a number of basic elements. The video signal first needs to be digitized if the source video is in analog form. The resulting digital signal is then processed to reduce the amount of data by using various techniques as described below. The resulting data stream is then formatted and multiplexed with the related audio signal which is itself digitized and compressed. The combined video and audio signals from each service are then also multiplexed into a single data stream that is then modulated according to the appropriate transmission system.

The receiving equipment comprises sub-systems which implement the reverse operations of transmission. A demodulator/receiver produces a baseband digital stream of multiplexed video and audio channels. A de-multiplexer extracts the required video and related audio. This is then passed to the video decoder to reverse the process of the video encoder and reconstruct the picture. If necessary, this is converted to analog and, depending on the application, modulated onto VHF/UHF carriers.

Figure 1. Implementation of MPEG Video Encoding Process



Video compression works both by exploiting the characteristics of the eye and by reducing the amount of unnecessary or repeated information contained in successive television images. By transmitting only the changes between frames, large economies can be made.

But video compression goes much further than that. By looking at the frame before, it can predict movement; the more predictable movement is, the better the picture can be represented with minimal transmitted data.

Each frame is divided up into blocks, which are then encoded in two stages. The first stage is to find a motion vector which relates the content of each block to the constant of preceding or following pictures.

The second stage is to compute the difference (if any) between the predicated and the actual picture block. With transmission of only the motion vectors and the difference information, the decoder can reverse the process and reconstruct the original picture. It is, of course, possible to fool the algorithm: a rapidly moving football may result in a local loss of background detail, even though the ball itself may stay sharp. It is vital that any motion artifacts are very subtle in broadcast applications and that they will not be apparent except to the expert eye.

In addition to temporal processing, the MPEG algorithm further reduces bit-rate by removing spatial redundancy within a single picture frame. Blocks of pixels are assessed for any correlation which can be exploited by applying Discrete Cosine Transform (DCT) coding. DCT coding analyzes the block and produces a frequency-like domain in the form of coefficients. The transformed coefficients are then quantized to remove less important information is a way that is invisible to the eye. Further data reduction is achieved by using run-length and variable-length coding to express the quantized coefficients in a very economical manner. The result is that, from block to block, the detail conveyed by the system is no more than it needs to be and each pixel is described with the minimum number of bits.

Using this powerful combination of temporal and spatial redundancy removal, standard broadcast quality pictures can be achieved with data rates as low as 5 MBits/s. At around 10 MBit/s, enhanced-definition widescreen pictures can be accommodated without noticeable degradation.

(Part 2, next month, looks at transmission aspects, applications, NTL's own video compression system, and the future of the technology).

Bruce Randall looks after corporate affairs for National Transcommunications in the U.K. He may be reached at telephone +44-962-822374; FAX: +44-962-822582.

ZDF UTILIZA EL AJ-D310 D-3

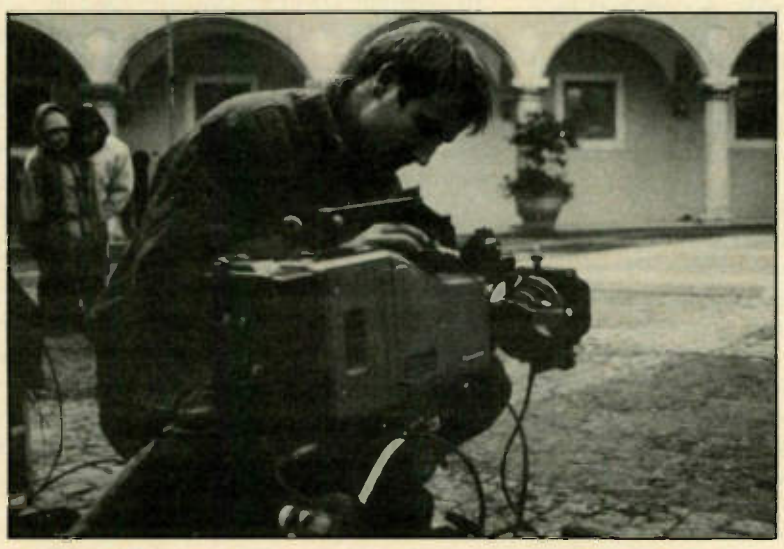
WIESBADEN-BIEBRICH, Alemania La red de televisión alemana ZDF usará los "camcorders" AJ-D310 D-3 de Panasonic para su nuevo proyecto de producción, "Liebe, Lieder und Gassenhauser der Renaissance" (El Amor, Canciones y Melodías Populares del Renacimiento). La compañía emprendió el proyecto en vista del ensayo exitoso que tuvo en los Juegos Olímpicos de Barcelona.

Se escogió el formato D-3 por sus cuatro pistas de audio, ya que el programa requiere la grabación de música. Una vez en producción, la compañía utilizará un par de "camcorders" sincronizados el uno al otro durante ciertas etapas del proyecto.

Un "cassette" de camcorder de formato D-3 tiene una duración de 34 minutos. Un cassette de estudio, como el que se usa con el AJ-350 VCR, provee 245 minutos.

Según el Director Martin Schneider, el formato D-3 tiene mucha flexibilidad, ya sea en producción en escena o en el proceso más complejo de sincronización durante grabación y reproducción. El formato funciona igualmente bien con malar condiciones metereológicas.

Como el ajuste principal de la cámara es digital, cambiar el ajuste, bien sea en escena o en el estudio, es posible. Las máquinas AJ-D350 VCR ya estan siendo usadas por Bayerischer Rundfunken y Deutsche Welle.



CellularVision Sparks Worldwide Interest

by Arthur Cole

NEW YORK A new video delivery system that uses cellular phone technology for multichannel transmission is drawing interest around the world.

Known as CellularVision, the technology has been given initial approval in the U.S. for operation in the 27.5-29.5 GHz band, and is being examined for use in such countries as China, Thailand and Malaysia.

"Interest is coming from all around the world," said Herbert Corbin, a CellularVision company spokesman, "particularly from countries where installing cable is not practical."

Even where cable service is possible, Corbin said, the CellularVision system can be installed and maintained at much less cost.

CellularVision Inc., developers of the system (telephone: +1-908-462-8200), has been operating an experimental 49-channel television system in Brooklyn, New York, for several months.

As its name implies, the system uses a cellular FM approach to deliver two-way video, voice and data, providing consumers with entertainment video, video teleconferencing, high-speed data services, personal communications services, video-on-demand, interactive television and HDTV.

The system utilizes millimeter waves requiring high-gain (about 26 dB) antennas measuring four-and-a-half inches square that are mounted either inside or outside the home.

According to Bernard Bossard, inventor of the system, CellularVision is a transport technology capable of delivering analog or digital signals, meaning it can take advantage of the various video compression schemes currently under development.

"We can deliver up to one gigabit of data," he said. "Once the cost (of video compression) comes down and the performance is (adequate), we will be able to do whatever cable can," said Bossard.

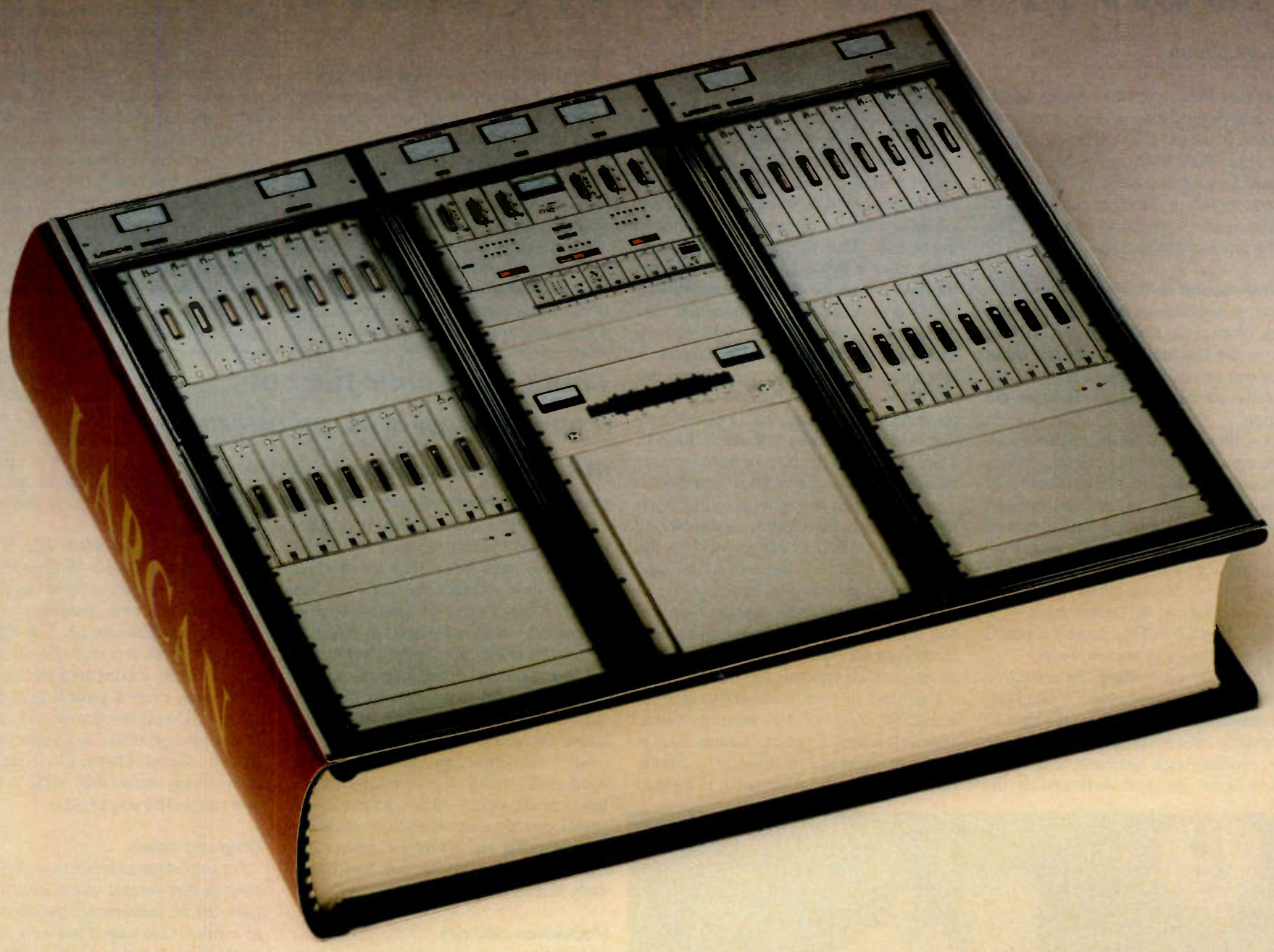
Bossard said the system overcomes a number of technical problems associated with conventional broadcasting. The FM approach does away with multipath while a vertical/horizontal polarization method allows simultaneous transmission of different services without interference.

Bernard said the system is different from so-called wireless cable technologies in that it is an FM signal, not an AM, and the signal-to-noise ratio is much lower in CellularVision.

"Wireless cable needs a high signal-to-noise for a good picture; 42 dB," he said. "We only need 8 dB. Wireless cable also requires a large antenna and line of site and has a serious multipath problem," he said.

Bernard said CellularVision Inc. is concentrating on developing the interactive capabilities of the system further.

In the New York market, where it plans to roll out a service over the next five years, the company will begin with a single transmitter serving a 28.5-square-mile "cell." That central "head-end" cell will be linked to others using point-to-point transmitters.



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Circle 32 On Reader Service Card

Fiber: A View With A Future

by Rick Lehtinen

Now that fiber optics has been a mainstay technology for broadcasters for over a decade, it is time to ask where it will go from here. Will fiber optics become an integral part of all facilities? Or will it become merely a transparent method of getting signals from point to point? The answer is a resounding both!

A thirty-second review

First, a word about how fiber works. Think of an optic fiber as a garden hose with an internal mirrored surface. Light enters one end of the hose, bounces back and forth off the walls, and falls out the other end.

But a fiber is a solid thread of glass. There are no mirrors. How is this bouncing beam accomplished? The answer is: through a principle called total internal reflection. The fiber is actually two or more different kinds of glass, each having a different refractive index. When light crosses the boundary between media of different refractive indices, it changes direction. (This is why a pencil in a glass of water appears to bend.)

By carefully controlling the refractive indices of the various layers of glass, fiber manufacturers can cause the light to constantly return to the center of the fiber, bending back and forth as it winds its way down the core. Surrounding the glass thread are various strength-providing members, buffering elements and protective coverings.

Depending on the diameter of the glass thread, light travels inside the fiber in many beams or few. Each light path is called a mode. Thus fiber can be either multimode or single mode.

The advantage of multimode fiber is lower cost. The disadvantage of multimode fiber is that it can only be used for limited distances. As the glass thread twists and turns through conduits and wiring trays, some modes will end up making long corners, while others will take straight paths. This spreads out the arrival time of a given burst of light, resulting in pulse dispersion. Pulse dispersion and other factors effectively limit to 1 or 2 km the distance a beam can travel without being recovered and regenerated.

Single mode systems can travel in much longer uninterrupted lengths, up to 50 km, depending on the loss budget and how the product is equipped. The cost for a single mode fiber optic transmission system is typically higher than multimode. One reason for this is that transmitters in multimode systems typically use LEDs, whereas single mode typically use lasers.

The glass in most multimode cables is either 50, 62.5, or 100 microns thick. (For reference, a typical human hair is about 80 microns in diameter.) Single mode fiber, on the other hand, is eight to 10 microns thick.

Most multimode fiber optic systems work at frequencies of 850 nanometers (nm) or 1300 nm, with some older systems operating at 660 nm. Single mode systems generally operate at 1300 nm, 1330 nm and 1550 nm. The 1550 nm band is most effective, but terminal equipment is more expensive.

It is possible to do wavelength division multiplexing—that is, to operate the same fiber at several light frequencies at once. If the input signal can tolerate it, time domain multiplexing is also feasible.

Think of an optic fiber as a garden hose with an internal mirrored surface.

Finally, a fiber optic is glass. Purified, to be sure, and specially formed into a long continuous thread, but glass nonetheless. As such, it is an insulator. Obviously, this means it can't carry current, but, more importantly, it is impervious to electrical noise. This makes fiber optics ideal for signal distribution in hostile electrical environments. Using fiber can virtually eliminate the need for humbuck coils and greatly reduce the need for equalization equipment.

All told, fiber can deliver a higher bandwidth—hence higher resolution and lower noise signal—than can coax. The signal can also survive harsh electrical environments and travel far greater distances. This accounts for much of fiber's early success in broadcasting.

Modulation methods

Most fiber is modulated in one of three methods. Amplitude modulation (AM), frequency modulation (FM) or pulse modulation (PM).

AM modulation is straightforward: The fiber optic transmitter varies the intensity of the light according to the instantaneous input signal amplitude.

In FM systems, the transmitter slews the duty cycle of a string of pulses according to the input waveform.

The PM, or digital systems, work by firing a series of pulses down the cable. Whether a pulse is present or not determines whether the receiver detects a "1" or a "0."

Amplitude modulated systems were the earliest. The advantage of AM was simplicity. The audio or video signals were more or less directly coupled to the photo diodes and receptors. Unfortunately, early photo transmitters and detectors often lacked sufficient linearity and stability to deliver outstanding performance. Further, in AM systems physical movement of the cable can result in amplitude shifts in the signal.

FM systems overcame these obstacles. They demanded less of the optical transmitter and receiver elements and had generally superior signal performance. This was achieved at a price, however. FM systems are complex, hence, expensive.

But FM systems are also good because the nature of the signal makes them self limiting and level correcting. As long as the receiver can detect the FM carrier and it is within the window of acceptance, a picture of proper level will be produced. The signal-to-noise figure increases dramatically only when the signal level falls below the window of acceptance.

On the other hand, AM systems typically have higher signal-to-noise, but lower overall distortion. The noise comes about because disturbances in either the cable or the electronics are indistinguishable from the signal, making it difficult to process them out. The distortion is low, however, because AM systems avoid a lot of the signal processing steps required for FM systems, lowering the potential for crosstalk and other problems.

Digital fiber on the scene

Digital systems present a new challenge yet offer exciting possibilities. Digital systems solve many of the distortion problems associated with other methods, but they require that every signal into and out of the fiber be in a serial digital format. This extra hardware can increase the cost of a digital fiber optic link, although the actual modulator and demodulator can be simpler.

Perhaps the true advantage of digital fiber optic modulation is apparent if one feeds the fiber with a serial digital video source. In this case, encoding or modulating is straightforward. The light goes on if the input is a one and off if it is a zero. Directly modulating the transmitter in this way saves a great deal of processing and simplifies design. There is, of course, the problem of integrating audio into the signal. Often, this is solved by interleaving audio data with video data in a simple framing system.

Drop and insert

An important advantage of digital systems is that several video and audio signals can be multiplexed down one fiber at a time. One important new approach to this is to send a signal around a bus operating at a 1 GHz or 2 GHz rate. Drop and Insert points around the network have the ability to drop (pull-off and receive), or insert (transmit) signals.

The bus signal is a large digital word consisting of several strings of ones and zeros. Each string contains one digitized video channel with four audio. To drop a signal, the Drop/Insert unit (DIU) listens to the appropriate string as it goes by. To insert a signal, the Drop/Insert unit replaces the appropriate string with its own encoded data. The Drop/Insert unit is capable of accessing any string or channel.

The digital advantage really shines once a facility couples a single channel digital video fiber optic system with a drop/insert system. In this case the DIU can also function as one end of the single channel link. This allows users to save roughly half of the expense of the link. At the same time, users gain the ability to switch a given node's signals to several other destinations. Different networks can be cross connected to provide broadcast quality digital video and audio over wide areas. Automated switching systems can make the interconnection fast and painless.

With the advent of digital fiber, point-to-point signal transmission via fiber optic is becoming more important than ever for television production.

Rick Lehtinen is a Senior Analyst in the Multimedia Division of In-Stat, Inc., a market research firm in Scottsdale, Arizona. He may be reached by writing **TV Technology**.

ESTUDIO DE VIDEO EN SU ESCRITORIO

por Richard Farrell

Fast Electronic GmbH, de Munich, Alemania fue inaugurada durante la primavera del año en curso. Uno de sus primeros productos lanzados al mercado fue la Máquina de Video (Video Machine) que con programas (software) agregados permite que la computadora funcione como un estudio de video de escritorio.

Su funcionamiento es sencillo. El video entra a la computadora y es digitalizado por medio del conversor A/D de la Máquina de Video. Una vez que el video ha entrado a la computadora y que aparece en la pantalla, el sistema permite al usuario cortar, mezclar y editar dos fuentes de video y simultáneamente agregar efectos especiales y hacer incorporaciones (transiciones) de la biblioteca de la Máquina de Video.

Una lasca (chip) digital codificadora al final de la operación total transfiere el producto terminado a una grabadora de cinta de video.

Requerimientos del sistema

La Máquina de Video puede ser utilizada con una plataforma IBM o MacIntosh. Para el Mac, el sistema requiere un Mac II o un Quadra con aceptación de NuBus, 8MB de memoria, un monitor (pantalla) a colores y el Sistema 7.

Para la plataforma IBM-PC, la Máquina de Video requiere un sistema 386 compatible con un "bus-slot" AT de 16 bits, 4MB de RAM, una tarjeta VGA a color 256 con 800 x 600 de resolución y el sistema Windows 3.1 para operación.

Los títulos, las gráficas y la animación puede importarse a la Máquina de Video de cualquier procesador de texto o programa de pintura o colores. La Máquina de Video tiene, además, una biblioteca de efectos especiales, más de 100 transiciones y efectos de video digitales en tiempo real, tales como desvanecimientos, efectos panorámicos, desplazamientos, aparición o desaparición gradual de una imagen, caídas, volteadas súbitas, una imagen dentro de otra, efectos de color, ampliación y disminución de tamaño, solarización y muchos más.

El sistema acepta PAL, NTSC y SECAM y permite la mezcla de fuentes PAL y NTSC. Las entradas y salidas de la Máquina de Video permiten incorporar las señales compuestas de video y S-video. La salida del video puede ser en PAL o NTSC compuesto (VHS, Video8), S-Video Y/C (S-VHS, Hi8) y hay la opción de usar YUV (Betacam) y RGB. El sistema acepta todas las grabadoras de video del mercado profesional y del mercado para el consumidor.

La Máquina de Video tiene dos sincronizadores que después de la digitalización, sincronizan los canales de video a la salida a un sincronizador externo (un sincronizador de estudio, por ejemplo). Otros dispositivos pueden ser conectados a la Máquina de Video sin necesidad de un corrector adicional de la base de tiempos (CBT).

La Máquina de Video tiene dos dispositivos de manipulación (uno para cada canal de entrada): uno cromático y uno de luminancia.

Almacenamiento compatible

Para fijar las vistas y sobreponer las gráficas y los videos en vivo, la Máquina de Video tiene 2 almacenamientos de vistas RGB de color de 24 bits con canal alfa. El almacenamiento de la versión Mac es compatible con Quicktime y la versión IBM PC es compatible con Windows GDI.

Las correcciones de entrada y salida son completamente programables.

La salida es totalmente intersincronizable con la fase H ajustable de los elementos de programación y la fase subportadora de color.

La Mácuina Video expresa el audio, ofreciendo apoyo para la targeta patrón de sonido.

Para mayor información sobre la Máquina de Video, comuníquese con FAST Electronic CmbH en el +49-89-50206-0; FAX +49-89-50206-199, o marque el No. **4 del Reader Service.**

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3M Professional AIV 16605
Intro: Betacam and Betacam SP videocassette line. D-3 Composite Digital Videocassette line. Scanner filler system for Ampex 1" VTRs.

Abekas 11551
Intro: A83 Component Digital Switcher; A57 Video Combiner; A65 Digital Disk Recorder; A51 Digital Special Effects Systems, other products.

Accom Inc. 12956
Intro: Editing environment.

Acrodyne Industries Inc. 15704
Intro: ADAM Acrodyne's Digital Amplitude Modulation transmitter. TLH/1K solid state 1 kW VHF TV transmitter/translator. TLU/1KSCE solid state 1 kW UHF TV transmitter/translator.

Advanced Audio Visual Systems 12747,12847-12849
On Display: S-310 digital video analyzer. EVA video automation control system. ACCESS 2000. S90 video multiplexer.

Advanced Digital Imaging 20051, 20151
Intro: A.D.1 Board.

A.F. Associates, Inc. 17353
Intro: Legislative production control system. Radamec EPO "See and Select" true video touchscreen. RP2 robotic and manual camera pedestals.

Audio Precision Inc. 3215
Intro: ATS-1 Programmable Audio Test Set

Audio Processing Technology - APT 4301/2
Intro: DSM100 Digital audio transceiver. ACE100 PC expansion card.

Audio Video Engineering 13611
On Display: Video hum-stop coil HSC-1 and HSC-2.

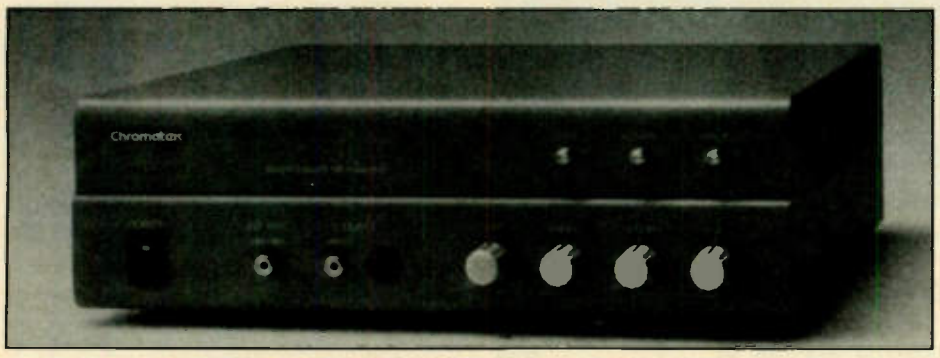
Audio-Technica US Inc. 11906
Intro: Engineered Sound line of sub/miniature Microline condenser microphones.

Auditronics Inc. 1002
Intro: AirMaster 90 consoles.

Aurora Systems 19401
Intro: Liberty hardware and resolution independent paint, typography, image processing, rotoscoping, morphing, 2 1/2D animation software.

B & B Systems, Inc. 12147
On Display: Contractors to build full-service broadcast and industrial TV facilities. Stereo audio monitoring equipment.

BAF Communications Corp.
Intro: CF-8000e-225 SNV Production Satellite News Vehicle. CF-8000c-207 SNV. ENG-18B. VSAT-18 Mobile VSAT System. IFB-MS-1 IFB Management System.



Chromatek's Model 9101 Downconverter

Alamar 12429
On Display: Automation systems: MC-2075, MC-900, Mini-Media Manager, Media Manager IV, NDP-100SX, SPS-100SX, MC-950FX, SC-2100. ESbus/ESnet Interface Controller Card. Novell Gateway.

Alexander Batteries 11113
On Display: Replacement batteries. Battery maintenance equipment.

Allen Avionics 19558
Intro: AVS Series miniature lowpass video filters. RF and microwave waveguide filters.

Alpha Image Inc. 18032
On Display: Digital production switchers: Alpha 500 and 501 and Alphie.

Alta Group 18032
Intro: SSR-1 still store. AP-30 component analog production system. Pegasus composite production switcher.

Altronic Research 3803

American Broadcast Systems 13413,13414
On Display: MicroCart 100 AutoDisc television spot playback system. MicroCart 50 Smart Cart software. VideoMGR data based tape library management software. Still/MO video library system. Master Clock option.

Ampex Recording Media Co. 17101
On Display: Video and audio recording tapes: DCT700t Series, Ampex 398 Betacam SP, 329 D2, 229 D1, 196 & 296 1", 197 & 297 U-Matics, 499, 456 and 489.

Ampex Systems Corp. 17101
Intro: DCT System CCIR-601 digital component production system.

Angenieux Corp. of America 17729
On Display: Studio and anamorphic lenses.

Antenna Concepts 4520
Intro: MMDS Slot antenna.

Antenna Technology Corp. 13644-13744
On Display: Satellite earth stations and related electronics.

Anton Bauer 12427
Intro: Logic Series digital battery system. Ultralight 2 on-camera light. Automatique. MP-4D microprocessor. DM-4 discharge/module battery evaluator.
Also: Camera batteries. Microprocessor chargers. Ultralight accessory lighting systems. Gold Mount battery bracket system. Universal battery belts and accessories. D.C. power supplies.

Applied Memory Technology 18282
On Display: Model 7422 Digital Component Video Recorder.

Asaca/ShibaSoku Corporation of America 16619
Intro: ADC-920 D1/D2 Tape Cleaner & Rewinder. ADR-6000 Digital Disk Recorder. ADS-7000 HTV Still Store. AG31A Digital Audio Generator.

ASC Audio Video 10551/10552
Intro: NEW CASE off line video editing system. VIRTUAL recorders.

ATI-Audio Technologies, Inc. 12902,12903
Intro: System 10000 Modular Amplifiers: LA10000 and MA10000. Plug-In mono and stereo DAs, plug-in mic and line amps, single and dual-channel units.

beyerdynamic Inc. 1912
Intro: DT 190 Sportscaster Headset/Microphone Combo. DT 150 Monitoring Headphone. MC 834 Large Diaphragm Condenser Microphone. MEM 86 Set Shotgun Microphone System. MCE 50 Series Miniature Clip-On Microphones. M4424 Control Room Talk-Back Microphone. VHF and UHF wireless microphone systems.

Broadcast Microwave Services, Inc. 12302,12303,12304
Intro: RMR-50A receiver.

Broadcast Video Systems 16736
Intro: PC boards.

BTS Broadcast Television Systems 18001
Intro: LDK cameras. Switchers. Digital products. Betacam products.

Cablewave Systems, Inc. 15708
Intro: E30 Waveguide and connectors for MMDS/ITFS. Directional antennas. Flexwell coaxial cable and elliptical waveguide.

Calaway Editing 18032
On Display: Off-line and on-line editing systems. CE-400.

Canare Cable, Inc. 11118-11112
Intro: DA206 110SL cable. 110SL-75SL impedance transformers. RGBS component video multi cable.

Cayman Graphics 11323
Intro: Real-time anti-aliased freeform broadcast quality character generator.

CEL Broadcast 19772
See: Snell & Wilcox

Central Tower, Inc. 2506
Intro: Frequency-matched tower sections. Series R, L, & H Towers.

Century Precision Optics 18472
On Display: TV camera lenses. Video accessories.

Channelmatic Inc. 12827
Intro: ADCART D digital ad insertion system.

Chromatek 17585/685/785
Intro: Model 9101 Palmedia scan converter. Model 9135 scan up/down converter. Model 9140 scan converter. Models 8404 & 8406 multi screen splitters.

Chyron Corp. 19401
Intro: Maxine character and graphics system. Centaur Video Adaptor. Codl Font Maker software.

Cinemills Corp. 16660
Intro: Silver Bullet 20 kW Tungsten halogen lamp head.

Circuit Research Labs 1918
Intro: TVS-3005 TV SAP Generator. DAA-50 Digital Audio Interface Analyzer. DAA-100 2-channel Function Generator. AES/EBU Audio Link Analyzer.

Clark Wire & Cable 13262,13362
Intro: Piggy pack light weight camera.

CMX Corp.
Intro: Omni 1000E. CMX Cinema.

ColorGraphics 18032

Colortran, Inc. 17619
Intro: Medallion, Encore XL, Encore 24/48 and 48/96 Lighting Control Consoles.

Comark Communications, Inc. 15746
Intro: IOX transmitter line.

Comlux 11329
On Display: Fiber optic single channel transmission system.

Comprehensive Video Supply 16106
Intro: Video amplifiers, multimedia monitor cables, desktop video production accessories, VGA to NTSC/PAL scan converters, video capture, delay boards, videotape logging system, and DTV production tools. Digital Edit Master editing system.

Computer Assisted Technology 19560,19561
Intro: CAT/SV Version 1.0 management program.

Computer Engineering Assoc. 19758
Intro: DGUX 530 work station.

Computer Prompting Corp. 16943
Intro: CPC-700 CaptionMaker Plus SMPTE time code based & CPC-600 CaptionMaker CLOSED CAPTIONING software.

Comrex Corporation 12506
Intro: Digital Audio Codecs. Frequency extenders. Talk console. Telephone couplers. Wireless IFB system.

Comtech Antenna Systems, Inc 13403,13404
Intro: EC8 control system. 1.8 meter Fly-Away system.

Comtek Inc 11129
Intro: IFB products.

Concept W Systems 13356
Intro: Camplex CP-301 Series multiplexing systems.

Datatek Corp. 13814
Intro: D-2540 Serial Digital Audio Routers. D-2535 100 MHz Video Router.

Dataworld 4818
Intro: TV allocation mapbook. LPTV detailed interface studies. Wireless cable spacing studies.

DaVinci Systems 18032

DCM 19175
Intro: DCM-PC PC-based version of NewsData newsroom automation software with video editing capabilities.

DeSisti Lighting 17978
Intro: Studio lighting suspension equipment.

Di-Tech Inc. 13103
Intro: Model 5880 AFV routing switcher. 128 x 160 matrix.

Dielectric Communications 15719

Digital Arts N/A
Intro: Digital Artist 3D modeling/animation software.

Digital F/X, Inc. 18881
On Display: Broadcast products: Composium, IMPACT, TitleMan. Desktop post: Video F/X plus. Audio post: Digital Master Ex, Waveframe 400, 401, 1000.

Digital Micronics N/A
Intro: Digital Editmaster editing system.

DPS Digital Processing Systems 11930
Intro: MicroSYNC A/V 4 field composite video/stereo audio follow synchronizer; Personal Recording Studio; Personal TBC IV.

Display Devices 13634
Intro: Cable Management System.

Dolby Laboratories, Inc. 3908
Intro: Model 740 Spectral Processor. DP91/DP92 AC-1 Digital Audio Decoders. DSTL digital aural STL accessories.

Dynair Electronics, Inc 16623
Intro: DATA-Link RS-232 signals. Snelec PRISM graphics/video display system.

Dynatech Corp. 18032
See: Alpha Image/Alta Group/Calaway Editing/ColorGraphics Systems/Da Vinci Systems/NewStar/Quanta Corp/Utah Scientific
On Display: Digital and analog products.

Editflex Systems 19485
Intro: Editflex III digital editing system.

Editing Machines Corporation 19755

Editing Technologies Corporation/ETC 19172
Intro: Ensemble Pro editing system.

EEV, Inc. 16640
On Display: UHF amplifying devices. Leddicon camera tubes. Power tetrodes.

Electric Image
Intro: EIAS Animation System version 1.5 3D graphics system. Transporter model converter utility. Projector for VTR control. IMAGE file conversion. Mr. Font PostScript conversion into 3-dimensional models. Camera rendering engine.

Emcee Broadcast Products 16033
Intro: TTS100HS wireless cable transmitter. TTV1000ES VHF broadcast transmitter.

Ensemble Designs 12462
Intro: Catalyst digital composite keyer.

ESE 13401,13402
Intro: ES-201 & PC-207A video distribution amplifiers. PC-2119 black burst generator. PC-217 audio DA. PC-237 wideband video DA computer card. ES-770 time code reader programmer.

Fairlight 12762

FAST Electronic US 17348
On Display: Video Machine hardware/software system.

Feral Industries 15733
Intro: Micro 4:2:2 Board-level TBC/Synchronizer. C-100Plus TBC/Synchronizer.

Fiber Options 16314,16414
Intro: 312B Stereo Audio Transmission System. 315B Digital Stereo Audio Transmission System. 175B High Resolution Video Transmission System. 290B SMPTE 207M Digital Control Transmission System.

Flash Technology 1618
Intro: FTS 2100 System Monitoring and Reporting Telemetry.

Folsom Research N/A
Intro: OTTO scan converter.

FOR.A Corp. of America 18938
Intro: VPS-300 video production system. MF-300 Multifex.

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UDP-2000 and UDP-5000 universal digital processors. DVM-400 digital component video mixer. PAM-300 audio mixer.

Frezzolini 13419
Intro: AR304 & AR124 4-channel autoranging NiCad battery; AR301 single channel auto ranging 12-30V, 1-12AH; MC-2, SC-2 Master Charge systems.

Gennum Corp. 17575,17675,17775
Intro: Digital ICs: GF9101 Multirate Digital Filter. GENLINX Serial Digital Chipset. Analog ICs: GS4881 Sync Separator.

Getris Images SA 19764
Intro: Dynamic Paint. Sony DNS-1000 still store in Getris Image systems.

GML, Inc. 1700
Intro: Model 9100 Rack Mountable Level Mixer.

Graham-Patten Systems, Inc. 12447
Intro: D/ESAM 400 audio mixer

Grass Valley Group 16933
Intro: Model 1000 and 4000 component digital production switchers. Super Edit editing software. SMS-8000 serial digital signal format converter. MCF Series multi-change fiber optic transmission system. 8800 Series video distribution amplifier.

Harris Allied Broadcast Equipment 2218
Intro: TV-RF: Sigma IOT UHF TV Transmitters. Platinum Series HT 1000EL Solid State VHF TV Transmitter. Systems: S-2A Air-Transportable Satellite Uplink System. S-18A Satellite Communications Vehicle. Remote Control: Digitrol 128.

Hedco 19739
Intro: Serial routing switcher modules for the Xplus series. GPI and joystick router control panels for the Xplus series. Xplus series routing switcher modules and control panels.

Hitachi Denshi America 17546
Intro: Studio/hand-held digital video processing cameras (concept); SK-F380, SK-F38 cameras; Z-ONE-C camera; RU Z1 Remote Control Unit..

H.L. Dalis 18867
On Display: Belden Wire & Cable, Switchcraft and Neutrik audio connectors, Kings Video connectors, S-VHS video, audio and DAT tapes. Crimping tools, coaxial strippers, cellular phones and accessories.

Horita 13447-13449
Intro: GPS-based Master Time Code and Sync Generators. PC plug In boards, Blackburst/sync and tone. Video distribution amp.

Hotronic, Inc. 13617
Intro: Broadcast Switcher Model AQ21/AQ21-SF/AQ21-SP.

Ikegami Electronics (USA), Inc. 19319

ImMIX 16684
Intro: VideoCube digital post production workstation.

Image Logic Corporation 17778
Intro: AUTOCAPTION PC-based system for closed captioning videotapes during post production. Direct Caption Card.

Imagine Products 10553
Intro: Micro Reader miniature LTC reader.

InnoVision Technology 18284
Intro: MONTAGE.

Innovision Optics 17569-17769
Intro: Remote control 3 axis mini jib arm. Probe lens system. Mini-mover motion control systems. Flexible fiber optic lighting systems.

Intelligent Resources 17181
Intro: Version 3.0 architecture system.

Intelvideo, Inc. 19205,19206
Intro: Model DEC7 NTSC Color Decoder. Model INR Impulse Noise Reducer.

IRIS Technologies, Inc. 16371,372,373
Intro: IRIS Desktop Control Platform. Video Commander 64 and 16.

IRT Electronics Pty. Ltd. 17973
Intro: Portable VA-393/394 Analog Video & Audio Fiber Optic Transmission system for temporary circuits and location where equipment housing racks are not available. Also, the Video Isolator, 500 V in modular form, which provides hum isolation between studio building and other separated locations.

Jampro Antennas 3424

J.N.S. Electronics, Inc. 2306,2307,2308
Intro: RFL-700 1.5-2.3 gHz Digital Microwave System.

JVC Professional Products Co. 16046
Intro: KY-27U 3-CCD LoLux Camera. BR-5525U S-VHS player. GY-X2U S-VHS camcorder. TK-F7300 high resolution image capture camera. BR-5422 dockable recorder.

Karl Heitz, Inc. 13631
Intro: Peri-Apollar Panoramic Lens. Kinoptik Macro-Apochromats. Gitzo Fluid Video and Photo head.

Kline Towers 20053
Intro: Joint venture with Dielectric: design, fabrication, construction and installation of towers, transmission equipment, antennas, inspection, maintenance services, HDTV studies, structural design analysis, requirements.

Knox Video Products 16433
Intro: Desktop Video Manager.

LDL Communications 19734
Intro: Remote Diagnostic System provides PC pictorial presentation of LARCAN transmitters' operating panels & flow diagrams.

Intro: HMI 200 W S/E Cinebar. HMI 200 W S/E handheld torch. HMI 575 W S/E Cinebar. Quartz 20K incandescent light.

Magni Systems, Inc. 19158
Intro: Extension of Magni Monitor.

MainFrame Computer Graphics 19565-66
Intro: Latest INSCRIBER and RTX versions. VMAXX board from Interlace Engineering.

Matrox Electronics Products N/A
Intro: Matrox Studio desktop video post-production suite. Personal Producer for Illuminator-16 editing system. Illuminator-PRO videographics board. Matrox Marvel multimedia controller.

Maxell Corp. of America 16122
Intro: Videocassettes for 1/2" digital VCRs.

Media Computing, Inc. 1106-1108
Intro: pcTV2 software and hardware.

MERET Optical Communications 17278-79
Intro: OmniSpeed 500 fiber optic serial digital link. Live Link 100 and 200 fiber optic links. Live Link 450 HDTV fiber optic transmission system.

Micro Communications Inc. 18946
Intro: HDTV Feasibility Study. HDTV Multi-channel Antennas. HDTV Filters. 7/8 Coax Switch. LPTV Bandpass Filters.

Micron Audio Products, Ltd. 17772
Intro: TX-631 switchable frequency wireless microphone transmitter. SR-623 switchable frequency receiver.

Microwave Radio Corp. 13801
Intro: MicroLink III/Series 2 18/23 gHz radio system.

Videoquip Research's Phase 3

Leader Instruments Corp. 11703-11706
Intro: Model 2250 4-channel 250 MHz oscilloscope. Model 952-TV/CATV/SAT signal level meter. Model 408NPS video test signal baseband/RF generator. Model 5872 combination waveform vector monitor.

Lectrosonics, Inc. 12508
Intro: CR195 UHF field receiver. UDR195 studio receiver.

Leitch Video of America, Inc. 19739
Intro: ARG-880 audio and VRG-680 video remote gain distribution amplifiers.MIX-7000 Series Digital Interface Series. Serial Interfaces for DCD-3500 Encoder/Decoder Series. STILL FILE still storage systems additional features.

Lenco Electronics 11662
Intro: Model PRC-865 video AGC processing amplifier. Audio and video DAs. PVA-152 video DA. PAA 652 audio DA.

Listec Video Corp. 18816
Intro: A-6000 PC Prompter Program. A-5500/A5501 Scrollbox. A-5505 Scroll-Buddy.

Lowel-Light Mfg. Inc. 16646
Intro: L-Light eye light.

LTM Corp. of America 16081
Megahorn and dual megahorn antennas. Power supplies for ProStar transmitters. PC-100 3.0 Antenna Control System.

Miller Fluid Heads (USA), Inc. 15738
Intro: Miller 25 Fluid Head. Single & 2-stage carbon fiber tripods.

Miranda Technologies 16663
Intro: SDM-100A 4:2:2 to RGB or YUV DAC, SDM-300 serial & parallel 4fsc to NTSC or PAL DAC, Titania 3D DVE for Matrox Studio, other signal processing products.

Montage Group Ltd. 11115-16
Intro: Montage III Picture Processor Models 35, 70, 100 professional non-linear editors. Personal Picture Processor software.

MTR AG electronics
On Display: Supervisor 7712 touch panel and routing switcher systems.

Multidyne Electronics, Inc. 13619
Intro: RT12-RM Rack mounted NTSC Test Signal Generator.

NEC America, Inc. Best. Equip. Div. 16611
Intro: VF-1 Magneto-Optical Disk. TI-123A CCD Camera.

NVision, Inc. 17726
Intro: NV5000 Universal Sync Generator. NV3064 Series of 64 x 64 routing switchers for AES/EBU, time code and machine control.

Nagra/Phi Tech 12206
Intro: NAGRA D digital field recorder with SMPTE/EBU timecode.

National Transcommunications 18178
Intro: System 2000 video compression system.

Nemal Electronics Intl. Inc. 11562
Intro: Audio/video cables.

Neutrik 2800,2801,2802
On Display: Audio XLR connectors. 1/4" and TT plugs. Patch cords. Goosenecks. XLR adaptors. Audio test and measurement equipment.

NewsMaker Systems 19459-19461
On Display: PC-based NewsMaker Electronic Newsroom Release 4.0.

NewStar 18032

Nikon Electronic Imaging 18878
On Display: ENG/EFP and TV lenses.

Nova Systems Inc. 13843
Intro: NovaSync 3 Frame Synchronizer Card. RGB/Component Video Routing and Distribution Systems.

Nucomm, Inc. 13341
Intro: 2-rack mounting space baseband and heterodyne transmitters and receivers for STL and ICR usage.

O'Connor Engineering Labs 16649
Intro: Quick Release Carbon Fiber Tripod. 1030 Fluid Head.

Odetics Broadcast 18932
Intro: TCS 90 cart machine. S-VHS on Accu-Cart. Multichannel playback system.

NAB '93 Show Plans Focus On Technology

(continued from page 1)

ed," Dobson said. "That many addresses in a neighborhood of that size requires five digits. But rather than educate 50,000 people on how the numbering system works, we divided the floor into bite-sized chunks."

As always, each exhibitor will get a different booth number, but the floor will contain different colored carpets to make it easier to navigate.

"Just look at your feet, and you'll know what section you are in," Dobson said.

Another change from last year that might draw attendees' notice will be an increase in security, Dobson said. The increase is mainly in response to last year's incident in which a speech by former U.S. President Ronald Reagan was disrupted by a political activist.

"That is something that is very difficult to predict," Dobson said. "But having had that experience in 1992, it has affected the way we address the entire matter of security."

Watchful eyes

Although Dobson could not say how many additional security personnel have been added, he did say there will be a "much higher level of security for 1993 and beyond."

"We will not have a police state, but there will be a significant increase over 1992," he said.

Dobson said more care will also be taken when assigning credentials (the activist who accosted Reagan gained entrance to the show by obtaining a press photographer's badge), however, he said it is uncertain what form this new scrutiny would take.

"(The Reagan incident) was an extraordinarily difficult situation to intercept," he said.

The NAB is also continuing its program of coordinating its show with that of smaller groups. This year's show will coincide with meetings of the Radio Advertising Bureau and the International Association of Broadcasters.

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O.L.E. Ltd. 10157
Intro: New features to the Lightworks editing system, both hardware and software.

Omicron Video 13041
Intro: Model 558-41/N NTSC D2 Digital Video serial and parallel with digital audio 4x1 routing switcher. Model 703/704 and 751/752 omnigen Amiga computer gen-lock system.

Optibase
Intro: Series 2000 MPEG playback boards.

Optical Disc Corp. 16072
On Display: LaserDisc recording systems. Recordable Laser Videodiscs.

Options International 18943
Intro: Super 16 Combo Telecine Gate. Low Mass Minimat Particle Transport Roller Assembly. VIEW Visually Integrated Edit Workstation. High speed lens.

Ortel Corporation 18172/18272
On Display: Microwave fiberoptic links.

Paltex Editing Systems 16249
Intro: EDDISX A/B-Roll Desktop Video Editor.

Panasonic Bdcst & Television Sys. 18019
Intro: AJ-D340 D-3 1/2" digital composite studio VTR; AG-3 S-VHS-C camcorder; AJ-DX10 1/2" digital component studio VTR.

Panasonic Comm. and Systems Co. 18019
On Display: LQ-4000 rewritable video disc recorder/player. TQ-3031F videodisc recorder/player.

Parallax Software Systems 15177
Intro: New broadcast version of Matador 2D Animation System.

Perrott Engineering Labs, Inc. 16317,16417
Intro: System 90 battery charger.

CMX OMNI 1000E

PESA Electronica S.A. 19401
Intro: System 5: SD5000 serial digital routing switcher. RM4000 stereo audio switcher. Enhanced control panel. AES/EBU serial digital audio routing switcher. Small scale routing switcher system.

Pinnacle Systems 16126
On Display: FlashFile Still Storage and Management System. Prizm Video Workstation.

Pioneer Communications of America 18481
Intro: Updated version of Rewritable Videodisc Recorder.

Portland Instruments N/A
Intro: HME 3-level intercom.

QSI Systems Inc. 16333
Intro: Model 824, 824P, 808, and 808P Image Inserters. Model 9000 Image Manipulator/Inserter.

Quanta Corp. 18032
Intro: Enhancements to the Delta and Orion character generators.

Quantel 17126
Intro: New products and enhancements to existing systems.

RTI 14046
Intro: Tape evaluator/recycler.

Radio Frequency Systems, Inc. 15708
See: Cablewave Systems
Intro: E30 Waveguide and connectors for MMDS/ITFS. Bogner low and medium power directional antennas.

Rank Cintel 12441
On Display: URSA Telecine. Turbo 2 Telecine.

RF Technology 13129
On Display: RFL Series fixed microwave systems. D Series portable transmitters and receivers. UPL line. MM3000 transmitter. 200DX receiver. DM-2 and DM-8 digital codecs. SVX-140T satellite video exciter.

RGB Computer & Video 17985
Intro: AmiLink/0S2.

Richardson Electronics, Ltd. 12806-12808
Intro: Shure microphones. GE lights.

Ross Video Ltd. 16109
Intro: Vision 50 Video Production Switcher.

Sachtler Corp. of America 13822
Intro: Off Ground Spreaders. Video 18 & 20 Series III. DA 150 HD & DA 150 HD 2. OB 1 & XL-II. XL-II Dolly. Fresnels. Reporter 20H/50H.

Sanken Microphone Co Ltd 2002
Intro: CQ-1 4-channel microphone.

Schmid Telecommunication 1612-1614
Intro: SIAT-MAX audio generator.

Shereff Systems 19769
Intro: Deputy CG upgrade.

Shively Labs 1209
Intro: FM translator antennas. Panel antenna designs.

Shook Electronics, U.S.A. Inc.outside area A
Intro: Model 32-40 production truck. EFP/SNG trucks.

Shure Brothers, Inc. 11901
Intro: L5 portable wireless receiver. EC Series wireless microphone systems.

Sierra Video Systems 12438
Intro: Model 1616D Serial Digital Video Routing Switcher. Model 88VS Compact Video/Stereo Audio Routing Switcher.

Sigma Electronics, Inc. 16260
Intro: Series 3200 routing switcher. Series 1000 transcoding/CAV distribution/digital products.

SIRA Sistemi Radio 16075
On Display: Broadband FM, VHF and UHF antenna systems, combiners and coaxial components.

Snell & Wilcox 19772
Intro: Standards converters, including world launch of Alchemist with PhC (Phase Correlation motion estimation), and HD 5100 HDTV Upconverte. Also Gazelle slow motion system, HD 3100 "cross converter". CEL Broadcast will show its range of broadcast standards converters and DVEs with some new additions; there will also be a new range of utility equipment.

SOFTIMAGE 16675
Intro: 2D video editing software.

Soft Touch 16943
Intro: Digital-CCE/PC closed-caption encoder. Portable closed caption decoder and character generator.

Softech Systems 17576
Intro: NewsView for WINDOWS.

Solid State Logic 15726
On Display: Scenaria digital post production system. SL 8000 G Series multi-format production system with Ultimation. ScreenSound digital audio editing. SoundNet digital audio network.

Sony Business & Professional Group 11711
Intro: Digital Betacam-compatible products: VTRs, players, multicassette machines. Digital component devices: switchers, effects processor and editors. Peripheral device for D-2 composite recorders.

Sony Recording Media-Pro Tape Div. 11711
Intro: BCT-D Digital Betacam videocassettes. V1-KQ 1" videotape.

Soundcraft 15713
Intro: B-100 Broadcast Console. Folio Compact Consoles.

SSAC N/A
Intro: Photoelectric Control PCR Series.

Stainless, Inc. 16113,213,313,413
On Display: Guyed and self supporting towers for broadcast, microwave and communications applications.

Standard Communications Corp. 13624
Intro: MT-900 intercontinental rebroadcast satellite TV receiver. MT-600 continental commercial satellite TV receiver.

Storeel Corp. 16642
Intro: Room stretchers systems for 8mm tape.

Strassner Editing Systems 13630
Intro: Studioheart.

Studer Revox America, Inc. 1218
Intro: Dyaxis II Multichannel Digital Audio Workstation. D730 and D731 CD players. C221 CD players and MB16 professional mixer.

Sundance Technology Group 13062/13162
Intro: RADIO non-linear editing engine.

Swintek EnL Inc. 12805
Intro: MARK IL-SM58 studio microphone system.

SWR 16043
Intro: SW8 low power TV antenna.

System Associates 13431
On Display: Video tape recorders. Editing systems. Edit controllers/time code. Cameras. Film chain. Character generators. Digital video effects. Switchers. Terminal equipment. Test Equipment. Routing equipment. Time base correctors.

Tally Display 17782
Intro: AMPLED audio monitoring presence and level detector. Output contacts.

Tekskil Industries, Inc. 17275
Intro: Companion 9 System field prompter. Easyview 15" monitor prompter. Valuprompt speech prompter. Valuprompt computer prompter.

Tektronix, Inc. 17119
Intro: Digital-only waveform monitor.

Telecast Fiber Systems N/A
Intro: Sidewinder XL fiber optic video/audio snake system. Microphone snake reels. Shipping cases.

Telemetrics, Inc. 18951
Intro: TM-9255 Coax Connected Camera Control System.

Telescript, Inc. 18811,18911
Intro: Notebook Computer Prompting System. Newsroom Computer Prompting System.

Television Equipment Associates N/A
Intro: 11 MHz DIP delay lines. 70 MHz IF filters. Group Delay Equalizer Networks.

Television Technology Corp. (TTC) 13806
Intro: IOT transmitter. New version UHF transmitter.

Telex Communications, Inc. 19414
On Display: Broadcast and professional audio equipment. RTS brand intercom line.

Telos Systems 1026
Intro: Systems for television talk show programs.

Tennaplex Systems 15729
On Display: HDTV-ready UHF TV panel antenna.

Tentel Corp. 13408,13409
Intro: Video head protrusion wear and drum eccentricity gauge.

Thomson Broadcast 15746
Intro: TTV 9100 CCIR 601 digital video switcher.

Thomson Digital Image (TDI America) 15746
Intro: Blob Modeler and Animator computer software.

Thomson-LGT 15746
On Display: TV transmitters, FM transmitters. Transmitting and receiving antennas.

Tiffen Manufacturing Corp. 16338-40
Intro: Warm Pro-Mist and Soft/FX filters. Clear & UV haze filters for EFP studio/field lenses. Davis & Sanford tripod models.

Time Logic, Inc. 19172
Intro: APDU-200PC Automatic Tape Control System.

TimeLine, Inc. 2206,2207
Intro: Lynx 2 Micro Lynx. VITC interface.

Torpey Controls 16827
Intro: Digital Time Displays, capable of running from SMPTE, ESE or DQS time codes, and also feature 12- or 24-hour decoding and PBS 30-hour translation. The CLK-50 Digital Master Clock. Production Timers.

Toshiba America C.P. Inc. 11841

Touchvision 15369
Intro: D/Vision Pro version 2.1 video editing software.

Truevision 10150
Intro: ATVISTA digital videographics board.

TV Answer 16681
On Display: 2-way interactive television.

Ultimatte Corp. 12951
Intro: CINEFUSION software.

Utah Scientific 18032
Intro: MC-601 digital master control switcher.

Varian Microwave Equipment Division 16101
On Display: Tubes and satellite communications equipment.

VGV, Inc. 18013
Intro: DX-60 composite digital downstream keyer.

Video Accessory Corporation 11127
Intro: S-Video and Y-C Video Brick Video Distribution Amplifiers. Genlockable Sync and Black Burst Generator. Video Brick Rackmount System.

Video Design Pro 14041
Intro: CableDOC Manager and CableDOC BC (barcode) cable documentation software. VCPro F17 Documentation Workstation.

Video International Dev Corp 16066
On Display: Converters: DTC 1204 digital std. DTC 1504 digital TV std. DTC 4500 motion vector std. SFLC 5000 graphics scan.

Videomagnetics 18010-210
Intro: CDS-2500 tape degausser.

Videomedia S.E.D., Inc. 16669
Intro: V-LAN animation and desktop video products: ANIMAX animation controller. OZ video editing software. Auto-PICT QT Version 2.0 QuickTime animation software. ALIX animation and editing control modules. V-LAN-CX animation modules.

Videoquip Research Ltd. 1607
Intro: DAVE-2000 Series II digital audio voice editor. SD-2 silence detector. MP-2 microphone preamplifier. VP-2 extended range VU/PPM meter. ALA-8 audio level amplifier. BG-2 safe border generator.

Videotek, Inc. 16253
Intro: Omniframe video and audio distribution. APM-800 rackmount audio program monitor.

VizuAll 12162,12262
Intro: Personnel Manager.

VYVX National Video Network 18884
On Display: Television transmission services. First Video production facilities.

Ward-Beck Systems Ltd. 12501
Intro: 2 new DA models; enhancements to MicroCOMII Communications System.

Wegener Communications, Inc. 5414
Intro: MPEG-based line of digital audio products: DR95 and DR96 SCPC Digital Audio receivers. DR180, DR185 and DR190 Subcarrier Digital Audio Receivers.

Will-Burt Co. 19201,19202
Intro: NightScan pneumatic mast.

Winsted Corp. 11927
Intro: Ergonomic Series of Multimedia workstations for desktop editing. System 90 Series of hi-tech post production consoles.

Wohler Technologies 18566
Intro: Digital input option. MSM-2 2-rack space unit.

Wolf Coach, Inc. 11933
Intro: 450Bx body style for SNG.

WSI Corporation 13343
Intro: WEATHERwatch crawl generator and warning system. NEXRAD Imagery. WEATHER for Windows & WEATHERmac software packages.

Yamashita Engineering Mfg Inc 15733

Video International
Intro: EDEC-2000 Digital Decoder and Line Doubler. CVS-907 VGA-to-NTSC Scan Converter. CVS-970AL Scan Converter. CVS-980M Monochrome Scan Converter.

Zero Stantron N/A
On Display: Racks and consoles.

Negotiating the Microwave Path

RF TECHNOLOGY

by Doug Lung

Throughout my 15 years in broadcast TV, I would have to say the majority of microwave paths I have been asked to check out have been misaligned. Many times the people doing the original aiming—riggers, engineers or whoever—were sure absolutely sure the path was aimed right and felt the problem had to be equipment or a path obstruction.

How does this happen? On a well-designed microwave path, the fade margin is often 30 dB or more. At this level, even if the microwave is adjusted on a sidelobe, an adequate signal will be received—adequate until a heavy rainstorm or a temperature inversion. By this time, the microwave transmitter or receiver is suspected. No one wants to climb the tower to re-aim the dish!

On the ground

If you are modifying an existing installation (perhaps installing a larger dish) and are reasonably sure the original installation was aligned properly, note the AGC reading on the microwave receiver *before* you change the dish. With a larger dish the reading *must* indicate a greater signal strength. Upgrading from a four-foot to a six-foot dish should increase the signal at least 3 dB. From a six-foot to eight-foot dish, expect to see an increase of at least 2 dB.

For new installations, much grief can be eliminated by calculating what the signal should be at the receiver. Several computer programs exist for doing this. Assuming the path is clear and you will be aligning the dish in good weather (no rain or temperature inversions) a simple free space path loss calculation is good enough.

The formula for calculating path loss is simple:

Path loss (dB) = 36.6 + 20log(frequency) + 20log(path length)

Frequency is in megahertz and path length is in miles.

The formula for calculating the received signal level requires that all values be expressed in dB. Transmitter power is in dBmW. (30 dBmW = 1 watt) Add both antenna gains and transmit power, then subtract both line losses and the path loss from the formula above. Most microwave receivers need -40 to -50 dBmW for a decent picture with a threshold of -70 dBmW. You can find antenna gain and waveguide loss numbers in the Andrew and Cablewave catalogs.

Received Signal (dBmW) =
Transmitter power (dBmW)
+ Transmitter antenna gain (dB)
+ Receiver antenna gain (dB)
- Transmitter waveguide loss (dB)
- Receiver waveguide loss (dB)
- Path loss (dB)

For quick calculations, I recommend a program on the Broadcast Professional's Forum on CompuServe (BPForum) called STLPAT.BAS. This basic program can be run on almost any computer that has a Basic interpreter or compiler. In addition to calculating path loss and signal strength, it calculates the path length from the latitude and longitude of the path ends. This program uses the U.S. FCC's method of calculating distance, which is slightly different from the great circle result. It should be close enough for most applications. If you are not familiar with the CompuServe broadcaster's forum, check it out. While most of the participation is from broadcasters in the U.S., more engineers from other countries are starting to show up as CompuServe adds international gateways.

Look in the microwave unit's manual or test data for a graph showing input level versus AGC meter reading (or voltage). If you cannot find it, call the manufacturer and complain! When the antenna is aligned properly, you should see a reading near this value, at least within 6 dB if conditions are good.

Donuts?

After calculating the signal to expect, what is the best way to aim the antennas? Most people let the rigger do it—they relay the AGC readings to him (or her) and let him (or her) do the work. I *do not* recommend this method! While I have worked with riggers who understand sidelobes and are willing to take time to make sure the dish is aimed right, there are many riggers who do not want to hear about sidelobes. If you are getting a usable picture and moving the antenna to either side makes it go away, they will bolt it down right there!

You stand a much better chance of getting the antenna aligned the way you want if you tell the rigger "move left, move right, move up, move down—a tad more—mark that point!" and never mention the AGC reading or the picture! After fixing a couple of mis-aimed dishes, I came up with my "donut" (toroid) method of dish alignment. It is so basic that I probably should not be so presumptuous as to give it a name, but it does underscore the point.

For new installations, much grief can be eliminated by calculating what the signal should be at the receiver.

When preparing to align a microwave dish, most visualize the dish's pattern as a pencil-thin beam ("breadstick" method?). In reality, the pattern is more complex. We can forget about most of the complexity, however, the first sidelobe can be quite strong and must be considered. Picture the sidelobe as a donut surrounding the narrow main beam. If you move the antenna in any direction, which pattern is likely to hit the other dish? The donut or the pencil?

There is only one elevation and one azimuth where the main pencil beam hits the other dish. On the other hand, you can move the dish up, down or sideways and intersect the donut. Although the sidelobe may not form a perfect donut, on a standard center-fed microwave dish it is close enough to consider it perfect.

How does this help in aiming the dish? First, at any azimuth other than that of the main beam you will find two or three signal peaks as you pan the dish—two sides of the donut and perhaps some of the main beam (it may be very weak!). Second, at any elevation other than that of the main beam you will find two or three signal peaks as you tilt the dish. Because it is fairly easy to set the elevation fairly close with a plumb line, inclinometer or measurements to a straight tower leg, I like to do the azimuth first.

Swing the azimuth and mark the peaks, regardless of strength. You should have at least two marks, maybe three. If you find only two marks, they should be fairly close in strength. If not, swing the dish a little more to see if a third peak is found. If you can find only one peak, the dish may be at the top or bottom of the donut. If the receiver level matches the calculated value, congratulations! More likely, it will not. Change the elevation until you see two peaks. If this does not work, swing the dish over a wider angle.

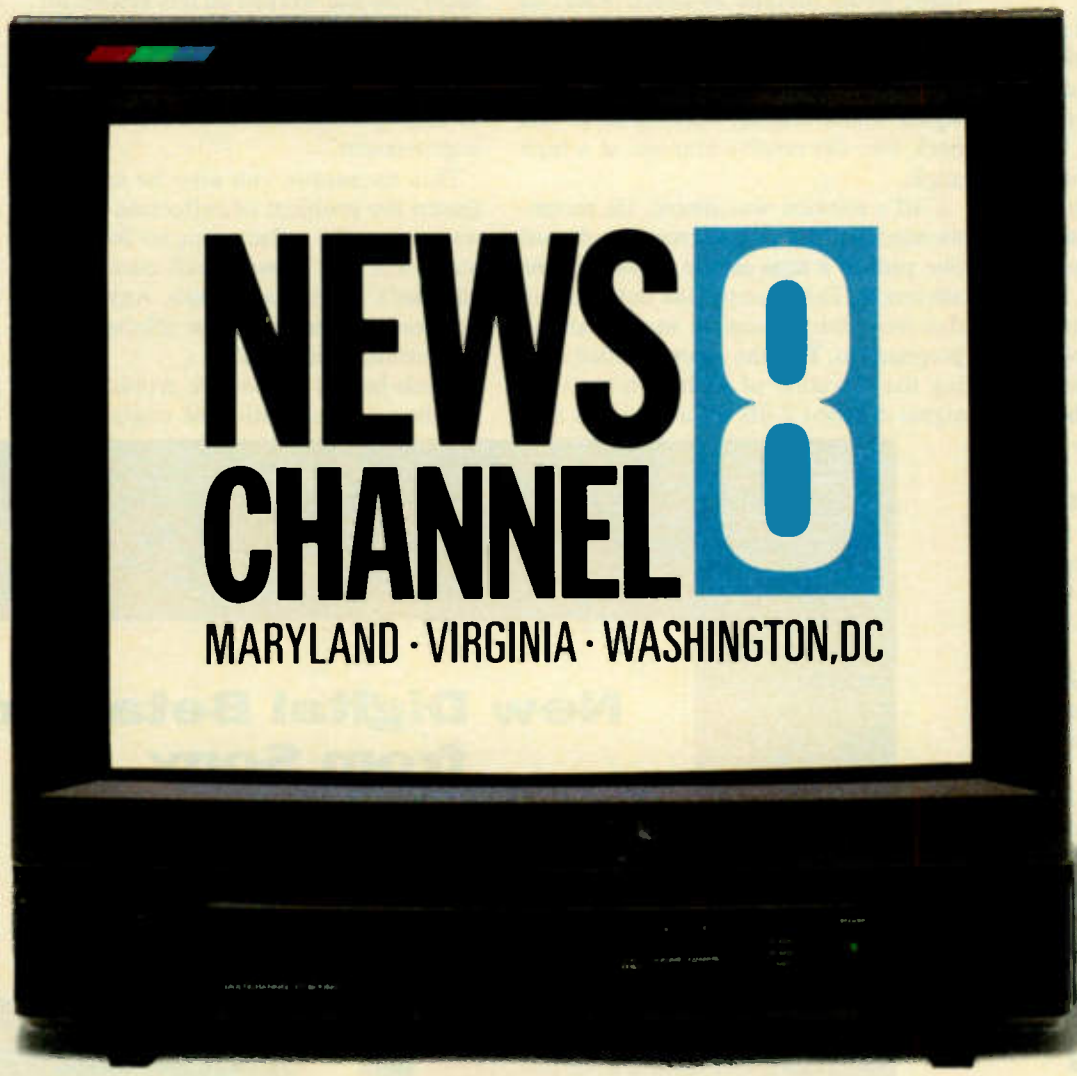
Look at the marks. If you have two marks, make a third one exactly in the middle of them. If you found three points, use the center one—it should be centered between the other two. Move the dish to the center mark. There might not be a signal there now. Adjust the elevation until the signal is peaked. In most cases you will find the main, pencil-thin beam right away. Try to move the elevation far enough to find another peak and verify you are on the main lobe.

If you have aligned a lot of microwave dishes, this method probably sounds familiar. If you have had some trouble getting the signal you expect from a microwave or are planning a new installation, I hope this information makes it easier. In any event, even though it sounds more complex, it is not. Ask anyone who has spent an afternoon trying to improve the signal on a dish sitting on the sidelobe donut at a *diagonal* from the main beam. Moving the dish up or down, left or right will not provide a better signal if the dish is returned to the first peak each time.

Not always perfect

If it were a perfect world, the "donut method" would work all the time. Unfortunately, sometimes it does not. Here are a few tips from experience on what to try after verifying the transmitter is turned on and the waveguide is not

(continued on page 16)



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Taking Aim at Dish Alignment

(continued from poge 14)

crushed.

First, check polarity. If the end of the feed is rectangular, the direction of polarization is across the *narrow* dimension, not the wide one. Some dishes cross the polarization in the feed. These dishes should have an arrow on the back showing polarization. Polarization problems are more likely when using two different types of antennas on the two path ends.

Second, if the dish movement is restricted in one direction, be suspicious. Sometimes bad luck tends to put the other end of the path such that the dish must move a half-inch through a tower member to line up. I found such a case while working with Bill Hayes in Hawaii a few years ago. The proof went fine at the transmitter, but just barely made the FCC's audio FM noise spec (it was required then) from the studio console. Microwave units were tested, the manufacturer contacted, all to no avail. The path was not obstructed—you could see the transmitter site from the studio when the clouds lifted.

We knew something was wrong. In desperation, I unbolted the feed from the back of the dish so I could move it around inside the dish. Eureka! At one spot there was plenty of signal. Unfortunately, a four-inch pipe prevented moving the dish there! After Bill procured a large pipe wrench, we modified the landlord's rooftop pipe plumbing a bit so the dish would clear. Fortunately this was on a holiday, so no one was around to complain. Larger dishes with feedhorn guys make it difficult to move the feedhorn around, but it is useful on smaller dishes or as a last resort for those really impossible mechanical situations.

If it were a perfect world, the 'donut method' would work all the time . . .

Once perfect...

Now that you have the dish perfectly aligned, you might want to move it off the main beam a bit. Before you call me crazy, let me repeat some advice from Cliff Fields. Cliff worked for Harris-Farinon, among other companies. I cannot think of another engineer who has installed more microwave systems, under a wider variety of conditions, than Cliff has. At the Society Of Broadcaster Engineer's conference in San Jose, California, last year Cliff told me about some of the more interesting problems with which he had dealt.

One case Cliff related revealed a secret few TV engineers know. He was asked to quote replacement equipment for a five-hop 6 GHz microwave system in the Florida Keys. He also learned that the existing system, which had been in for about 18 years, had always had a severe fade problem, usually in the early evening hours. Cliff recommended replacing the microwave equipment, waveguide and antennas. If you have ever been in the Keys, you know that these paths include as much water as land. Cliff suspected that the problem was due to antenna decoupling caused by super-refractive conditions whereby the signal would actually bend upwards and back into the receive antenna at a high angle.

Cliff's solution was simple. He recommended that the new antennas be aligned one path at a time at two o'clock in the afternoon. This is about the only time in that area that you can be sure of normal propagation. Then he recommended raising the elevation of each dish until the signal dropped 2 dB for a total loss of 4 dB on each path. According to the engineers who had worked on this system for 18 years, 90 percent of the fading was corrected by the new system. This was a very easy thing to do, cost nothing and, in this case, provided a 10:1 ratio of improvement.

This technique can also be used to lessen the problem of reflection off of water since the reflected signal from the water will now come in well outside the antenna's main beam width. Any well-designed system will not be affected by a 4 dB increase in path loss.

If you have a microwave problem that requires a combination of engineering knowledge and real world experience, Cliff can be reached in Santa Clara, California at +1-408-249-7393.

If you have come up against a tough RF problem and found an interesting solution, I would like to share your experience with the rest of the world.

Do not worry about putting it down in any fancy fashion or drawing pretty schematics. Drop me a note at 2265 Westwood Blvd., Suite 553, Los Angeles, CA 90064 U.S.A., or send it to **TV Technology**. You can also phone me at +1-305-884-9664 in Miami, Florida or +1-818-502-5739 in Los Angeles, California. The best way to contact me is via CompuServe. My PN is 70255,460.

Doug Lung is vice president and director of engineering for the Telemundo Group of stations.

Examining Video Transmission

by Randy Hoffner

AUDIO ETC.

Frequency modulation is one of the two fundamental methods of modulating a radio-frequency carrier; the other is, of course, amplitude modulation. FM transmission delivers a signal-to-noise ratio that is superior to AM.

That being true, it is logical to ask, "If FM is better than AM, why not use it to broadcast video as well?" Frequency modulation of a broadcast carrier with a video signal would occupy far too much spectral bandwidth to be practical. That leaves amplitude modulation as the method used to modulate an RF carrier with video signals. The basic AM transmission process is modified somewhat to permit a higher quality picture to be broadcast.

Varying amplitude

In amplitude modulation, the amplitude of a radio-frequency carrier is caused to vary at a rate corresponding to the frequency of the modulating signal. In most systems for the transmission of television pictures, the amplitude of the carrier varies in inverse proportion to the amplitude of the modulating signal: the higher the voltage level of the video signal (the whiter the picture), the lower the instantaneous level of the RF carrier.

If we were to analyze a carrier signal of varying amplitude, we would find that the effect of modulation is to generate additional signals that have frequencies clustered around the carrier frequency. These additional signals, called sidebands, are so located that the frequency separation between a sideband component and the carrier is numerically equal to the frequency of the modulating signal producing that component.

AM signal

An AM signal consists of a carrier component of amplitude E_c and frequency f_c, together with a single pair of sidebands for each modulating frequency f_m. This is fundamentally different from an FM signal, in which a theoretically infinite number of sidebands is generated for each modulating frequency. The amplitude of each sideband is $1/2\ E_cM$, where M is the modulation factor (which may range from 0 to 1), and their frequencies are $f_c + f_m$ and $f_c - f_m$.

When M has its maximum value of 1, the amplitude of each sideband is one half that of the carrier component. Note that the lower sideband, $f_c - f_m$, can exist only if the modulating frequency is lower than (or equal to) the carrier frequency.

When the "fathers of television" set out to choose what portion of the electromagnetic spectrum should be used for television transmission, their first guideline was the fundamental principle that the carrier frequency must be higher, and preferably much higher, than the highest modulating frequency. The higher the carrier frequency relative to the modulating frequencies, the narrower the range of sideband components as a percentage of the carrier frequency, and the easier to maintain linear amplitude and phase responses in the transmission system.

In television as practiced in the United States, the highest video modulating frequency is a little above 4 MHz. This is one of the reasons that television broadcast frequencies were chosen to be above 40 MHz, which makes the highest video modulating frequency less than 10 percent of the carrier frequency in all cases.

According to "Principles of Television Engineering," a book published in 1947, another reason stated for locating television frequencies above 40 Mhz is that "...the region of the r-f spectrum from 40 Mc. to the upper limit of the spectrum is not at present actively employed by other services..."[1]

Today, of course, a multitude of "other services" employ a great deal of the spectrum above 40 MHz, and new spectrum-hungry technologies are appearing with great frequency (sorry, no pun intended).

The first U.S. standards for the new medium of television were generated by the Radio Manufacturers Association (R.M.A.) Committee on Television, which wrote a set of transmission standards, recommended practices, and definitions for television. The R.M.A. standards were superseded by the NTSC-FCC standards.

Large undertaking

When the R.M.A. standardization work was first undertaken, the only practical method of video transmission known was the use of garden-variety amplitude modulation, in which the carrier and its upper and lower sidebands were generated and transmitted. The R.M.A. Standards Committee first produced a double-sideband television channel model, as repre-

(continued on page 19)

MARKETPLACE

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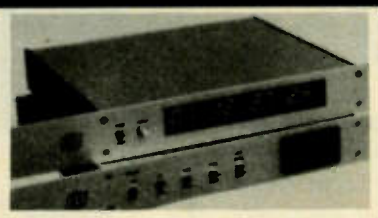


Clock converters

ESE has two new products: the ES-2695 is a SMPTE time code to ESE time code converter, allowing clock systems using SMPTE time code to drive as many as 100 of the more economical ESE clock slave family with a pair of wires.

The ES-2743A is an ESE time code to SMPTE time code converter. This converter will allow the users of ESE clock systems to have a source of SMPTE time code.

For more information, contact ESE at +1-310-322-2136; FAX: +1-310-322-8127, or circle **Reader Service 56.**

PC prompting

BDL Autoscript recently introduced three PC-based prompting packages that run on IBM and compatible computers without the need for any hardware changes or additional boards, according to the company.

The three packages, +NewsPlus+, +StudioPlus+ and +LocationPlus+, combine the same core software and external video adaptor with specialist +Plus+ features designed for each particular working environment.

All three handle all European languages as standard. Greek, Turkish, Russian, Arabic and Hebrew are also available, and systems can also be offered in Chinese, Vietnamese, Tamil and Sinhalese.

For more information, contact BDL at +1-44-71-538-1427; FAX: +1-44-71-515-9529, or circle **Reader Service 111.**

HDTV filters

Matthey Electronics has a new range of high definition television filters. Designed to the European Research Consortium for HDTV (Eureka 95) templates, this range of "EU95" video filters provide the signal conditioning necessary in systems sampling at 72 MHz and 36 MHz.

The filters are available in both pre adc and post dac versions for the luminance and chrominance channels and are packaged in resin-encapsulated 40-pin DIPs.

For more information, contact Matthey Electronics at +44-782-57758; FAX: +44-782-838558.

Boom support

Psycholites of Australia has developed the Supportapole for the boom swinger or pole operator to relieve the strain on the arms and back and make the job easier.

The product consists of a waist-mounted pivot support that allows the Supportapole to move in any direction.

For more information, contact Psycholites at +61-8-2673719; FAX: +61-8-2390280, or circle **Reader Service 60.**

Videocassettes

FUJI's M321SP 1/2" metal videocassettes feature super-fine Metallix metal magnetic particles formulated to match the higher carrier frequencies of high performance Betacam SP VTRs. The particles are specially treated to make them oxidation-resistant for long service.

The four-layer tape construction provides stable tape transport, and advanced new surface treatment technology provides a mirror-smooth tape surface for superior tape-to-head contact and minimal head wear.

For more information, contact FUJI at +81-48-668-2152; FAX: 81-48-651-8517, or circle **Reader Service 6.**

Audio cart machine

Fidelipac's DCR-1000 digital cart machine uses 2MB and 13MB 3.5-inch floppy disks as its storage medium. A standard keypad enables the user to enter subcode information that is displayed on a backlit LCD screen.

The 13MB disks will record three minutes and 44 seconds of stereo material at a 44.1 kHz sampling rate and five minutes and 10 seconds at 32 kHz sampling.

For more information, contact Scott Martin at +1-609-235-3900; FAX +1-609-235-7779, or circle **Reader Service 118**.

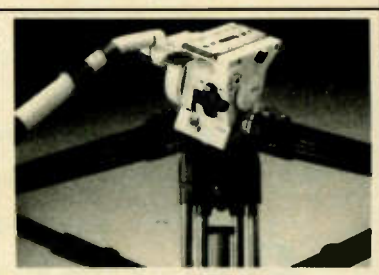
Signal clipper

Abekas has added to its range of System Products the A29 "Video Legalizer," a product that corrects illegal excursions in RGB or composite color space of digital signals conforming to CCIR 601 serial or parallel format.

Using advanced digital signal processing technology, the A29 clips in either the digital RGB or composite color space, guaranteeing that the final composite color output is legal.

The A29 is delivered with various pre-set default settings including clipping level, clipping shape and allowable overshoot. These settings can be programmed off-line via a standard RS-232 port from a PC for both 525 and 625 operation.

For more information, contact Abekas at +44-734-585421; FAX: +44-734-473857, or circle **Reader Service 62**.



Pan-and-tilt head

Vinten Broadcast's Vision SD12 ENG/EFP pan-and-tilt head can carry the additional payloads of larger viewfinders, heavy batteries and larger lenses associated with one-piece ENG camcorders and dockables.

The SD12 incorporates the SD (Serial Drag) system together with Vinten's "perfect balancing." Serial Drag combines lubricated friction and viscous drag.

For more information, contact Mike Martin at +44-284-752121; FAX: +44-284 750560, or circle **Reader Service 25**.

DVE board

New from Miranda Technologies is the Titania, a 3-D DVE board for use with the Matrox Studio with Personal Producer.

Developed in cooperation with Matrox, the board and operating software combine to provide additional dialogue boxes that give full control of three-dimensional effects using the click-and-drag mouse interface. Transitions and keyframe data are saved and recalled along with other storyboard information.

For more information, contact Miranda at +1-514-333-1772; FAX: +1-514-333-9828, or circle **Reader Service 22**.

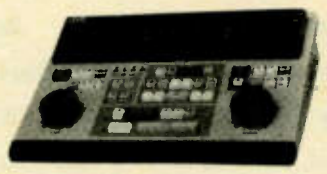
Edit controller updates

FOR.A Corporation announced two new options to the EC-780 edit controller.

The FOR.A EC-780 is an A/B roll edit controller that offers a number of features at low cost. The EC-780 is now able to control a third serially controlled VTR for A/B/C roll operation. This option, called the IU-780EX1, also has monitor output for viewing the edit decision list.

The second option, the IU-780SW1, is software that enables downloading and uploading of the EC-780's internal 256-event memory to PC. Configured in the CMX format, the EDL is transferred to and from a PC through the RS-232 port.

For more information, contact Per Sjofors at +44-81-788-7664; FAX: +44-81-788-7435, or circle **Reader Service 101**.



Editing control unit

JVC's RM-G860E features A/B roll editing with two feeders; independent search/jog dials for players and recorder; serial and parallel remote control interfaces; time code referenced editing and three 8-digit time counters.

Two GPI ports provide for control of external equipment, and the go-to function allows for the operation of all three VCRs simultaneously.

The RM-G860E can be installed in a standard-size rack.

For more information, contact JVC at +81-33-245-1402; FAX +81-33-245-1402, or circle **Reader Service 20**.

Chroma key synthesizer

AstroDesign's Synthevision HM-7010A is a background link-up unit for chroma key synthesis. It can synthesize different video materials (HDTV and NTSC images, computer graphics, etc.) with virtually no restrictions, according to the company.

The unit enables NTSC recorded images or TV camera images to be realistically combined with computer graphics. Background material can be linked with pan, tilt, zoom and other foreground data on a real-time basis. Synthesized images have a greater 3-D depth because the appropriate parts of the images are brought in and out of focus according to zooming movements.

For more information, contact AstroDesign at +81-44-751-1011; FAX: +81-44-751-1300, or circle **Reader Service 14.**

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

Transmitting Video Signals on a Carrier

(continued from page 17)

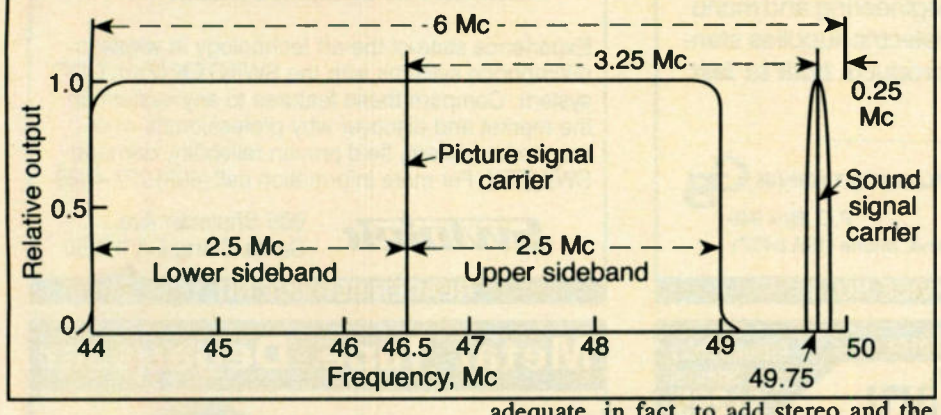
sented in Figure 1 for the 44-50 MHz channel. In this model, the picture carrier was located 2.5 MHz above the lower band-edge of the channel, and the aural carrier 250 kHz below its upper band-edge. The picture sidebands extended symmetrically 2.5 MHz on either side of the carrier, and the separation between visual and aural carriers was 3.5 MHz. This model restricted the highest video frequency to 2.5 MHz.

Conventional amplitude-modulation circuits inherently produce double-sideband signals, but such signals are wasteful of spectrum space, because identical information is contained in each sideband, making this transmission method redundant. In order to produce a more efficient television transmission system, one capable of transmitting more picture detail, the first video signal compression technique was developed: vestigial-sideband transmission.

We know that all the information carried by a modulated RF signal is contained in the sidebands, and that an amplitude-modulated signal contains a pair of sidebands which are mirror images, and are located above and below the carrier respectively.

Because identical information is contained in the two sidebands, it follows that only one of them is required to convey all the information contained in the modulation. If a single sideband could be transmitted, the channel would be more fully exploited, because a broader range of modulating frequencies could be accommodated.

Figure 1. Double sideband television channel as initially specified by the R.M.A. Committee on Television



Technical difficulties

The production of a single sideband is, however, a technically difficult problem. The unwanted sideband may be filtered out prior to transmission, but, in this imperfect world, filters do not have ideal cutoff characteristics. It is thus not possible to remove an entire sideband without introducing undesired phase shifts around the carrier frequency.

The compromise arrived at was to use a "vestigial sideband" system, in which the unwanted (lower) sideband components are completely removed from the signal only at points sufficiently far from the carrier to avoid undesired phase shifts at the carrier frequency or above. The carrier itself and the lower sideband components near the carrier frequency are not eliminated, leaving a vestige of the lower sideband in the transmitted signal.

The R.M.A. Standards Committee's second recommendation was a channel structure based on vestigial sideband transmission, as illustrated in the top portion of Figure 2. That model, with the addition of a color subcarrier, is the structure used for broadcast of NTSC television. The picture carrier is shifted to the left, so that it is located 1.25 MHz above the lower channel-edge. The sound carrier remains 250 kHz below the upper channel-edge. This increased the separation between picture and sound carriers to 4.5 MHz, permitting a video signal of over 4 MHz bandwidth to be transmitted, while leaving adequate spectrum space for the frequency-modulated aural signal; adequate, in fact, to add stereo and the other components of the BTSC multichannel television sound system some 40 years later.

NTSC, PAL and SECAM

In addition to NTSC and its 6 MHz-wide television channels, there are the 625 line/50 Hz systems that use either PAL or SECAM color video transmission. These systems transmit video with bandwidths of 5, 5.5, or 6 MHz on channels that are 7 or 8 MHz in width. They all use the vestigial sideband channel model as described. Although the channel width is greater, the visual carrier is located 1.25 MHz above the lower channel edge, the vestigial sideband extends 750 kHz below the carrier, and the aural carrier is located 250 kHz below the upper channel-edge.

The signal transmitted using the vestigial sideband system has the characteristics of either a double-sideband system or of a single-sideband system, depending upon the spectral distance from the carrier. The upper sideband and the carrier are transmitted without attenuation, as is the lower sideband to a point about 750 kHz below the carrier. Beyond that point, the lower sideband is attenuated rapidly, so that when the edge of the channel is reached, substantially none of it remains.

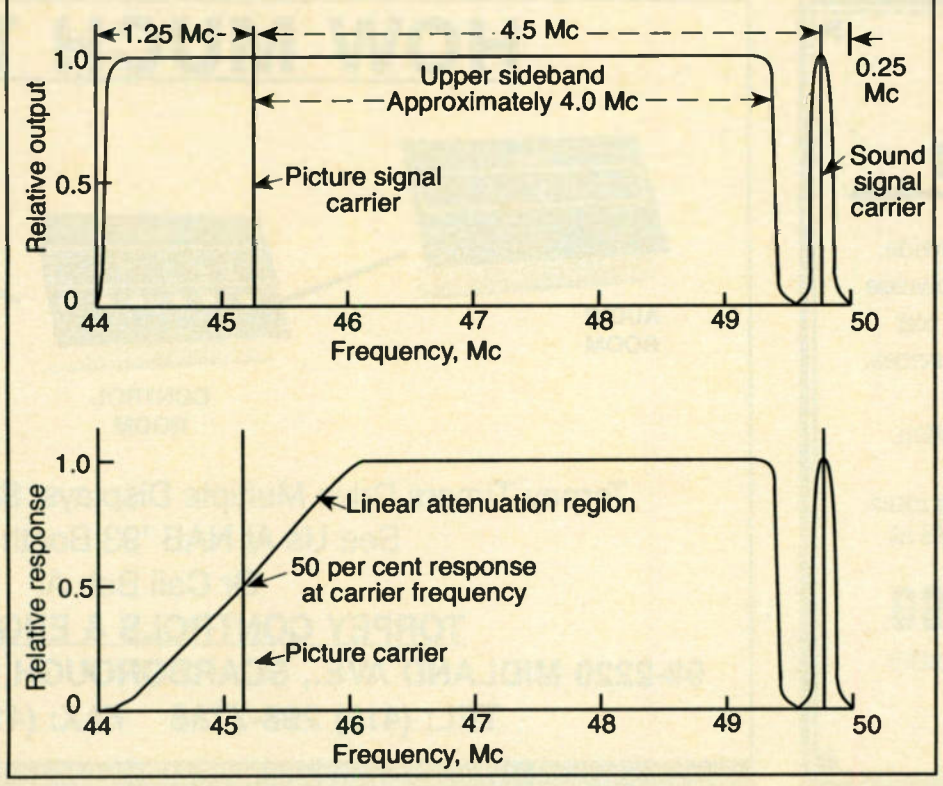
This technique can create frequency-equalization errors in the received signal unless it is properly filtered. In the single-sideband portion of the signal, the modulation level transmitted is only 50 percent in the conventional sense, because only half the sidebands are present.

To equalize the modulation level over the entire visual signal, the receiver employs the response curve shown in the lower portion of Figure 2. The carrier is placed on the edge of the receiver's band-pass curve, at the 50 percent voltage level. The slope of the filter is such that those components of the lower sideband that are received have their corresponding components in the upper sideband linearly attenuated, equalizing the modulating levels of the single-sideband and the double-sideband components.

The vestigial sideband transmission system was developed to address the problem of transmitting a high-quality television picture within a reasonable amount of radio-frequency spectrum space. In a sense, it is a forerunner of today's video compression, because it involves the elimination of redundant information before transmission. It permits a television channel to carry a video signal of nearly twice the bandwidth that is possible using the standard double-sideband amplitude modulation approach. This resulted in the capability to transmit a picture containing much greater detail, and facilitated the addition of compatible color as well.

The system has served us well since the late 1940's, accommodating improvements in both picture and sound when technology permitted. It appears that the end of the vestigial sideband television transmission system's life is in sight, however.

Figure 2. Top: Vestigial sideband television channel standardized in the U.S.
Bottom: Receiver response curve to equalize modulation level of sideband components near the carrier to those far removed.



[1]Fink, Donald, Principles of Television Engineering, New York, McGraw-Hill, 1940, revised to conform to 525-line standard, 1947, p. 262.

The figures are from the book cited above. Figure 1 is from page 265, and Figure 2 is from page 266.

Randy Hoffner is director of research and development at NBC Labs. He may be reached at +1-212-664-4733, or write to him at **TV Technology**.

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.

In Search of an HD Frame Rate

(continued from page 1)

learned my history, the U.K. was first on the air, and they used 50 fields (25 frames) a second. We Americans weighed in soon thereafter at 60 fields (30 frames).

Hey—it made sense, even if power line synchronization didn't end up in television standards. Any leakage from the power supply would be hidden as a stable pattern in the picture and thus rendered invisible. With us watching more TV than anyone else in the world, Philips even made a deal with RCA on a new European standard, 625/50 (the Brits started with 405 lines), that was so close in horizontal frequency to our 525/60 that components were interchangeable.

So far, so good. Only, by the time most Europeans adopted 625/50, we Americans had already changed to 525/59.94 to accommodate color (okay, so there were crazy Americans who weren't Serbs born in Croatia). That 59.94 is one of the stupidest things about our NTSC color system (the rotation of the I and Q axes by 33 degrees from R-Y and B-Y might be another), but the fact that it's sort of worked for the last 40 years should let you know something: TV does not have to be coupled to power frequencies.

Filtering system

You don't need to be American to know this. Osaka and Tokyo ain't got the same power frequencies. The fact that the same TV can be used in both cities means the power supply leakage problem is easily solved. Heck, the tiny country of Barbados switched from 625/50 to 525/59.94 without changing their 50 Hz power system. All they had to do was add filter capacitors to the power supplies of some old American- and European-built TV sets (the Japanese-built sets, of course, were fine).

Now, don't accuse me of saying that America should return to 525/60 or change to 625/50, and I sure ain't gonna dictate expensive standards changes to any other country in the world. Little old Barbados had just one TV station, so a zillion VTRs, sync generators, and other stuff didn't have to be junked. The way I figure it, if you're currently broadcasting 525/59.94 NTSC, it's probably a good idea to stay that way; ditto for 625/50 PAL or SECAM (and, no, I haven't forgotten the biggest Portuguese-speaking country in the world; if you're Brazilian, you can stick with 525/60 PAL).

What I *am* saying is that Tesla's alternating current shouldn't amount to a hill of beans (whatever its volume) for the *next* television systems. You want to keep using your current VTRs and TV sets? Keep broadcasting 25 frames a second or 29.97. You want to enter the exciting new world of HDTV, requiring brand new VTRs and TV sets? You're crazier than Tesla ever was if you figure you've got to stick with today's frame rates. Given the choice, I'll pick 18 napkins any day over 25 frames.

Pick a rate, any rate

Look here: Right up front, there's an actual, psychophysical relationship between frame rate, brightness, and picture size. The higher the frame rate, the brighter and bigger the picture can be without flicker driving you to blow kisses at pigeons. The way I hear it, HDTV's supposed to have bigger pictures than today's TV. The way I see it, *all* TV sets, all over the world are getting brighter.

I ain't saying the only way around the problem is a higher frame rate. Perish the thought! You can also build new TV sets with one of two features: either a non-decaying screen (like a conditionally-refreshed liquid crystal display panel illuminated by a flicker-free light source) or a frame-rate-increaser. Neither one of those works all that well at the moment, so an insistence on 25-frame-per-second HDTV means choosing among dim images, tiny screens, incredibly expensive displays, rotten pictures, and/or a good long wait for the future to catch up with us.

Being an internationalist, I hate to say this, but Japan's 30 frames per second *is* better (our 29.97 frames per second is as dumb as ever). It *does* flicker less, and it offers better motion rendition. But it ain't the best possible solution, either.

Hey, look at the computer world. What kind of frame rates do you see there? 67? 72? And those are all *progressively-scanned* displays, so we're talking actual *frame* rates, not *field*.

Yeah, I know. For the forseeable future, there's going to have to be a lot of programme sharing between HDTV and regular TV, so it's supposed to be a good idea to use the same frame rate to make standards conversion simpler, to which I say, "Bull!" (pardon my French—French computer company, that is).

The idea is supposed to be that if we 525ers select 1050-line HDTV and you 625ers select 1250, then all we have to do is divide by two, and an HDTV programme becomes a perfect regular TV programme. Yeah, right. Give me a break!

Two halves don't make a whole

Divide-by-two standards conversion guarantees lousy pictures. You've got to use multiple scanning lines in the interpolation process, and, as long as you're doing that, it doesn't make a heck of a lot of difference whether you're interpolating 2:1 or 3:2 or 5:3 or whatever. And, as long as you're building a good standards converter, it wouldn't kill you to put in frame rate interpolation, too. Yeah, it'll cost more, but the way HDTV is supposed to go, maybe you're talking one expensive HDTV-to-regular-TV standards converter per network, versus a zillion and a half cheap and lousy frame rate upconverters in every HDTV set. I think I can figure out which to choose, and I ain't a genius like Tesla.

That brings me to politics. What *should* the HDTV frame rate be? The Japanese 30 is better than either the U.S. 29.97 or the European 25. Based on what I've been able to read about psychophysical testing, I believe 70 is adequate. If Hollywood's happier with 72 (three times film's 24), I ain't got a problem with that, and if it'll bring world peace to make it 75 (three times 25), I ain't got a problem with that, either (Tesla liked numbers divisible by three). Heck, I'm even willing to divide whatever it is by two (sorry, Nikola) to live with interlace until we work out the problems of progressive scanning.

What can I tell you? I'm just as sweet as all of us Americans are when we're not inventing things like AC power.

Mario Orazio is the pseudonym of a well-known engineer who wishes to remain anonymous. Write him in care of **TV Technology**.

Channelmatic Aids Cable Television

by Jim Radmann
Chief Engineer
Milwaukee Cable Advertising

MILWAUKEE, Wisconsin At Milwaukee Cable Advertising (MCA), our job is to grab the feeds of the various cable networks, insert local advertising spots, and pass the feed to two cable headends in the Milwaukee area.

Don't worry, be happy

Without having to deal with programming, we have no need to worry about backtiming, show cueing, segment lengths, or networks running long. All we need to concentrate on is the advertising availability.

My elation with this situation was short-lived, however, because while most cable networks average only a one-minute break per half hour, we have 10 networks at five individual unmanned sites running videotape machines, TBCs, switchers, demodulators, D/As, and more. To do all this with approximately one to one-and-a-half people per shift, including the chief engineer, is quite a challenge.

To meet this challenge, we use the Channelmatic CompEdit system and Vbase software running on a 386SX with DOS 3.3.

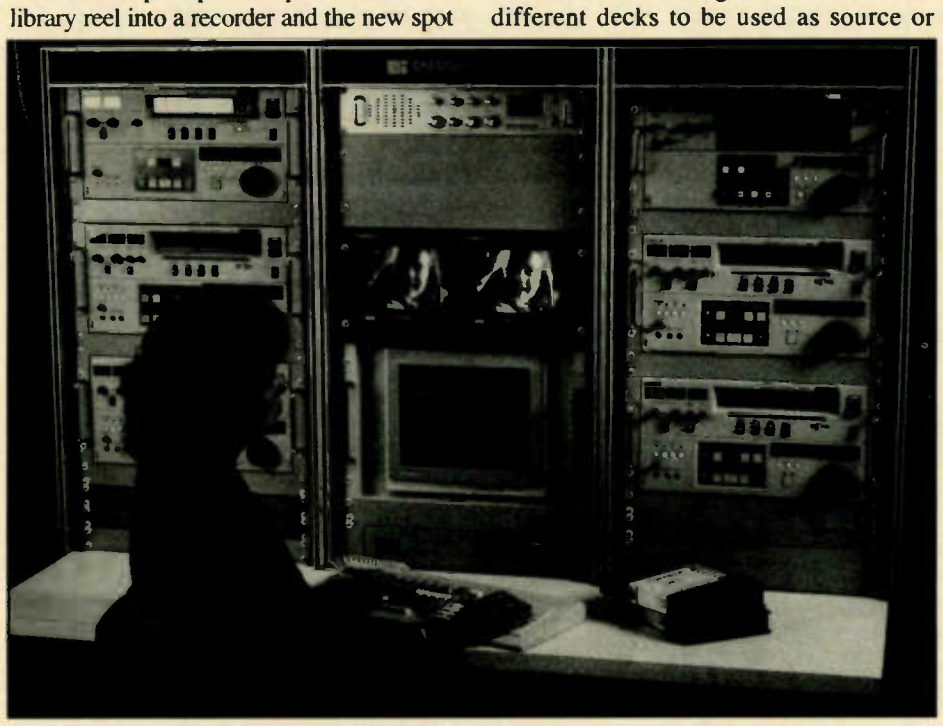
Basically, the CompEdit compiles spot reels for air from a library of spots contained on individual reels. The system reduces the human error involved in number matching or pulling spots for air.

For example, when the log generated by traffic has new spots (cable traffic systems generate multiple logs for multiple networks), they are added almost automatically to the database. This requires a task or job to be created for the automated editing system.

With Vbase software, the process is fast and easy.

Fast and easy

The screen prompts the operator to load a library reel into a recorder and the new spot into a source VTR. The edit point is marked and all time codes for the record reel are automatically set by the database. A push of the preview button and both audio and video levels can be adjusted through an integral TBC used just for this process.



The Channelmatic CompEdit compiles spot reels for air.

Our Magni waveform monitor tied into the B input of our switcher's source video monitor allows us to view both to see the video and adjust the levels to be corrected. Audio levels are adjusted directly on the recorder.

Then the edits are done automatically.

With the Vbase software, the operator is able to choose configurations that allow different decks to be used as source or record VTRs.

Once the library reels are finished, the next step is to create master on-air spot reels (MSRs). Like in the library reel process, the system prompts the operator to load the network's MSR-designate reel into a record deck, and the library reel into a source deck. If the task requires more reels than available tape machines, the operator is prompted to load the reels as needed throughout the task.

Choose a machine

Again, the recorder/player designation for the VTRs is flexible. If, for example, three headends require three similar tapes, it makes sense to build them simultaneously in order to limit generation loss. If only two MSRs are needed, a recorder can be allocated as a player to reduce the number of library reel changes during a task.

However, there are tradeoffs in these various configurations. For example, if

USER REPORT

you limit the number of library reels, then you limit the number of active spots, which slows access time when you have to shuttle from one end of a tape to the other. Conversely, with more reels, you have faster access, but the operator has to make more tape changes.

However, the CompEdit system has a number of features designed to alleviate the shuttle delay. Chief among them are fast forward and fast rewind.

CompEdit is time code-based, and if the next edit is more than five seconds away by shuttle, the system drops out of shuttle and fast forwards to the next location, where it goes back to shuttle for cueing. It also has look-ahead cueing, so it is prepared for upcoming edits.

Mark downs

The multiple configurations that can be set up allow the operator to trade off decks and even mark decks as "down" if removed for repair.

For spot editing, the system software in Vbase also uses optimizing algorithms to do the faster, more similar edits first. These algorithms also allow multiple types of VTRs—even optical disk machines—to be used on the system.

With the CompEdit system, the productivity of our current staff has increased at least four-fold.

For broadcasters, the system can alleviate the necessity for large, array-type on-air sequencers and, instead, allow spot reel insertion with same-day turnaround, higher on-air reliability, single-deck playback and redundant spot reel playback all the time—not just during important programs.

Editor's note: An SBE-certified broadcast engineer, Jim Radmann has worked in television engineering for 13 years.

The opinions expressed above are the author's alone. For further information, contact Mike Watson at Channelmatic (telephone: +1-619-445-2691; FAX: +1-619-445-3293); in the U.K., contact Jonathon Rigby (telephone: +44-442-891-130; FAX: +44-442-891-132), or circle **Reader Service 97**.

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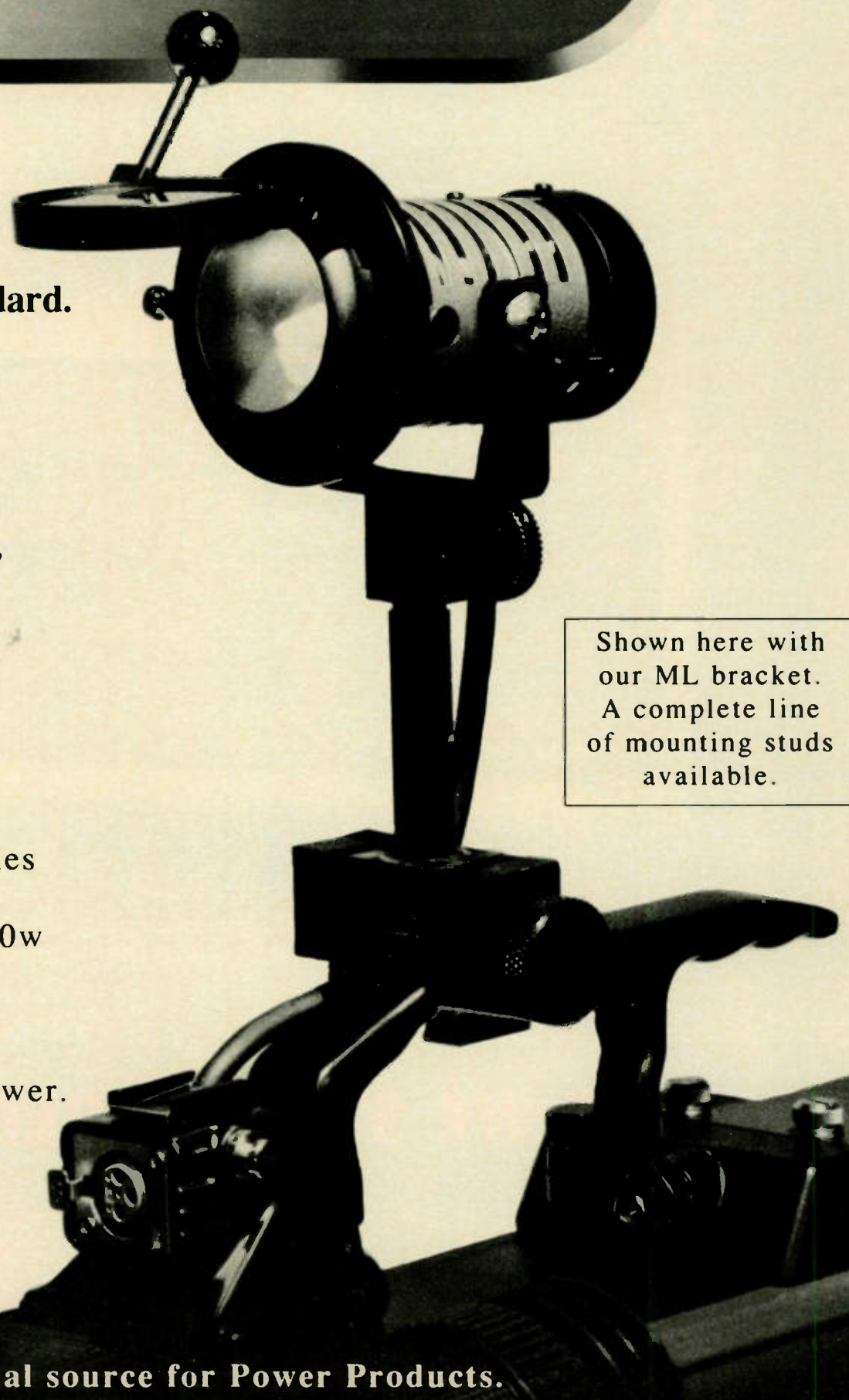

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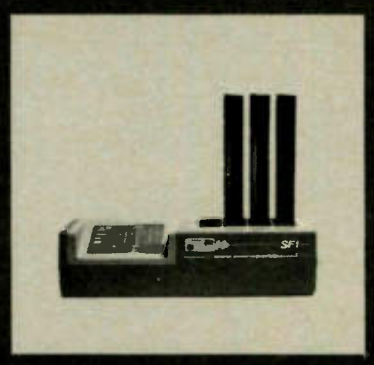

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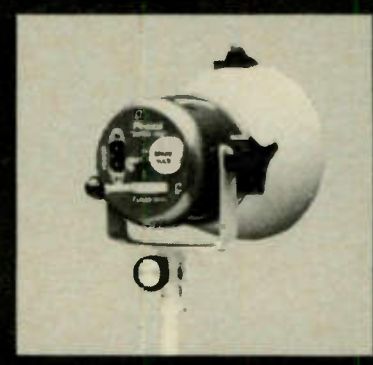

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Station Automates with M.A.R.C.

by Victor Landau
Director of Engineering
WHO-TV

USER REPORT

DES MOINES, Iowa WHO-TV has been using the M.A.R.C. II-400 M-II automated recording/playback cassette system from Panasonic for three years.

We use the M.A.R.C. for all of our commercial playback and about 10 percent of our syndicated programming, a level we expect to increase as our operators get acclimated to the AU-CSF2400 software, which went on-line in mid-September 1992.

Program delay

We also use the system for network program delay. If we are airing a local sports event with no fixed out time, we can slide the network programming by as little as 15 minutes, a task that was very operator-intensive in the past.

The 2400 software allows us to move one step closer to automation in master control, freeing personnel for other things, such as increasing our satellite recordings, paying more attention to detail prior to our live programming, fulfilling housekeeping duties, and even gaining some fairly long walk-away times at off hours when personnel used to be caring for the M.A.R.C.

One of the 2400 software's features is the "dub-in-line" capability, which can be used to pre-compile events on internal or external VTRs for playback at a later time. It uses the available VTRs to compile the events while continuing to load and play the needed breaks.

In the past, we prepared a backup reel for commercials airing during the 6 and 10 p.m. news strips. We used to edit the playlist manually, record outside the M.A.R.C. and re-edit the playlist. Now, we can program the M.A.R.C. to do that automatically, eliminating the need for reserving a block of free time.

Dueling playback

As soon as we free another router, we plan to take advantage of the 2400's A and B channel playback feature, which permits the system to play back two different events at the same time. This feature goes hand-in-hand with automatic program delay, so we can output a program on B channel and output commercials and breaks on A channel without having to recue the tape manually when the program is on.

WHO-TV supplies two five-minute local news feeds per hour to CNN. We will be able to play those news feeds on the second channel output instead of an outboard machine with a separate timing system.

The 2400 software allows control of up to five external VTRs. Currently we use an AU-65H M-II studio VTR, and we have ordered several more AU-65H studio recorder/editors from Panasonic's "Enhanced M-II" series.

Our M.A.R.C. has performed wonderfully since we acquired it. We have not had any problems with robotics or maintenance. We like the fact that the architecture of the system controller is open enough so we do not have to modify tape machines to use them with the system; it will operate with practically any M-II deck.

The M.A.R.C. has been very easy to use. We had a week of operator training when the system went on-line and then about two days of training for the 2400 software revision.

And, as with any new software upgrade, we are presently exploring all the enhancements it offers and looking at how to integrate them into our operations.

Editor's note: Victor Landau served as corporate engineer for Palmer Communications Inc., WHO's owner, for eight years before assuming his post at the station.

The opinions expressed above are the author's alone.

For further information on the M.A.R.C. or the AU-CSF2400 software, contact your nearest Panasonic representative.

Trends in Digital Compositing

JAPAN Market Report

by Fumihisa Nobui

TOKYO In 1989, the first Quantel Harry was delivered in Japan. It was a product that quickly gained popularity because it was based on a film editing concept rather than a switcher system, which was previously the main editing system used in post production.

Costing about 150 million yen, the Harry compositing system enables frame-by-frame editing on a single screen and is being used to produce an increasing number of TV commercials in which multiple composition is a requirement.

However, Quantel was not willing to rest after the success of Harry. The company recently introduced a digital disk compositing system, and last year, it introduced Henry and Hal as successors to Harry.

Henry, positioned as a higher-end product than Harry, is considered to be state-of-the-art in video processing technology. The system is equipped with a function called "concurrent editing," which has the advantages of both multi-layer processing and non-linear, random access processing.

The multi-layer function can simultaneously process a maximum of five layers in the foreground and one layer in the background, while such editing functions as cut, resolve, copy and stretch are easily executed by an electronic pen.

While Harry excels in retouching, its main drawback is the lack of real-time processing. Henry can process pictures in real time and can function much like an animator as well.

When editing D-1 material with a switcher, operation staffers and production directors must work together to assemble the work. If the images do not match, they have to be disassembled and work must restart from the beginning.

However, on both Harry and Henry, technical artists are only required to edit what they themselves wish to image.

Japanese production companies now using Henry include Digital Egg, Mothers and P3 of Postpro. All three facilities are aggressively seeking new production business based on the strength of their new systems.

To date, numerous systems have been introduced in Japan that are manufactured under similar design concepts, and more and more of these systems are finding use in post production. Among some of the more notable systems in Japan are Getris Images' Venice, Digital F/X's Composium, the DP/MAX by Dynatech ColorGraphics and Ark Render by Symbolics.

Venice is a four-layer system with animation, 3-D and DVE modules. By connecting the Getris Aramis, a RAM recorder equipped with 4MB DRAM chips, frame-by-frame editing can be performed. Aramis is considered by some to be indispensable for the operation of Venice because the RAM recorder provides a time axis for each object.

The unit provides a maximum of 18 seconds of video storage at 4:4:4:4 quality with automatic rotoscoping, retouching and mixing by cel and by animation.

Last year, Getris announced Eclipse, a low-priced model with two layers.

Meanwhile, six Digital F/X Composium systems have been delivered in Japan. The system was introduced as a comprehensive digital video processing workstation for post production applications where a number of compatible single function devices have been used. It is equipped with 4:4:4:4 internal processing, five live source digital keying and mixing, six VTR key frame editing, real time digital effects video typography, and paint and digital library functions.

The ColorGraphics DP/MAX features easy operation and a large amount of available software. This composite workstation features paint, 2-D/3-D animation, cel animation, modeling, real-time layering and graphic functions. The menu is operated by tablet, which controls a VTR and a disk recorder on a frame basis while editing.

Louth Automation Rules at KING

by Brian Lay
Engineering Manager
KING-TV

SEATTLE This year, KING-TV updated its master control equipment by installing a Grass Valley Group Master 21 switcher, a Sony Betacart for commercial playback and several Beta SP VTRs for program recording and playback.

Our traffic department also installed the BIAS traffic system, and our goal in designing a master control automation system was to place all of these devices under computer control so that a single operator could easily oversee station operation.

Unique automation

We selected the ADC-100 system from Louth Automation because it offers some unique features not found in other systems.

The system's strongest point is its client server architecture. All of our devices are connected by serial data (RS-422) to the ADC-100's device server, from which the playlists (or record or random-access lists) are run.

The device server contains a 486 processor, intelligent I/O cards and interface cards to black reference and house time code. Since I/O to the devices is buffered, the central processor is not burdened by having to wait for devices to respond. This allows the server to run up to eight separate lists simultaneously and control up to 24 devices, all frame accurately.

While new devices require that a new software driver be installed, firmware does not have to be changed. In fact the I/O ports will automatically change between Sony and Ampex protocols.

Those familiar with Local Area Networks (LANs) will recognize the client/server relationship. The server is controlled by any number of client PCs connected through a LAN to the server.

The system's strongest point is its client server architecture.

NetBios LAN software is used to communicate over an Ethernet network running on twisted pair cable (10BaseT). When an operator needs to perform a function on a list running on the server, such as the master control operator editing the schedule, a request is sent across the LAN to the Device Server.

Fast talker

Network communication is extremely fast, and the client PC display is updated at a TV frame rate, so the response to client commands appears instantaneous. In fact, several clients can view and control the same list at the same time.

This unique ability for multiple control locations has several important benefits. At KING-TV, we make many changes to our schedule throughout the day; it is our intention to use the flexibility of the system to enable different departments to make their own schedule changes directly from their desktop PCs.

Auto dubs

Louth Automation has provided a program called AutoScreen to automate the spot dubbing process. AutoScreen also maintains a database of all recorded media, using the Novell BTRIEVE Database Engine. This database is a superset of the Sony Betacart barcode information and has additional fields to track recording quality, type, operator ID, date of recording and a free-form text field.

To record a new spot, an operator loads the reels, scrolls AutoScreen to that spot on the list and initiates the dubbing process. The AutoScreen computer automatically cues the VTRs, starts it in record and then re-cues it for confirmation of SOM and EOM if desired.

All spot information is written to the database, and a barcode label is printed.

AutoScreen is also used to enter SOMs and segment durations for programs. Program tapes intended for playback outside the BetaCart do not require barcode labels, but instead have tape ID numbers recorded into time code user bits.

Checking the menu

The daily operation of master control is quite simple. The client PC uses pop-up menus, and commands can be entered via keyboard or mouse. Context-sensitive help screens are provided.

The mouse is very useful for editing operations. A control panel attached to the client provides dedicated keys for functions like Ready, Play, Re-Cue, Next, etc. When a playlist is loaded for transmission, all events requiring tapes are checked against the database, then the appropriate SOMs are added to the playlist, or the missing tape is listed on an exception report.

USER REPORT

Events are triggered by manual start, time-of-day, or at the conclusion of the previous event.

A flashing indicator alerts the operator to media not loaded in the Betacart or VTRs. The Betacart operates in the Versatile Control Mode, with the Device Server as host, so editing of the playlist can be done very quickly, and all tapes play back with frame accuracy.

Overall, the system has met our expectations and the operators have found it easy to learn. The seamless integration with our traffic computers has virtually eliminated data entry mistakes, and the ability to scan the 600-plus events in a daily schedule for missing tapes or time conflicts means catching a problem before it airs.

In addition, using automation to control program and commercial playback and switching allows our master control personnel to maintain a clean, error-free on-air product while accommodating the last-minute schedule changes that are vital in our business.

Editor's note: Prior to coming to KING-TV, Brian Lay spent 10 years at WHDH-TV in Boston, Massachusetts, where he directed the installation of several automation systems.

The opinions expressed above are the author's alone. For further information on the ADC-100 system, contact George Fullerton or Hayley Ditzler at Louth (telephone: +1-415-329-9498; FAX: +1-415-329-9530), or circle **Reader Service 13.**

GVG Delivers Analog Model 200 to Chile

by Jay Kuca
Marketing Communications Manager
Grass Valley Group

SANTIAGO, Chile Although Grass Valley Group's new line of digital switchers—Models 1000, 3000 and 4000—have received a lot of attention, the company is also maintaining a strong presence in analog products.

In fact, GVG recently delivered its 2,000th Model 200 switcher.

The unit was delivered to TV Nacional De Chile (TVN), the official state television network of the government of Chile.

When it was established in 1969, the network covered only a small portion of the country. But today, the signal is transmitted via Panamsat and a network of 150 repeated stations to nearly 98 percent of the mainland, the Chilean Antarctic and Easter Island.

The Model 200 switcher has been installed in the control room of TVN's main news production studio, where it is used to originate four daily live news broadcasts. When the switcher is not being used on the air, it is frequently pressed into service to assemble taped news segments.

"Our technicians and operators are very pleased with our decision to acquire the GVG 200 switcher," said Ingeniero J.S. Martinez, TVN's technical director. "They tell me that they find it to be a very powerful production and post production tool, that it is easy and comfortable to operate, and that they find the E-MEM to be an invaluable feature for our direct-to-air-news broadcasts."

TVN's experience with Grass Valley Group production switchers dates back to 1978, when all the network's studios and outside broadcast vehicles were outfitted with GVG 1600 series switchers. The news studio project is the first phase of a modernization program that will eventually result in replacement of all the 1600s.

GVG's Model 200 line currently consists of three versions.

The Model 200-1 is a compact unit, containing one M/E, program/preset and DSK. It is designed for small edit suites.

The Model 200-2 is a two-M/E-plus-DSK version, designed for larger suites, while the Model 250 features two M/Es, program/preset and DSK. The 250 is intended for fast-paced, live applications.

All of the 200 series switchers offer dual linear keyers in each M/E, and each keyer has its own dedicated shutter mask and matte generator. Additional features include E-MEM effects memory and dual color background generators with wash.

All three models are available in composite versions for either NTSC or PAL operation. The 200-2 and the 250 are available in analog component versions for either 525/60 or 625/50 operation.

Editor's note: Jay Kuca is marketing communications manager for Grass Valley Group in California. For further information on the Model 200 switcher, contact Frank Stolten at Grass Valley Group (telephone: +1-916-478-3901; FAX: +1-916-478-3411), or circle **Reader Service 114.**

Sony D-1 On Line at Post Perfect

by Bert Berat, Senior Editor
and Joe McCormack, On-line Editor
Post Perfect

NEW YORK Pat Howley, president of Post Perfect, is a firm believer in the serial digital format.

While early D-1 rooms were wired with parallel digital cables, he chose to wait until serial digital peripheral equipment became more available and the use of serial digital became more widespread elsewhere before constructing a serial digital D-1 room.

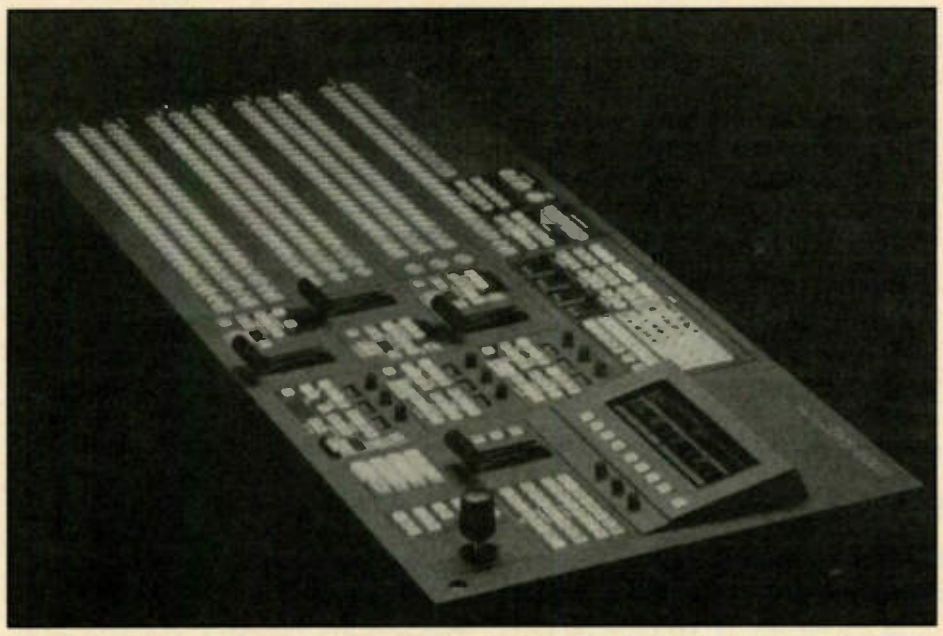
Analog illusion

One of the key things we were waiting for was an affordable D-1 switcher that behaved like an analog switcher operationally.

Today, our D-1 room includes a Sony DVS-8000C switcher that interfaces to a BVE-9100 editor driving four Sony DVR-1000 VTRs. There are also two Abekas A66 disk recorders, and soon we will have a Quantel Henry concurrent editor and three Solid State Logic Scenarias.

We also plan to add more Sony D-1 VTRs (DVR-2100s) and a digital audio board.

While the operational design of the DVS-8000C is based on current analog switchers, it affords all the advantages of digital signal routing transparency.



Sony's DVS-8000 Digital Switcher

USER REPORT

Because of its familiarity, the 8000C is extremely user-friendly. The switcher operates in a logical manner, which allowed us to spend our first days actually using the unit, not learning about it.

Its interface is comparable to top-of-the-line analog switchers, and it is the only digital component switcher that looks like a switcher, not a layering device.

Now we are capable of compositing in D-1 using the same methods we used with analog equipment. The difference lies within the interior workings of the machine.

The interface of the 8000C is more interactive than other switchers, and it is similar to the way editors are accustomed to working. The only apparent difference is the dramatically improved image quality.

Because picture quality is no longer a concern, working with the DVS-8000C allows the editor to concentrate on the creative aspects of on-line editing. In an analog suite, the operator has to keep a sharp eye on timing and levels.

Color correction is a breeze with the 8000C. There are no level changes or shifts, and we can color correct within the component domain and not just perform color phase correction.

Also, our clients have the opportunity to make decisions on-line, an option they do not have in an analog suite. If a client makes a change in the base layer, for example, we do not need to worry about the time it takes to get back to a subsequent layer. All changes can be performed quickly.

The interface to the BVE-9100 editor provides instant recall of switcher setups. Using a feature called "Initial Panel," the switcher saves entire setups and transition triggers to the EDL, edit by edit. This is a great time-saver when revising a complicated effects job, and it allows operators to customize setups to their own needs and preferences.

Dual frame stores

Dual frame stores are also built into the switcher. This provides still pictures that can be used to build graphic layers on top of one another without having to recall those images from a disk or tape recorder.

The chromakey feature is extremely clean and in many situations compares to top-of-the-line matte systems.

The switcher's key frame programming enables us to set up the DVS-8000C like a special effects device or a VTR. We are able to memorize an effect one key frame at a time and then run it from the BVE-9100 editor. The effect can be jogged frame-by-frame as controlled by the editor's jog knob. This allows us to do more accurate effects work and gauge the progress of the effects at specific points in time.

The DVS-8000C also saves energy and space and reduces operating costs.

A few days after we took delivery of the switcher, we used it to create a multiple layered optical effect for a commercial spot. The film was color corrected in one pass, and approximately five keys were put in at one time.

Using the DVS-8000C, the spot was completed in one day. In an analog suite, the project would have taken at least twice as long.

Editor's note: Bert Berat began his television career in the mid-1970s and worked at the ABC and CBS networks and various New York post houses before coming to Post Perfect.

Joe McCormack has been an on-line editor at Post Perfect for three years, having formerly worked in Ireland.

The opinions expressed above are the authors' alone. For further information on the DVS-8000C, contact your nearest Sony Business and Professional Group representative.

Abekas A84 Switcher Working at The Mill

by Jon Hollis
Senior Editor
The Mill

LONDON The Abekas A84 digital switcher is the single piece of video equipment that has had a great effect on my style and performance as an on-line editor.

This was apparent to me four years ago when I realized how much of a radical departure it was from conventional switchers. It was the first switcher that really explored the ideas of multilayer and keyer editing.

Starring role

The excitement of working within this setup led the A84 to become a major part of The Mill, the first entirely digital post production house in London.

At The Mill, we generally use the A84s for keying, fast layering and for the straight cut-together work.

But the machine's real strength lies in its keying power; not only the quality, but also the flexibility of having nearly 72 keyers to play with. All of this is broken down into eight layers, each of which has a main key section, an upstream key section, foreground and background mask key busses, two color field generators and a color corrector.

The best way to think of the layers are as building blocks to tackle problems with.

The chroma key is especially good, with fine control over suppression (slewed if necessary) and key levels. Each layer also has the ability to mask the main key with other live matte runs and to color correct the full of the key. These values can now be plotted on a time line in a very simple way.

Once this layer is mastered, then multiply the effect by eight, all with switchable priority, and you have a very powerful effect.

USER REPORT

The A84 has also been a very simple machine to master. The general layout is very accessible, and the panel allows fast operation. And even though it is largely menu-driven, we never have to delve through more than two sub-menus.

Solid core

The configuration of the edit suites at The Mill are constantly changing, but the core is always the eight-layer A84. I wouldn't like to work with anything less than the fully configured eight layers because I think it reduces flexibility.

Generally, we master onto disk with a four-disk configuration and a digital

(continued on page 30)

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ERI M-1105-2A 2-bay FM, 97.7 MHz, $1200; ERI 5-bay FM horiz, 102.5 MHz, $1000; 75' of 1 5/8" coax w/1 5/8" EIA flanged conns, $500; 45' of 1 5/8" coax w/conns, $350. G Kenny, KCL, POB 932, Neosho MO 64850. 417-451-1440.

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Hitachi SK 970s (3) w/7" viewfinder, BV/DV/RV-970s, exc cond, $15K all/BO. Sherlene, UPS, 800 N Seward St, Hollywood CA 90038. 213-469-7244.

Bolex H16 reflext w/Switar 18-86 lens, time lapse Galvanometer, motor & housing, $1800; Frezzi LW 16mm w/ang 12-20 lens, $11300. T Porter, 208-888-7600.

Sony BVP3/BVV1 Betacam w/Fuji 12x1 lens. BO. G Mazzone, MMR Prod, 2606 Keygate #10, Toledo OH 43614. 800-395-7223.

JVC KY 17 3-chip w/case & 16:1 lens, $3495; Sony DXC 3000 3-chip w/12:1 lens, $2695, both w/tripod & AC adaps, VTR cable, exc cond. D Brennan, CVL, 3596 Lorna Ridge Dr, Birmingham AL 35216. 205-823-0088.

Hitachi SK-970 (2) w/7" viewfinder & Fuji 14x8 lens, (4) BU-97 base station, (3) RU-97 rem ctrl unit, $7000. Tony, 800-432-3887.

Sony SC-999 1/2" CCD syst w/(2) lenses, cam & RGB adaps, cables, extras, unused, $2000. J Strouse, Video Engrg, POB 517, Arnold MD 21012. 410-757-6679.

Hitachi FP-21 (2) w/cases, manuals, Anton Bauer brckts, plates, cables, batts, $600 ea/$1100 both. F Zakrajsek, Essential Video, 700 W St Clair, Cleveland OH 44113. 216-241-4143.

Pana AG450 S-VHS w/hardshell case, 2 batts & access, $800; RCA PRO 825 8mm palmcorder w/1 batt, soft case, little use, $500, both w/AC adaps, great cond. K O'Berry, CBN, 2515 Linwood Ln, Lake Ridge VA 22192. 703-491-6120.

Hitachi SK-90 w/Fuji 12x9 lens, AD adp & batt, Sony BVU-110 w/batt & case; Bogen 3061 tripod, $1500 all. K O'Malley, 804-446-2730.

Pana 200 CLE w/case, $3000; AG7400 S-VHS port w/belt batt, $1650. B Reiter, Space 9, 800 Heinz Ave #9, Berkeley CA 94710. 510-649-8111.

Pana WV 555B EFP pckg, Canon 15:1 zoom, AC adap, batts, case, manual, tripod plate, cables, exc cond w/Canon VHS port deck, $1200. D Frantz, Ruggles, 1660 Mathis Ferry Rd, Mt Pleasant SC 29464. 803-881-9669.

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Pana TR-930 (2) w/manuals, exc cond, $85 ea. J Brown, ATP, 611 Lacey Way, N Salt Lake UT 84054. 801-292-6331.

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Pana AG-7510 (2) + AG-7500A; (2) IDEN IVT-7 TBCs; Pana MX-12 dig mixer; AG-A650 & NV-A505 A/B roll edit ctrler; AudioSource EQ, $12500, will separate; Amiga 2000 w/68040 & 32MB RAM, 200MB HD, 88MB Syquest, 2 floppy drives, 250MB streaming tape backup, 1080 mon, Firecracker 24-bit display card & 2400BPS modem w/graphics software, $7500; HP IIP w/PostScript laser printer, $850; Epson 300-C 600DPI scanner, $800. B Reiter, Space 9, 800 Heinz Ave #9, Berkeley CA 94710. 510-649-8111.

RCA TG-6 (2) MI 556780-A1 geners w/black burst mod, gd cond, $450 ea. B Ellis, KOZK, MPO Box 21, Springfield MO 65801. 417-865-2100.

Chyron DSC Illusion dig eff syst w/perspective & rotation, exc cond, $6200. D Brennan, CVL, 3596 Lorna Ridge Dr, Birmingham AL 35216. 205-823-0088.

Sony VO-5850 (2), $2600 ea; Pana WJMX-10, $1000; Convergence ECS 90 w/TC & type 5 I/F, $1000; Sony DXC-M3 camera w/extras, $1800; BVU-100 port 3/4" w/TC, $1000; BVP-330 camera w/Fuji lens, $1600; CVS dig TBC, $400; Comprehensive PC-2 CG w/IBM syst, $1000; JVC CR-4400 port 3/4", $300 or $13K all. G Phipps, 419-224-2472.

Ives II frame-accurate 2-mach ctrler w/TCRGs, sync gener, A&V fades, GPI, EDL printout, video stat display, JVC interfaces, exc cond, $2000/BO. 608-251-8855.

Pana TQ-3031F optical video disc rec, $11500; (3) TQ-3032F optical disc video plyrs, $2500 ea/$6000 all; TEA LV210A optical disc rec, $9000; (4) TEAC LV220P optical disc plyr, $1800 ea, 5 for $15500; Polar video S-VHS switcher, $2000; FOR.A FA-300 TBC, $2600; (2) TrueVision AT-Vista 4-meg boards, $2100 ea/$4000 both, exc cond. Greg, 617-354-7628.

Telechrome 3604 RGB chroma keyer w/rem ctrl, $750; Knox K50 char gener, $450. Bill, Corp Media Svcs, 175 Bunker Hill Rd, Auburn NH 03032. 603-644-8899.

Prime Image TBC Freeze (2) w/low hrs, $1200 ea/$2200 both. E Rouse, Valley Chnl, 1350 N 200 W Logan, Logan UT 84321. 801-752-7537.

VCRS/VTRS

Want to Sell

Pana AG7510 Y/C plyr, $2500/BO. F Green, Prof Multimedia, 25681 Euclid Ave, Euclid OH 44132. 216-261-2020.

JVC CR-4900D port 3/4" w/case, $1600/BO; Pana 8500 1/2" editor VHS, $1200; PANA SEG WJ-5500B, $1900/BO, all w/manuals, exc cond. J Brown, ATP, 611 Lacey Way, N Salt Lake UT 84054. 801-292-6331.

Sony DVR-10 D-2 digital, no hd wear, full front panel, $31500/BO. 614-882-2228.

JVC VHS source BR-S611U S-VHS, $2200; BR-6400U, $850; both exc cond, pckg/BO. 608-251-8855.

JVC 3/4" CR-850U edit, 400 hrs, $3900; CR-600U source, 200 hrs, $2500; CR-8250U SP edit, 200-hr hds, $2750; CP-5000U plyr, $350, all exc cond, pckg/BO.

Hitachi HR 230 1" TBC 230, $10K; 130, $8000; HR 100, $650; Sony 5858, 5800 RM 440, $4895. 407-293-3390.

JVC BR6400U source deck; 86U edit ctrler; ICM 2000P video proc, $2495. B Hines, IPS, RD 1, Export PA 15632. 412-468-4115.

Pana NV-9600 w/(2) NV-9240s, AU-A70 3/4 A-B roll edit syst w/AU-J10 multi-source adap, cables, manuals, $1500; (2) JVC CR-1400 3/4" ports w/pwr splys, $500; JVC 5500 3/4" plyr, $250. F Zakrajsek, Essential Video, 700 W St Clair, Cleveland OH 44113. 216-241-4143.

Ampex VPR-2 1" C format w/console; Tek 528 waveform mon & Conrac test/mon, manuals, exc cond, $10K. S Green, Creative Video, 406 Westgate Mall, Madison WI 53711. 608-274-9944.

ACR-25 (2) 1A/2B, all/part, 500+ loaded cass w/loader & misc parts, BO. Tony, 800-432-3887.

Sony EVO 9800 AFM & PCM audio 8mm time code, 9-pin rem, manuals, exc cond, $2500. K Laham, S Fla Video, POB 630277, Miami FL 33163. 305-931-7048.

SWITCHERS

Want to Sell

Pana WJ 5500B prod video, FX, 9 wipe patts, $700. E Rouse, Valley Chnl, 1350 N 200 W Logan, Logan UT 84321. 801-752-7537.

Pana WJ-MX10 w/manuals, exc cond, $650. J Garber, WGBR, 50 Holly Rd, Severna Pk MD 21146. 410-647-2115.

TRANSMITTERS/EXCITERS

Want to Sell

Harris SAW filter bd, $550; Townsend UHF exciter, $10K; Townsend Pulser ICPM corr chassis, dual output, $12200; Harris Visual & LO for Aural, UHF, $5K; Townsend exciter parts. G Kenny, KCL, POB 932, Neosho MO 64850. 417-451-1440.

services

BSkyB Reaps Benefits of BASYS

by David Sparks
Operations Head
BSkyB TV

LONDON BSkyB currently has six satellite channels in operation, with a seventh due on the air later this year. It is likely that we will eventually have nine or 10 channels based at our Osterly, West London, headquarters.

One of the things we have always tried to do is expand our operations without bringing in extra people. That is where the BASYS newsroom automation system is helping.

Our BASYS installation at BSkyB consists of 176 separate devices —terminals, printers, wire services, machine controllers, etc.—all linked together. The original system was built for Sky News, our 24-hour news channel that is now running 31 half-hour news bulletins each day. This system has been expanded to our sports channel operation, Sky Sports, to access information from wire services.

Human interfaces

With Sky News, we have developed a system in which journalists are linked through the BASYS system to devices like our Chyron character generators and Sony Betacart machines. With this system, we don't employ people simply to type in captions; that responsibility now falls to the journalist, and the captions are loaded directly into the character generators before each bulletin. Similarly, the playlist for the Betacart machines is downloaded from the terminal before each bulletin.

USER REPORT

For both these functions, the BASYS Machine Control System (MCS) is the hub of the operation.

We have also looked at using the MCS for controlling our still stores, which we should be able to do if we decide to purchase the new Quantel PictureBox still store.

Another important part of our system is its ability to effectively log tapes. When we first started, we had the original BASYS Archive system. This system is in an area where we can log either scripts or tapes, although we only use it for tape logging at present. Now, every edited story is logged by an archivist telling us exactly what shot we have and where it is.

We recently installed BASYS's Archive II, which features much better search facilities. With Archive II we can either access our library for information, or journalists can conduct their own searches using a terminal on the system.

. . . journalists are linked through the BASYS system to devices like our Chyron character generators and Sony Betacart machines.

Further modifications

We are currently discussing with BASYS ways to modify their Resource Management System (RMS) to meet our requirements, including installing modules for satellite and lines bookings and for tape tracking.

A tape tracking system would mean putting a barcode sticker on every tape so it can be scanned with a light pen as it is used and returned to the library. With the automatic tracking, we will know at any given time where a tape is and who is responsible for returning it.

We also want the tape tracking system to interface with our Library Management System (LMS) from Sony. With such an interface, our library can be automatically notified if a tape scheduled for air is missing.

As for the satellite and lines booking system, we are looking for a way to smooth out the bumps in our master control.

With a station like ours, where we have a sports channel and a news channel, there is a tremendous number of satellite feeds coming in. On a normal day, news will bring in between 70 and 90 feeds from outside the building. And sports will have about 20 feeds between Monday and Friday and another 20 to 30 on the weekend.

Feeds from afar

If a feed originates from America, for example, there might be eight or nine individual elements getting the picture into the building. With all these individual elements for one feed, each item that makes up the chain is an individual booking with one supplier.

All this information must be collected so the person in master control trying to get the feed into the building knows whom to talk to, where the problems are and what the routing is. So it obviously makes sense for this to be a unified system.

Another important function is knowing the cost of the feed. The satellite bookings system has some modules built into it that allow us to quickly get an approximate cost and to cross-check with suppliers' invoices.

This gives the journalist who has asked for the feed a rough estimate of how much he's spending and in turn makes our journalists accountable and responsible for what they are doing.

In our experience, we've found that the installation of BASYS systems at Sky has streamlined our operation, improved our effectiveness and given us the ability to expand our operation without losing control of costs.

Editor's note: As operations head at BSkyB, David Sparks oversees the facilities, automation systems, as well as numerous other aspects of the satellite service.

The opinions expressed above are the author's alone. For further information on BASYS automation systems, contact Avril Page at BASYS (telephone: +44-753-583-333; FAX: +44-753-591-108), or circle **Reader Service 121.**

The Abekas A84 Is Working at The Mill

(continued from page 28)

VTR for the rushes and final master tapes. For picture manipulation, there are three fully configured A57 digital effects channels and an A72 character generator shared between the two edit suites.

With eight layers of key and four minutes of disk space, multilayering becomes two-way. We have the ability not only to perform many keys at once, but also to layer this by recording onto a disk and swapping it to become the next background layer.

Although we were initially excited about the unit's LINC interface, this feature has turned out to be a disappointment. In theory, the interface allows the integration of the A57, the disks, the A72 and other devices, such as routers and audio followers, into the switcher.

This sits alongside the eight independent time lines and enables everything to be locked into the effect while providing embedded control from the A84's panel. This should give a true real-time updating time line.

High hopes

Unfortunately, I have never seen this work properly and it frequently crashes. It is a feature designed to enhance creativity by faster setting of effects, but instead it slows everything down and has a poorly designed interface that is confusing.

Apart from the hopes of the LINC, there have been very few problems with the A84. With constant technical support from Abekas U.K. and an inspiring speed into which new features are introduced from users' suggestion, the A84 still seems to have lots of room to grow and improve.

We are waiting for the imminent release of version 4 software and hardware, which enhances the flexibility of time lines, increases the amount of storage registers available and provides more memory space for extra features in the future.

In addition, Abekas officials have assured me that version 4 fixes all problems with the LINC.

As with most devices, the A84 could benefit from some improvements, and generally, most of these have to do with storage and retrieval of data from the hard disk. At the moment, we must store every register used in a session one at a time to the hard disk.

Also, some form of compatibility with the A57 and A84 is needed. None of the color values seem to match for the xy position and trajectory paths.

I do feel, however, that for a five-year-old switcher, the A84 is nearly perfect. It has provided me with the power I need to achieve a great deal of special effects that I am quite sure I could not have achieved otherwise.

A lot of the new operational procedures and techniques I am working on at the moment have, to a certain extent, outgrown this switcher, and I pin my hopes on the next generation of system to inspire me yet again.

Editor's note: A video professional for 10 years, Jon Hollis has been at The Mill for the past three years and is also a director of the facility.

For further information on the Abekas A84, contact Dave Levy at Abekas (telephone: +44-743-585-421; FAX: +44-734-597-267), or circle **Reader Service 129.**

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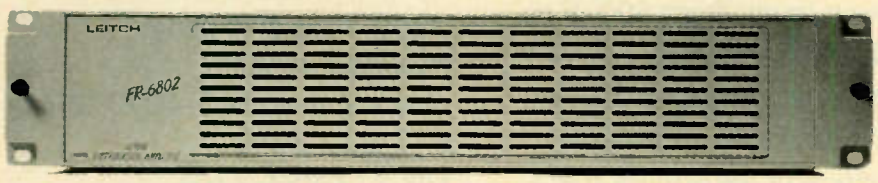

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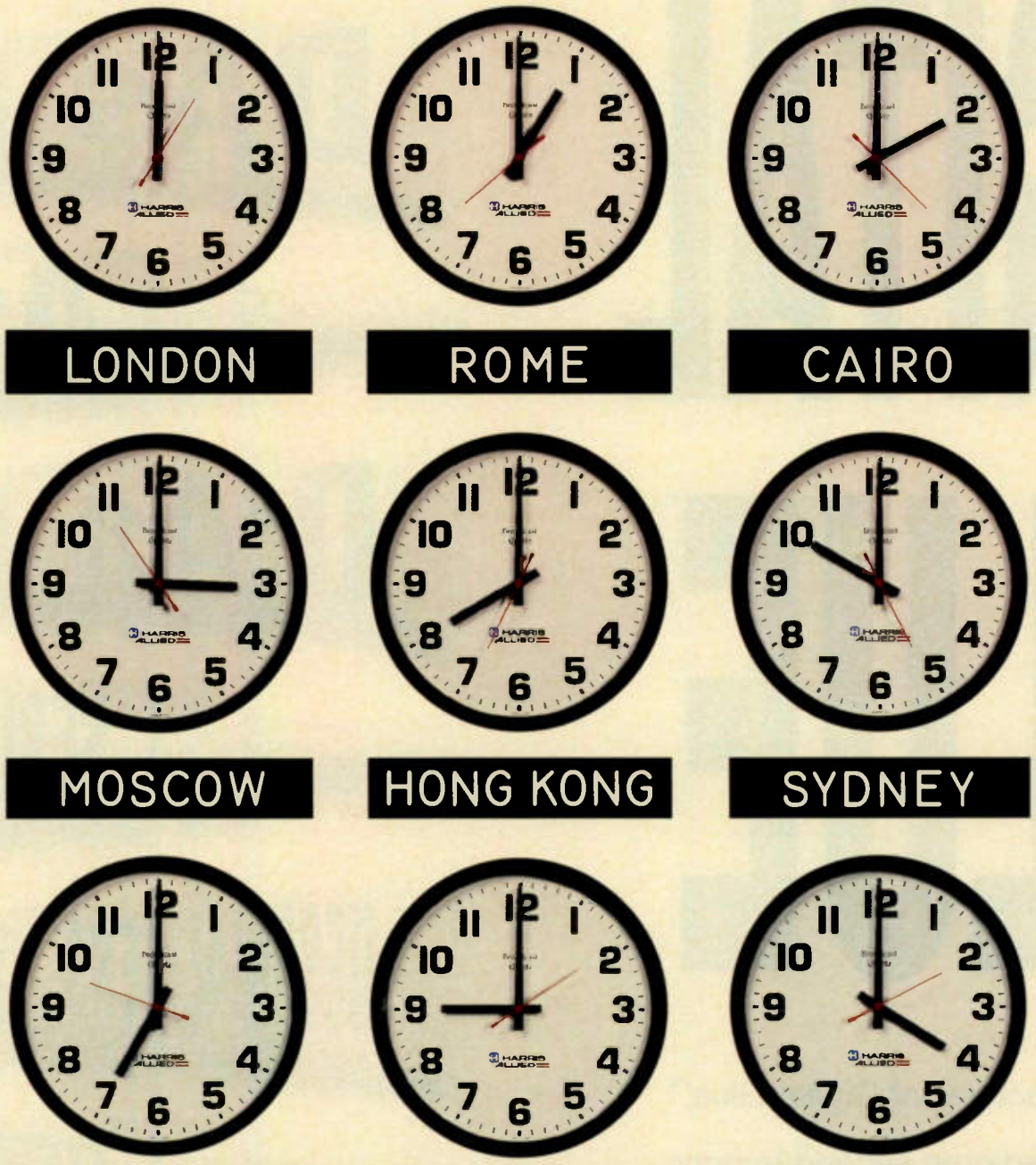

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