BME
FOR TECHNICAL AND ENGINEERING MANAGEMENT
AN ACT III PUBLICATION
OCTOBER 1988
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INSIDE FIBER OPTICS

AN INTRODUCTION FOR ENGINEERS

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THE WHEATSTONE SP-6 AUDIO CONSOLE lets production people quickly accomplish 8 and 16-track work, yet easily handle routine transfers and dubbing operations. With its unique track monitor section it can facilitate simultaneous stereo mixdown during the multitrack bed session – almost halving typical production time cycles. Input channels are laid out just like an air console, with machine starts below the channel fader, so staff familiar with on-air consoles can quickly become comfortable in the production environment.

For those interested in more advanced techniques, the SP-6 employs a powerful talent monitor section designed to rapidly call up live mic and track combinations, making difficult punch-ins a breeze. Standard SP-6 input channel equalizers are more comprehensive than those supplied as optional items on competing products, allowing much greater creative freedom. Input channel auxiliary send sections are designed to be the most versatile in the industry, providing 4 different auxiliary buses to allow digital delay, reverb, talent foldback, and mix-minus feeds. Stereo input channels can provide either mono or stereo effects sends. Even more, the SP-6 has 4 auxiliary effects return inputs that allow effects to be recorded onto the multitrack or sent to the monitor buses.

The SP-6 provides independent headphone, control room and studio monitor feeds, as well as stereo cue/solo. Control room and studio mute and tally functions are independently dipswitch selectable on individual input channels. Additional studio modules may be ordered to accommodate larger, multi-studio installations. The SP-6 may be configured with any combination of mono and stereo input modules, in mainframe sizes ranging from 16 to 32 or more inputs. The console is available in either an 8-track production format or a 4 stereo subgroup TV master control configuration. So why not profit from Wheatstone's experience and reputation? Call us today and learn more.

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DYNAMAX CTR12 and CTR14 shown

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DYNAMAX products are designed and manufactured in the U.S.A.

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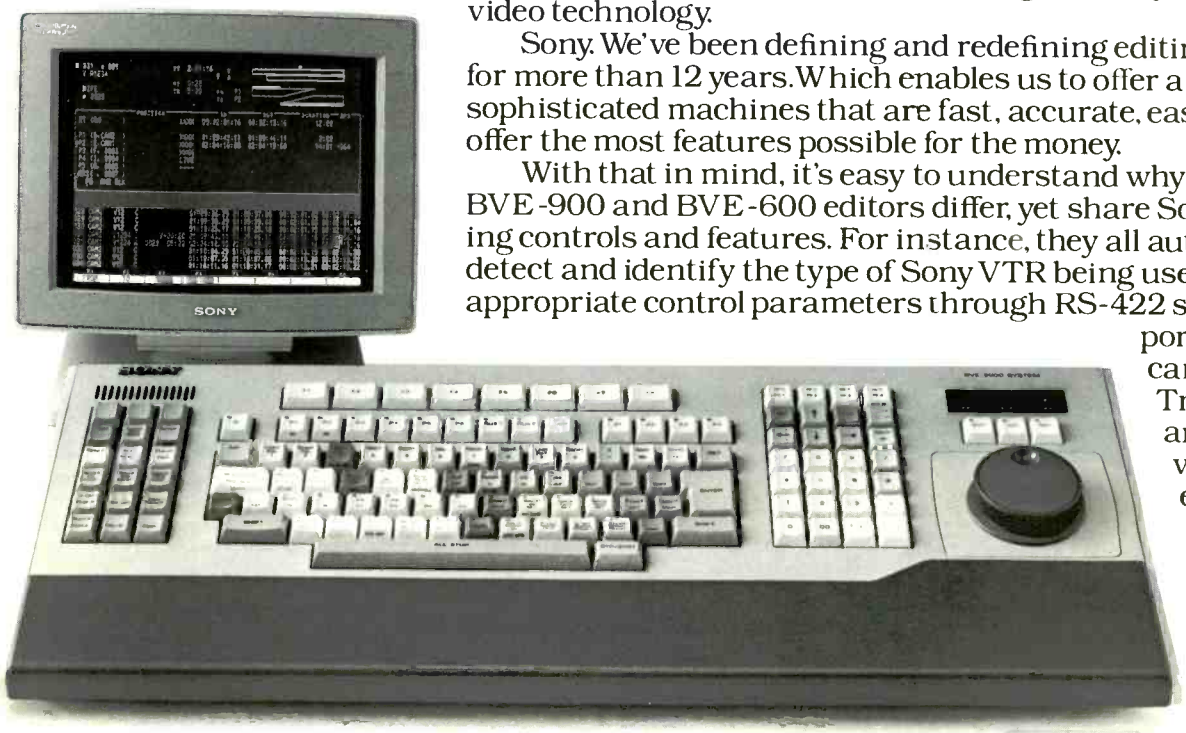
Why Sony cutting edg

BVE-9000



One company has consistently managed to stay at the for video technology.

Sony. We've been defining and redefining editing contro for more than 12 years. Which enables us to offer a wide rang sophisticated machines that are fast, accurate, easy-to-use a offer the most features possible for the money.

With that in mind, it's easy to understand why the BVE-9 BVE-900 and BVE-600 editors differ, yet share Sony's key ope ing controls and features. For instance, they all automatically detect and identify the type of Sony VTR being used and set the appropriate control parameters through RS-422 serial control ports. Plus, they can read Control Track, Time Code and perform video/audio split edits. The list of features goes on and on, so by all means, read on.

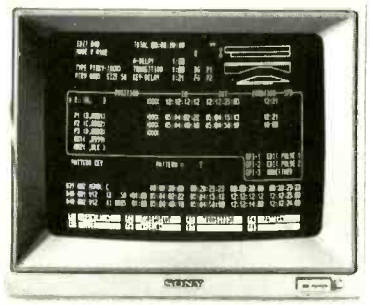
The BVE-9000. State-Of-The-Art That's Top-Of-The-Line.

The Sony BVE-9000 is one of the most flexible and powerful editing systems in the world. It's designed to save the most precious commodity of all: time.

Among its significant innovations are multi-edit preview and full assembly look ahead. This allows you to preview an entire sequence of up to 999 events, before actually having to record a single edit. And then, with the flick of a few key strokes, you can automatically record the entire program.

Of course, there are many other incredible features that help you control your entire editing facility. For one thing, the BVE-9000 can work with 28 separate devices. It also has an optional color menu display that's user friendly and programmable for layout and color.

What's more, our Dynamic Motion Control Learn-With-Create and



BVE-900

is on the f technology.

switcher Learn-With-Create features allow you to record a move without having to re-rehearse it. In addition, the temporary record assignment greatly speeds up multi-layering. And the most complete set of test diagnostics in the industry helps reduce system downtime. No wonder this top-of-the-line editing system can meet all your present and future needs.

The BVE-900. State-Of-The-Art Technology And State-Of-The-Art Economy.

The next best thing to editing on a BVE-9000 is editing on a BVE-900. It, too, is an easy-to-use system and economically offers technical advancements and expandability.

It controls up to four VTR's in any A/B roll edit. So you can perform sync roll and sync play. In addition, the BVE-900 gives you full control of video switchers and audio mixers, including fader selection and VCA control for split audio/video edits.

What's more, its easy-to-use menu driven display puts edit accessibility at your fingertips.

BVE-600

The BVE-600. State-Of-The-Art Technology Even More Economically.

The BVE-600 is our most economical unit. It allows you to control three VTRs (two players and one recorder). Which, depending on your needs, may be more than enough. You have the power to dissolve, wipe, or superimpose editing sequences, without the need for an external video switcher. Our optional built-in component/composite video switcher offers a selection of 10 wipe patterns. That, with our built-in MXP-29 Audio Mixer interface, make A/B roll editing a reality.

Of all the benefits of using Sony editing control units, perhaps the greatest is that they form an easy-to-use system. Which means you can connect them to Sony VTRs, switchers, audio mixers and video monitors. All of which are serviced by Sony.

For more information about Sony's entire line of editors, write to: Sony Information Center, P.O. Box 6185, Union, NJ 07083. Then you'll be able to see even better why Sony is on the cutting edge of technology.

SONY

Broadcast Products
Sony Communications Products Company

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The DPS-270 Time Base Corrector . . .
The Last Word in Time Base Correction.

Well Actually, Here's the Last Word . . . $2,995.

THE DPS-270 Time Base Corrector. True S-VHS Y/C component processing – at a more than affordable price. The DPS-270 offers S-VHS Y/C and NTSC composite inputs and outputs, as well as a 5.5 MHz bandwidth. This makes the DPS-270 compatible with any ¾" VTR that accepts external sync and subcarrier. And the unit also provides Y/C to NTSC encoding and NTSC to Y/C decoding.

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BME
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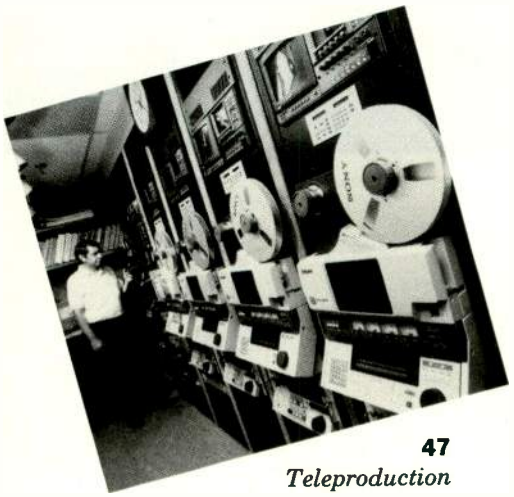
OCTOBER 1988
VOL. 24, NO. 10

On the cover: *"Inside Fiber Optics"; cover photo courtesy of AT&T Bell Laboratories.*



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Features

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PHASE TRAK 90 PLAYBACK

If you aren't satisfied with the audio quality of your carts, don't blame the tape. They only sound as good as your cart machines permit.

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*Patent applied for.

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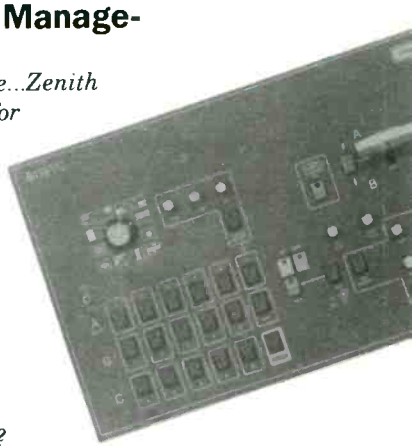

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Voice Recognition

It pays for itself...
The Panasonic MII Cart

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Official Video Equipment Of
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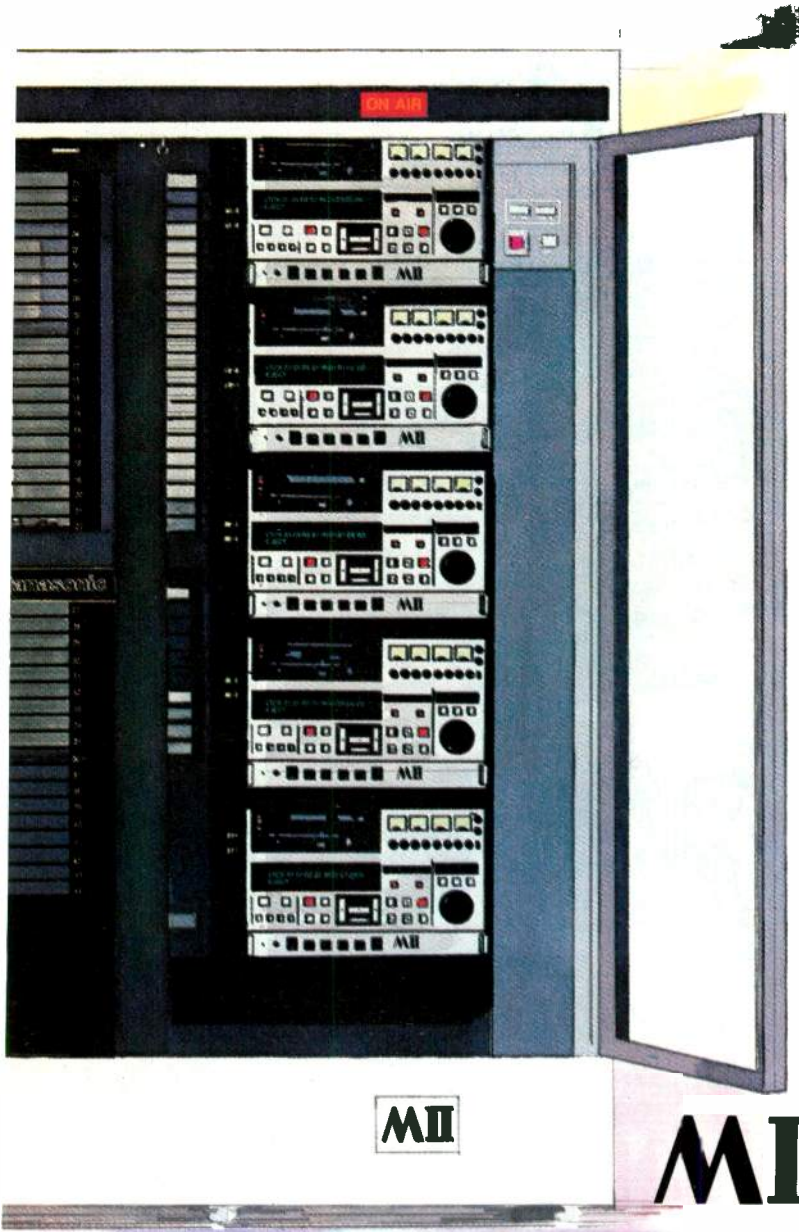

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- Uses 10-, 20-, 30-, 60- or 90-minute cassettes in any desired mix.
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- Uses up to 5 standard MII studio VTR's plus 3 optional outside sources.
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Photographed at On Tape Productions, San Francisco, CA.

The video industry demands the same uncompromising audio quality the recording industry expects. Dolby SR signal processing and Dolby A-type noise reduction are now available on one processing board for the Sony BVH-3000/3100 VTR. Contact your Sony representative and inquire about the BKH-3080. Find out why recording and film studios around the world rely on Dolby for cleaner, quieter audio.

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VIEWPOINT

Technical quality must be the prime consideration in choosing an HDTV standard.

If the broadcasting industry agrees on any one point in the ongoing debate about advanced television, it's that major changes in the technology used to transmit television signals to the public are necessary and inevitable. Beyond that, the multiplicity of proposed standards continues to generate controversy. The most basic system parameters have yet to be defined, and political and economic concerns sometimes seem to overshadow technical considerations.

The FCC's recent, tentative statement about advanced television is a welcome first step toward wresting some order from the ATV chaos. The Commission rightly made no attempt to define a standard for ATV transmissions—a move that, at this early stage, could only have been hasty and ill-advised. It began, rather, to structure the many questions that have shrouded the ATV issue from the beginning.

Whence will the answers to those questions come? Perhaps more important, who will define the next set of questions? At this juncture, we'd like to make a few points about the ATV decision process:

First, we believe that the FCC must act expeditiously to select a single standard for transmissions. Not to do so will throw the television industry into a disarray worse than that which followed the AM stereo nondecision of a few years ago. Worse, if the FCC drops the ATV ball, it will be picked up by cable television and the receiver industry, both of whom have concerns that diverge widely from those of the broadcast community.

Secondly, the industry must take care not to sacrifice technical quality in its quest for compatibility. An NTSC-compatible advanced television broadcasting system is advisable for a host of reasons, but the consequences of selecting a system with serious technical limitations will haunt the industry for years. The FCC and the broadcast industry should carefully consider all proposals, including those that would simulcast an incompatible signal, and choose on the basis of demonstrated technical excellence as well as economic and practical considerations.

The spectrum allocation issues raised by ATV are already raising hackles. It seems unlikely that there'll be enough extra spectrum to permit all U.S. television broadcasters to participate. Like many others, we're concerned about the FCC's proposal to allow stations to use this extra spectrum for non-HDTV services, even temporarily. A "use it or lose it" policy would encourage station operators to get ATV on the air quickly.

This decision gives us the chance to make a quantum leap in the direction of excellence. We must choose carefully, because we'll have to live with our decision for a long time.

Eva J. Blinder
Editor

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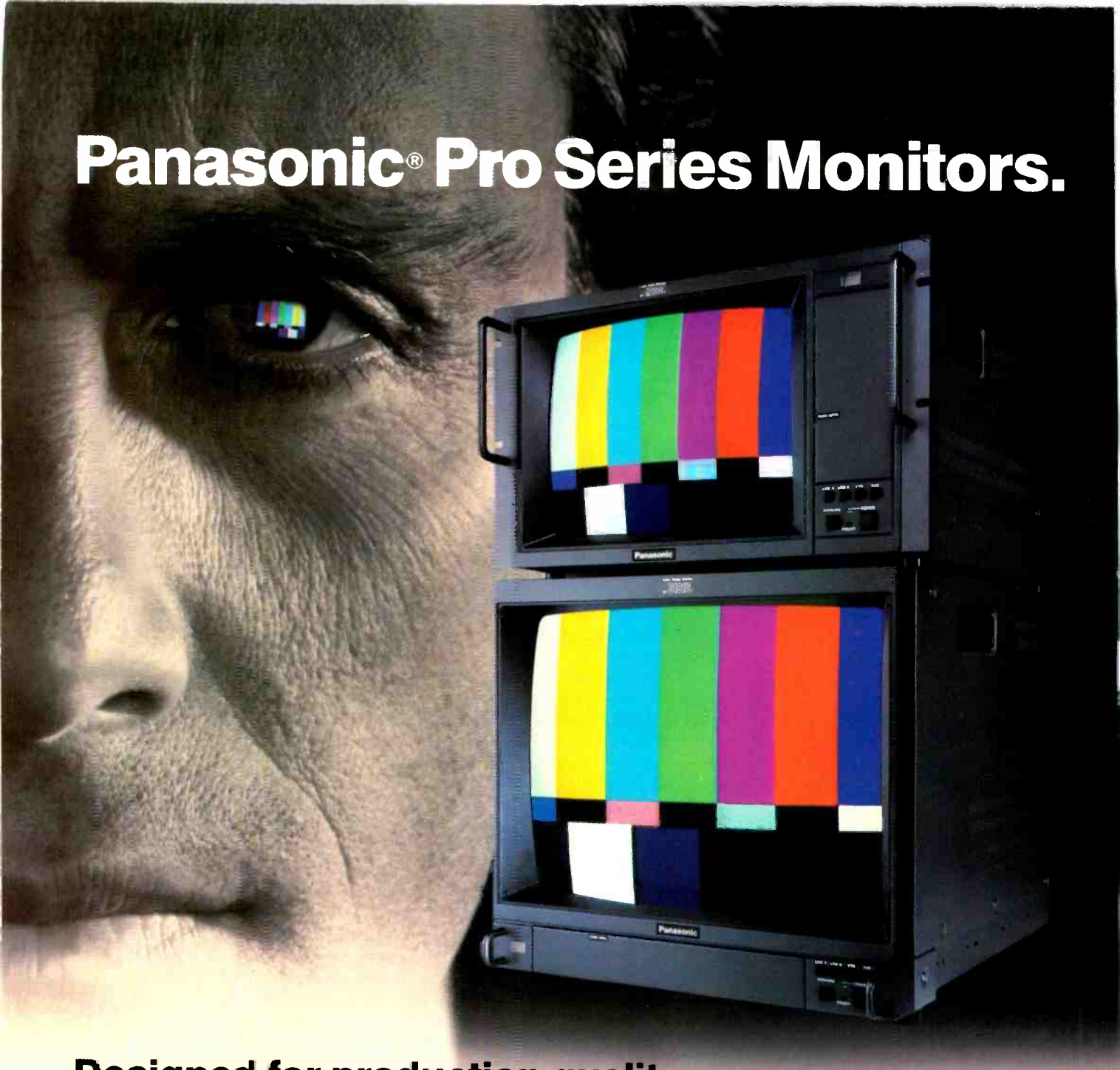

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Our BT-Series provides you with the controls and connections necessary for studio applications--while serving a host of industrial, educational and professional video needs.

For maximum performance and versatility, both monitors offer complete, direct compatibility with the new S-VHS format--in addition to conventional signals. And video reproduction on the BT-Series is superb. As a matter of fact, the BT-M1310Y boasts a horizontal resolution of more than 560 lines, while the BT-D1910Y offers you greater than 550 lines.

What's more, each monitor provides you with a full set of front panel controls. Like Line A/B split, S-Video input connectors, Blue single-only switch, pulse-cross circuit, preset picture off/on, comb/trap filter selectable and normal/underscan switch, just to name a few.

So when you are looking for professional quality, but still need to keep an eye on your budget, look into the Panasonic BT-Series high-grade monitors. For more information, call Panasonic Industrial Company at 1-800-553-7222. Or contact your local Panasonic Professional/Industrial Video Dealer.

Panasonic
Professional/Industrial Video

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FEEDBACK

Buck That Hum

In your article "Remote Vehicle Engineering" (*BME*, July, p.33), you talked about various design options and problems that arise in remote situations. You spoke of how power isolation transformers were used to regulate and clean up the output of on-board generators.

Another type of isolation tranformer that I did not see mentioned was video isolation transformers. These one-to-one isolation transformers for video/data lines have been designed to eliminate the effects of power and spurious noise potentials between ground on transmitted signals. In any remote situation, hum can be a problem.

My company, in business since 1953, manufactures video isolation transformers and humbuckers. We have been manufacturing our video isolation transformers for over 15 years. We would be happy to provide your readers with information.

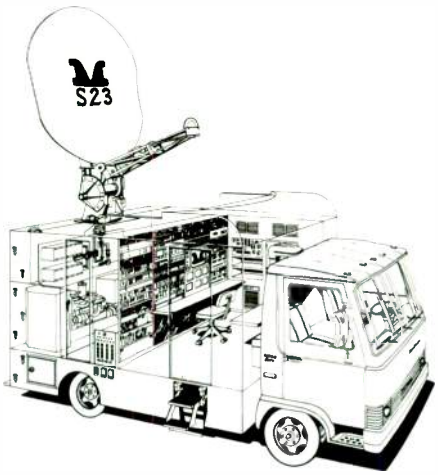
Joseph Barbuto
North Hills Electronics, Glen Cove, NY

Computer Blooper

As a broadcast engineer for WCFC in Chicago and a USENET site administrator as a hobby, I found several discrepancies in your article ("A Nationwide Computer Network," BME, August, p. 25).

First, you imply that USENET is a physical network. It is in fact a logical network with sites on the BITNET, ARPANET, NSFNET and the informal UUCP network of UNIX machines. The number of USENET sites now exceeds 75,000. Of these sites, about half are privately owned and operated, which places the C.S. departments and computer companies at a minority.

Communications on the network



are much less cumbersome than you imply. I can send a message to Australia and get a reply back in 24 hours or less. The same applies to Europe, only the time is faster as the link is via one of the SATCOM satellites.

The USENET recently lost "The Backbone," located at AT&T in Naperville, IL. There was little or no effect due to the passing of this machine. I have been involved with the USENET for about four years and cannot remember when communications have ever been severely interrupted.

There is no reason why broadcast engineers could not have access to the USENET. There are a large number of public-access UNIX sites organized around the needs of the computer hobbyist. My system, a free USENET site, supports almost any terminal that can be found, and it does support use with almost any computer. There is no sign-up fee, no on-line charges by the minute, and I accept any file type, binary as well as text.

I am willing to help create any USENET newsgroups that would be useful to the broadcasting community. I will set up UUCP USENET feeds for any broadcaster, and I will provide the software to do it. The requirements are that you must have a machine that is running UNIX (a PC AT with XENIX is okay, as are many others) and an inexpensive 1200 or 2400 baud modem that can dial out. If more details are needed, I will be glad to furnish them.

Rich Andrews, Engineering
WCFC-TV, Chicago, IL
UUCP Address: rich@jolnet

New Network

The article "A Nationwide Computer Network" in the August 1988 issue was excellent. It pointed out a problem or, better yet, a lack of a solution that has been of prime concern to a number of us in broadcasting.

In October of last year another engineer and I put together a system on our own with the TV and radio broadcaster in mind. We have electronic mail capabilities for all to use plus free computer software that consists of many related directly to broadcasting. We also have areas of tips on equipment which are provided by broadcasters with expertise in that particular area. We offer graphical displays of schematics and equipment, listings of broadcast equipment for sale and full computer teleconferencing.

Currently we are running three lines. All we need is a little support from the broadcaster. For full access, we ask $1.50 per hour on-line charges with a 10-hour minimum. The numbers for this are (601) 371-0574 and 371-0575. We also have a line, (601) 373-0160, for free usage with some limitations. We offer 300/1200 baud operation.

The "Net-Work" system is available to all broadcasters 24 hours every day, seven days a week.

Herbert M. Jolly
CE, Mississippi Authority for E.T.V.,
Jackson, MS

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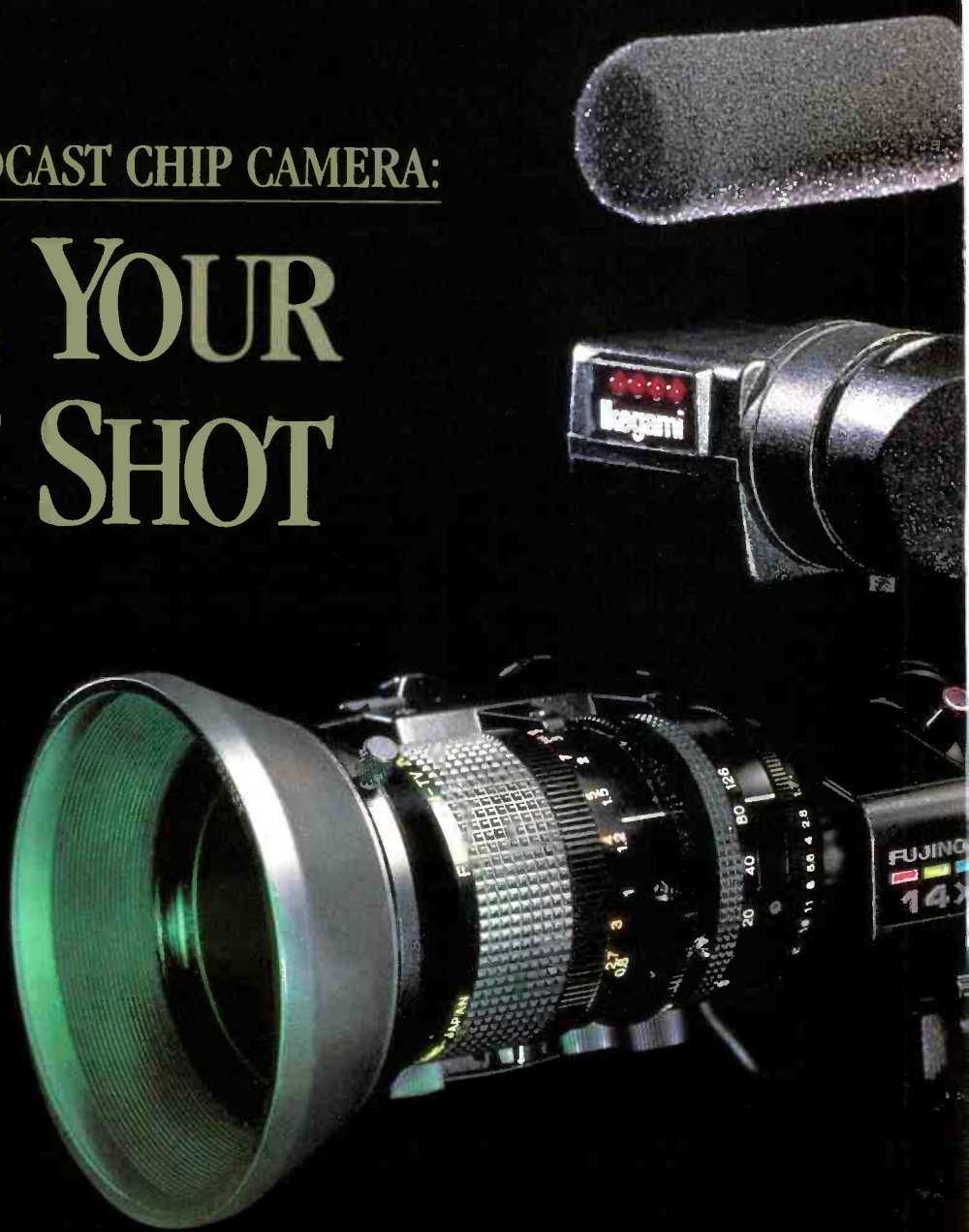
Ikegami's remarkable broadcast CCD, the HL-55, features three newly developed ⅔" FIT (frame interline transfer) chips, each delivering an industry-first 400,000 plus individual pixels. This insures low FPN (fixed pattern noise), a reduced vertical smear, and enhanced resolution at over 700 TVL and high S/N ratio of 62 dB.

Compact and lightweight (6.81lb with viewfinder), the HL-55 features a six speed electronic shutter for improved dynamic resolution, high sensitivity (+24dB), a newly developed optical low pass filter for reduction of noise and much more.

Our exclusively designed viewfinder provides complete setting data, a clearer picture than conventional viewfinders, and can add or delete a safe title area box, cross hairs and audio bar graph.

THE HL-55 BROADCAST CHIP CAMERA:

TAKE YOUR BEST SHOT



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TELEX®

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UPDATE

*3M Exits Two-Inch Quad Videotape...*BME *Names Technical Editor...WTTW Pioneers HDTV Television Pilot... FCC Rules on HDTV; Congress Takes a Look...Conus Co-op Covers Disaster Live*

3M Exits Two-Inch Quad Videotape

Although the reports of the death of two-inch quad videotape have been somewhat exaggerated, 3M's decision to leave the market by the end of 1988 spells the beginning of the final throes in the United States.

"Quad is in the very late stages of mature product development," said 3M professional audio/video and specialty products division marketing operations manager Frank Russomanno, hailing the format's 32-year history. "I'd hate to say records will never be broken, but this one will probably never be touched."

The transformation of the market to the one-inch Type C format for mastering, broadcast, production, syndication and commercials, coupled with the decline in demand for two-inch videotape, mandated the decision, he explained.

"At some point in time a manufacturer must decide where to allocate capacity on behalf of new products," Russomanno said, adding that D-2 composite video will become a key format. "D-2 is very popular, and anyone who will be in this business will have to recognize it as a format of choice," he concluded.

"They hated Fuji first and they'll hate 3M last," commented one broadcaster, pointing out that rural broadcast outlets, universities, some duplicators and small markets with limited budgets still use quad-format video. Fuji exited the business in 1984 in order to concentrate on one-inch, 3/4-inch and half-inch videotape, according to Fuji Photo Film U.S.A. magnetic product division marketing director Brad Friedrich.

"We see the market moving to half-inch technology and digital formats," Friedrich said. In common with TDK, which supplies a small amount of two-inch tape in Japan only, Fuji felt the U.S. two-inch market was no longer economically viable.

Although two-inch VTRs and cart machines are not now manufactured, the good news is current quad users will not have to rely on recycled tape alone.

Ampex has no plans to leave the two-inch market either in the U.S. or worldwide, according to Mike Wilke, product line manager for Ampex's magnetic tape division.

"Despite the fact that quad is a format in decline, we as a supplier of professional products have to support it down to the last machine," he said, likening the situation to the discontinuation of gasoline for a vintage car. "The format is almost gone, but it's a testimony to the longevity of the machines that they keep working."

Next on the endangered species list? Three-quarter-inch—"It's been around 15 years and it's had a good life," said one manufacturer, who wished to remain anonymous—and one-inch: "Half-inch and D-2 spell the beginning of the end," he predicted.

BME Names Technical Editor

BME has appointed James A. Ackerley to the new position of technical editor. Ackerley holds a BSEE degree from Fairleigh Dickinson University and an MA from Teachers College. Formerly a technical writer with nearly three decades' experience in the aerospace and defense industries, he joins the publication from Harris Corp.'s PRD Division. In addition to dBase programming expertise, Ackerley's extensive credits include documentation of VAST circuit card assemblies, laser bombsights and digital phase voltmeters.

James A. Ackerley is BME's *new technical editor.*

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UPDATE

WTTW/Chicago director Jack Ginay (center) supervises shooting the first television pilot using HDTV technology produced by a local television station.

WTTW Pioneers HDTV Television Pilot

Local broadcast television station WTTW/Channel 11, Chicago, IL, has just completed shooting a pilot program utilizing HDTV technology. Although proponents of 1125/60 HDTV are seeking broad acceptance of the format as a production standard, this is believed to be the first use of the technology by a broadcast television station. The 1125/60 format has already been used for shooting music videos, commercials and television movies.

The WTTW project, a nonverbal showcase for a boy-meets-girl fantasia, was produced and edited on equipment provided by Sony Corp., which also provided technical assistance. Using local actors especially chosen for their ability to communicate through facial expression and movement, the pilot communicates in the "international languages" of music and movement, according to executive producer and writer Glen DuBose. This will leave the viewer free to concentrate on the HDTV aspects of the program.

The 10-minute pilot was shot on location in Chicago at sites including O'Hare Airport, Wrigley Field, the Terra Museum of American Art, Lincoln Park and the North Avenue Beach. The program made its international debut at the International Broadcasters Convention, September 23-28, Brighton, England.

WTTW was also instrumental in the development and eventual viewer acceptance of television stereo sound. It was the first television station in the United States to broadcast its full programming day in MTS.

FCC Rules on HDTV; Congress Takes a Look

Despite the political tub-thumping endemic in an election year, the FCC issued what will undoubtedly be a landmark ruling by endorsing the concept of high definition television compatible with current NTSC receivers.

In its September 1 statement, the three-member FCC made a "first pass" at establishing R&D guidelines and spectrum allocation for HDTV transmission and development of equipment. Despite—or perhaps in the face of—what are sure to be complicated international allocation and standards negotiations, the FCC has thereby reaffirmed strong support for the American terrestrial broadcast industry. As a result, however, the industry could find itself going it very much alone against HDTV-oriented alternative media here and broadcasting abroad.

The preliminary rulings found that (a) existing broadcasters and stations are best equipped to bring an advanced television system to viewers, (b) advanced television programs must be able to be received on existing television sets in the same way that NTSC color broadcasts are compatible with black-and-white sets, and (c) if additional frequency space is required, it should be found within existing VHF and UHF television bands. The FCC noted that bandwidths suitable for advanced systems are currently in use for other purposes, and also cleared the way for cable television operators to deliver any HDTV system compatible with their delivery format.

In addition, the FCC sought public comment on three options for a spec-

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Circle 109 on Reader Service Card Page 91 for Demonstration

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trum allocation plan:
*That no additional spectrum be made available;
*That a 3 MHz channel, not necessarily contiguous, be made available to augment the main channel; or
*That a 6 MHz channel, also not necessarily contiguous, be made available to augment the main channel or to simulcast HDTV during a period of transition.
The comment period is 60 days and 30 days for replies.

Taken together, the proposals appear to eliminate the possible use of the Japanese NHK MUSE or PAL/SECAM-compatible European MAC/EUREKA high definition technology as an international transmission standard or a broadcast transmission system in the United States. In addition, consumer receiver manufacturers—including American manufacturer Zenith, which has just tossed its advanced television hat in the ring with Spectrum Compatible HDTV (SCHDTV)—would be forced to design different receivers for their domestic and export markets.

While the Japanese 1125/60 9 MHz MUSE-E system is the only one which has been tested over the air, NHK has nevertheless developed six other NTSC-compatible systems, notably MUSE-6. Neither these MUSE systems or any of the 19 advanced systems in development currently exist as other than computer simulations.

In addition, both the NHK Narrow-MUSE and Zenith SCHDTV systems, which would broadcast a noncompatible 6 MHz signal, can be implemented with a second 6 MHz channel simulcasting NTSC; thus, they are not ruled out by the FCC guidelines.

Reaction and broad-based support to the FCC guidelines was swift and predictable. American and European professional and consumer receiver manufacturers and the NAB, EIA and NCTA associations commended the proposals, while the HDTV 1125/60 Group, a consortium of manufacturers, was quick to point out the rulings in no way affect the use of 1125/60 as a production standard.

Strong support for the FCC moves also came in a September 7 House Subcommittee and Finance Hearing on Advanced Television Technology, which called for a coherent national strategy and action memos to facilitate American involvement in HDTV by January 4, 1989.

NAB Call for Papers

The NAB Broadcast Engineering Conference Committee has issued a call for papers for the 43rd Annual Broadcast Engineering Conference. The conference will be held in conjunction with the NAB Convention April 29 through May 2, 1989 in Las Vegas, NV.

Technical papers are invited from broadcasters, manufacturers and Associate Members relating to broadcast equipment, systems and techniques of interest to broadcast engineers and technicians. The committee also invites papers relating to notable improvements in broadcast engineering technology and is specifically seeking papers from equipment users and Associate Members involving "cutting edge" broadcast production technology.

One-page abstracts on proposed subjects should be sent to the Engineering Conference Committee of the NAB's Science and Technology department by October 25, 1988. Completed papers and artwork are due by March 15, 1989.

Conus Co-op Covers Disaster Live

The Conus Satellite News Cooperative provided full, live four-city coverage of the recent crash of Delta Airlines flight 1141 to 44 Conus members and international networks. Satellite uplinks from five SNG trucks, one of three Conus trucks parked 250 feet from the wreckage, provided 67 live reports from the crash site and a total of 103 feeds. Crash-scene video and a live press conference originating from Salt Lake City were aired on 12:00 p.m.(EST) newscasts the day of the crash, followed by a live press conference from Atlanta, the home base of Delta Airlines. Conus also provided SNG anchor coverage in Jackson, MS and Salt Lake City plus a live team at the Dallas site for full custom reports and question and answer sessions. The Delta flight was enroute from Jackson, MS to Salt Lake City, UT, when it crashed at Dallas-Ft. Worth Airport Wednesday morning, August 31, 1988.

Source Corrections

The Source Buyers' Guide, published in BME's August 1988 issue, contained typographical errors in the following companies' listings. Please correct your copy as follows:

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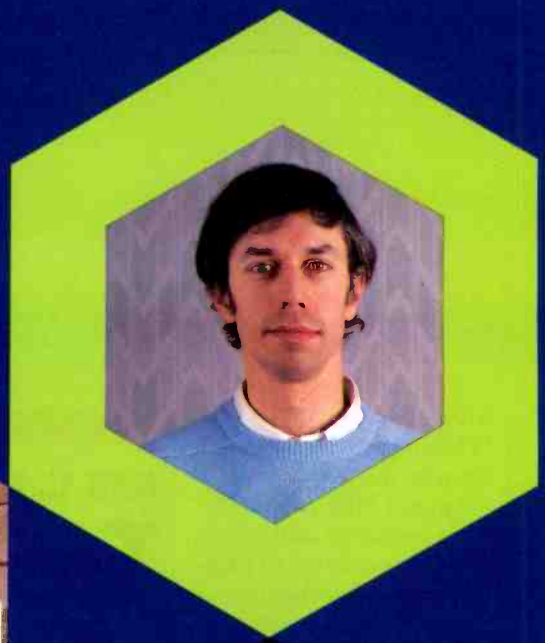

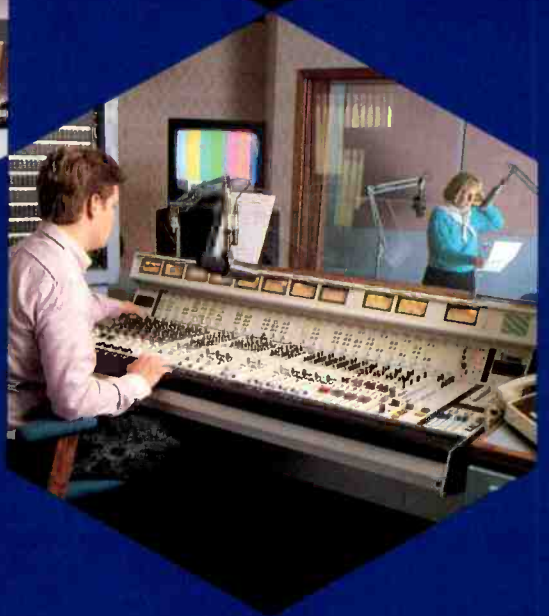

"That's what I tell colleagues from other stations when they ask why I prefer Auditronics consoles," says Jon Book, Engineering Manager, Studio Systems for WOC-KIIK in Davenport, Iowa.

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CROSSTALK
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HDTV Formats Square Off in Europe...Zenith Wants to Take U.S. Higher...A Call for Nominations

EUREKA! HDTV Formats Square Off in Europe

BME's correspondent called it "The Battle of Brighton" as the forces of the European EU95 MAC/EUREKA HDTV project faced off against the 1125/60 Group, the U.S.-based association charged with establishing 1125/60 as an international high definition production standard.

The confrontation boiled over at the International Broadcasting Convention held last month in Brighton, England, indicating now more than ever that the HDTV universe may well be parcelled up into at least three incompatible transmission systems. While production and transmission standards do not have to be the same, the ease of transcoding between them varies greatly depending upon which formats are used. Even *de facto* choice of an international production standard could drive international transmission selection—or vice versa.

Industry sources currently say satellite delivery of HDTV will begin in 1990 in Japan and in 1992 in Europe. Japan supports the NHK MUSE 1125/60 Hz system, Europe's EUREKA system is 1250/50 Hz and the industry expects the United States to adopt a form of NTSC-compatible 1050/60 Hz delivery. In addition, the USSR is developing a 1350/50 Hz system which it is proposing as another world-wide standard for production.

If the IBC sparring were an Olympic event, the 1125/60 Group would have won on market-readiness, according to our ringside correspondent. The EUREKA group of 30 participants, shrouding their demonstration in security procedures which would have been more appropriate to events in Seoul, showed a complete operational HDTV image chain compatible with existing 50 Hz television standards.

The EUREKA program—spearheaded by Thomson, Philips and Bosch—is a year from its target completion date. Unlike recent ATV demonstrations in the U.S., however, the EUREKA demonstration, which transmitted 1250/50 Hz signals via HD-MAC to a satellite and back, was a real transmission and not a computer simulation. The EUREKA production demonstration used 1250/50 cameras with progressive scanning and interlace scanning and an interlace scanning VTR with diagonal filtering electronics. It also also used a Bosch 25-frames-per-second telecine and a Thomson 12-bit digitation slide scanner with sequential progressive scan, Gretag and Barco monitors and a Philips videodisc player.

Unable to obtain demonstration facilities at the IBC show, the 1125/60 Group set up at a nearby university. Their work clearly showed the head start the NHK format has thanks to the continuing support of Japanese manufacturers, and Sony in particular. Over 30 companies are currently making 1125/60 equipment, including graphics systems represented by Quantel and Symbolics. Proof of this lead was demonstrated the same week in Seoul, Korea, where NHK transmitted live Olympic video in full

Excellence in Engineering: A Call for Nominations

The editors of BME Magazine invite your nominations for BME's second annual Excellence in Engineering Awards, to be presented in the January 1989 issue.

The Excellence in Engineering awards recognize organizations and individuals who have made significant contributions to the broadcast engineering profession. Honorees may include stations or facilities that have demonstrated innovation in design or operation; industry groups that have spearheaded technological progress; or researchers who have furthered the science of broadcasting.

To nominate an organization or individual, write to BME Magazine, 295 Madison Avenue, New York, NY 10017. The deadline for nominations is November 15, 1988.

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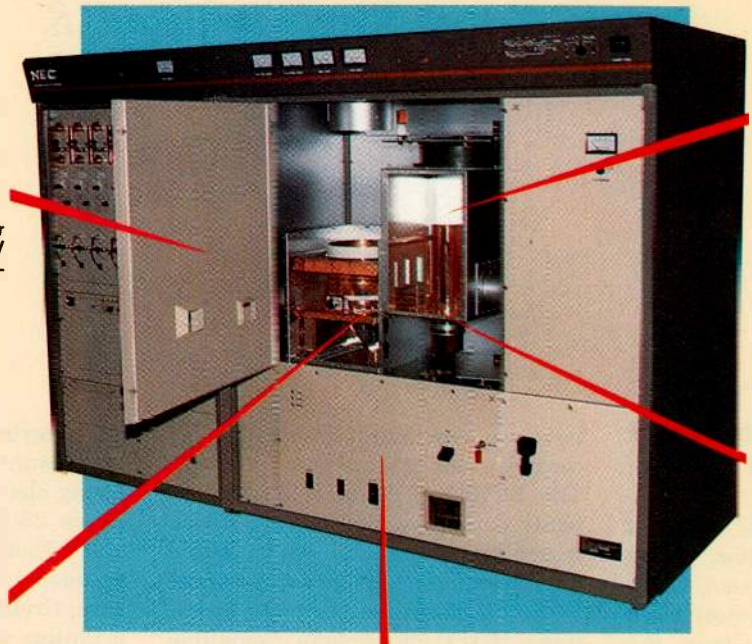

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David Williams, Chief Engineer
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650-106

HDTV via satellite to Tokyo. If there is a clear message in the recent skirmish, says our correspondent, it is that Europeans, Americans, Japanese and now Russians should get busy designing HDTV standards converters.

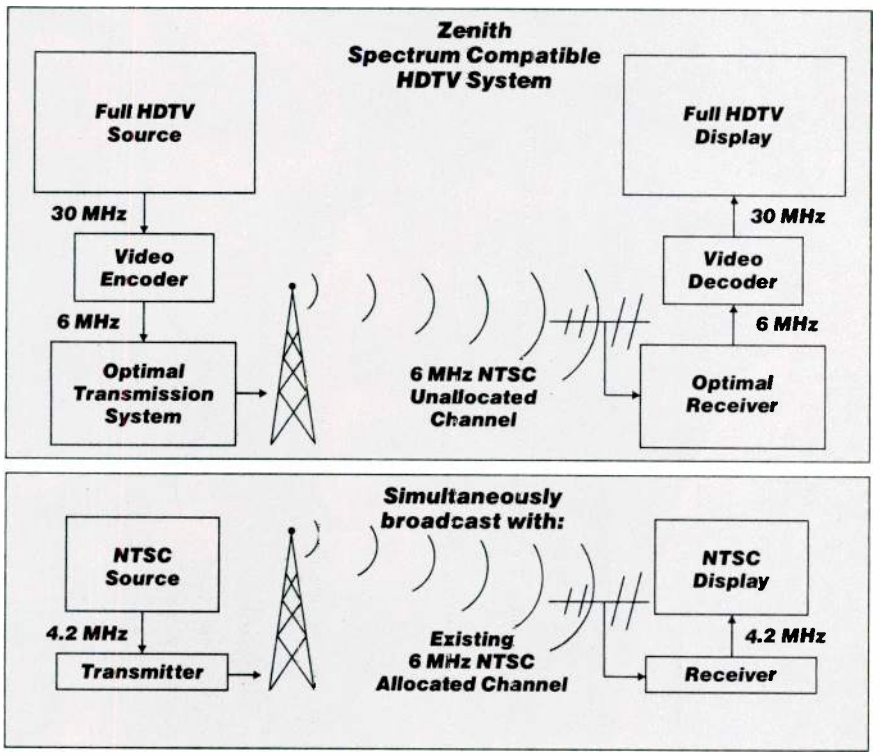
Zenith Wants to Take U.S. Higher

Zenith Electronics Corp., currently the only major remaining U.S.-based manufacturer of television receivers, has come out swinging in the advanced television (ATV) fray with a new 6 MHz-compatible high definition television transmission system. Called "Spectrum Compatible HDTV," the dark horse system was demonstrated to Congressional leaders and proposed to the FCC's Advanced Television Service (ATS) Advisory Committee by the Glenview, IL-based company in early September.

Zenith, currently embroiled in shareholder action trying to force the sale of its consumer electronics business, is clearly pulling out all the stops and may, in fact, have pulled a front-end/end-user rabbit out of a hat: industry leaders already praise its innovative design solution to an engineering problem. Essentially, the system calls for conventional NTSC broadcasts to be simulcast with noncompatible HDTV using previously unavailable 6 MHz channels.

The Zenith system was designed to create an HDTV system which utilized the 6 MHz broadcast standard bandwidth to generate video images with up to five times more picture information than conventional TV images and CD-quality audio reproduction. The proposed system—which can accomodate wide-screen pictures—was also designed to coexist with the NTSC universe.

Zenith engineer Ron Lee demonstrates SCHDTV to U.S. House of Representatives telecommunications subcommittee.



The Zenith system is based on an encoding process which digitizes the low frequency information (below 200 Hz) in a 30 MHz video signal and transmits it with high frequency video in a 6 MHz space. Transmitting low-frequency information digitally reduces the system's power requirement, which in turn enables boosting the high-frequency, picture-detail elements which comprise a high definition signal. Because the system requires less power, and thus generates less interference, this 6 MHz signal coexists with current channels.

Traditionally the FCC assigns only a limited number of television broadcast channels in any given area to prevent interference between channels (in metropolitan areas, spectrum allocation is generally every other VHF channel and every sixth UHF channel). The Zenith system reportedly reduces interference by up to 90 percent so that adjacent unused channels can carry HDTV signals without affecting standard broadcasts. Further, under the Zenith proposal HDTV channels can be assigned to television channel frequencies that are not used under current FCC channel allocation rules.

The Zenith system thereby differs from some 17 other ATV proposals, which either require additional frequency space for HDTV signals or are not compatible with existing TV standards, the company says. Conventional TV sets will receive broadcasts with undiminished reception while HDTV sets will tune to another channel to receive high definition transmission. ■

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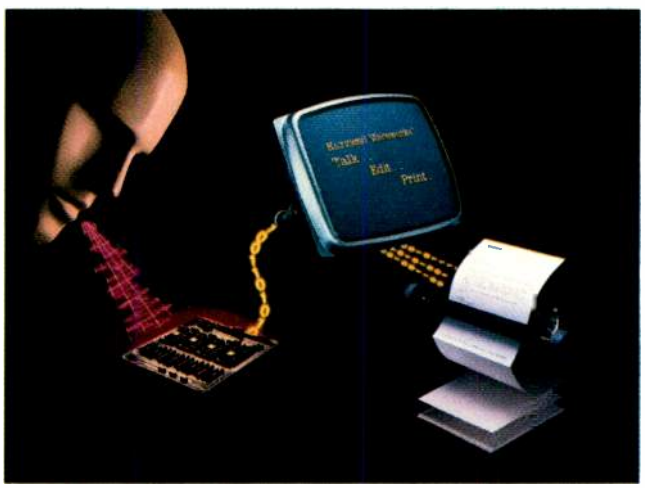
Recognizing His Master's Voice

By James A. Ackerley and Beth Jacques

"Machines work, men think" is a good concept, and one which leads easily to the more advanced concept "machines act, people take it easy." In the Utopia of the future, machines supposedly will ask the right questions, do the research, write the scripts, transmit the news, and serve the coffee. A well-bred machine will, of course, need a full complement of people to answer its questions and will never, never ask for a raise.

As a first step down the road to Utopia, or wherever it is that computers are taking us, it is necessary for people to teach machines to understand and respond to the spoken language. The emerging technology that enables us to speak to machines is called voice recognition and the possible applications are as boundless as the imagination. Scientists at the MIT Media Lab, for instance, have taught a computer to carry on a conversation as though it were a real live secretary. They are now trying to get it to sense when the boss is having a bad day. As wonderful as this may seem, voice recognition has had its failures and many a thorny problem remains unsolved.

The first attempt to use voice-recognition technology in the broadcast industry was the CMX 3400+ Videotape Editing System. The idea was to use voice instead of keyboard commands and thereby free the operator to handle the switcher controls and special effects. The system selected had a vocabulary of only 100 words. As Stanley D. Becker, vice president of engineering for CMX, recalls, "The number of words was not a debilitating problem, but it ended up being gimmicky. It didn't prove to be as effective as people thought." The system was offered for sale but there were few buyers.



Essentially a computer peripheral device, the Kurzweil KVS opens vistas in voice recognition.

One system was sold to Post Masters in Nashville, TN. Bill Rowland, an engineer there, remembers that it worked fine, but that the voice recognition feature was helpful in only one way. While mixing at an audio board, if the operator didn't like the results, he could hit the PL button and say, "do it again." The machine would stop, recue, and do it again. "Frankly," Rowland says, "I think you can hit a button faster than you can think to tell it what to do." Mike Duncan, vice president of Post Masters, reports that the system hasn't been used in two years. "The downfall," he says, "was not the box, but the humans who operated it. I'm sure techniques exist to make it do what we want, but are we as humans prepared to do what it requires? I don't think so."

What kind of machine, you may ask, listens to people and does what they tell it? One example currently in operation is the Kurzweil Voice System (KVS). This voice recognizer is a self-contained box that connects to an IBM PC/XT or PC/AT computer via an RS-232 interface. The voice recognizer listens to the incoming speech, translates the spoken words into binary-coded text and passes the text directly to the keyboard buffer so that it looks to the computer as though the user typed it in. Because of this, any application the computer is programmed to perform can be initiated by voice command.

The voice recognizer consists of three different boards, an audio processor, a speech processor, and five pattern processors. The function of the first board is to translate the analog acoustic signals into digital form.

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This is done by a 16-bit A/D converter sampling at the rate of 16 KHz. The second board filters out the background noise, describes the incoming speech in the form of spectral frames which record the energy across the various frequency intervals, and "normalizes" the amplitudes of these spectral frames. These functions are performed by eight custom VLSI digital filter chips under the control of an MC68000 microprocessor.

The third board consists of three functional components, a pattern matcher, a phrase selector, and a phrase translator. These functions are accomplished by custom high-speed recognition circuitry operating in conjunction with a buffer and RAM storage.

During normal operation, the pattern matcher assigns scores reflecting how closely each sound in the vocabulary corresponds to the spoken voice. It then selects the phrases with the highest totals to be the candidate phrases. Next, the phrase selector chooses the candidate phrase with the highest score above the recognition threshold. The score must be above this level to prevent the voice recognizer from reacting to such meaningless speech as throat clearing. The phrase translator then converts the chosen phrase to a string appropriate for the particular application being run and sends it to the computer.

Currently, the fields of medicine and law offer the greatest range of applications for the new technology of voice recognition. An interface of the Kurzweil Applied Intelligence VoiceRAD voice recognition system with the McDonnell Douglas RadCom radiology management system gives hundreds of radiologists a quick and accurate method of preparing their x-ray reports. Standard sentences or paragraphs can be produced using a single "trigger" word or phrase, while additional commands permit backtracking, editing and modifying of the test results on screen.

A possible future application for the voice recognizer is the translating telephone. A salesman calls a prospect in Frankfurt. The voice in the receiver is German, but the message on the screen is English and the voice going out is synthesized German. An actual translating device of more limited capability will be introduced later this fall by Advanced Products and Technologies. This hand-held computer called The Voice will translate any of 10,000 common phrases from spoken English to spoken German, French, Spanish, or Italian. Further work in this area is being done by researchers at Carnegie Mellon University in Pittsburgh who have developed an experimental system which translates simple spoken Japanese into simple spoken English.

CMX's 3400+, an early attempt to incorporate voice recognition into the broadcast environment.

Dr. Lawrence R. Rabiner, head of the Speech Research Department at Bell Labs, points out that the ultimate goal of speech understanding goes beyond the word and phrase recognition we have achieved so far. We would like to be able to converse with a computer as we would with a friend, raising and lowering our voice, speeding up and slowing down, and using any word or phrase that comes to mind. There are many problems in the way of achieving the sophistication in our voice recognizers that would be necessary for this level of performance. First of all, there is the fact that the same word does not always mean the same thing. For example, does the phrase, "Lions claw Bears," refer to the jungle or to the gridiron? People, moreover, do not speak clearly. We tend to run our words together and to depend heavily upon context to understand the intended meanings of others.

"Rather than tackle problems which we think are a long way away in terms of practical implementation and useful devices," suggests Rabiner, "we should consider more limited problems such as transactions with a single word and sequence and digital applications." By going in this direction, we will soon be using voice recognition to change the numbers our telephone will dial automatically, to transmit credit card numbers over the telephone, and to select the type of information we are seeking when we call an airline.

Dr. Jim Jewett, Vice Chairman of Telco Research, a Nynex company, identifies two basic approaches to the creation of voice recognition systems. One is to analyze large units of speech such as words and phrases and the other is to analyze small units such as syllables, sub-syllables, and phonemes. He concludes, "Phonetically based systems are the most successful. Others are contingent on pauses which allow the machine to recognize a word and run it by a dictionary. Speech Systems Inc. of Tarzana, CA, is working on a phonetic system which will translate the stream of incoming sounds into phonemes which pass the dictionary faster and more successfully." Whatever methods are used to create the new systems, Jewett is optimistic about the future of speech recognition. With the help of gallium arsenide chips and better algorithms, we should, in the near future, be able to "speak broadly and do dictation." ■

This article was researched by Beth Jacques, BME's senior editor, and written by James A. Ackerley, BME's technical editor.

To improve your definition

Introducing the Sony ED Cam. At $7700, the price won't strain you.

To get unbelievable definition like this you could do a lot of push-ups. And pull-ups.

Or you could just exercise good judgment. And pick up the new Sony ED Cam.™ For the ED Cam is a very special piece of equipment. Designed and priced for those who want to work with high resolution. At home.

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ED Cam (E for extended, D for definition) gets its terrific good looks from our exclusive ED Beta™ format.

So you'll see similarities like a shift from 5.6 MHz to an astounding 9.3 MHz in the luminance carrier signal. A signal-to-noise ratio improved by an incredible 3 db over standard SuperBeta.® And an eye-opening 500 lines of horizontal resolution.

You'll also find TSS recording heads for improved performance with our newly developed, metal particle tape. Which allows for extremely high-density recording. And standard Beta II and III recording modes for up to 3 hours of recording time.

Then we added 2 high-density ⅔"CCD imaging chips with an effective 760,000 pixels. And separate Y and C signal processing for direct playback with spectacular sharpness and color fidelity.

For incredible sound fidelity, there's Beta Hi-Fi® stereo. A detachable stereo microphone with dual sound level meters. And standard stereo microphone inputs.

And so you don't miss what you're shooting, there's a 10.5-105mm, 10:1 ratio, variable-speed zoom lens. And a bayonet mount that can use a variety of lenses.

We also bulked up on editing features. ED Cam has Flying Erase™ Head. Edit Search and Shuttle Edit capabilities. Audio and Video Insert Editing. A Control L Terminal. And a Synchro Edit Switch. All easy-to-use features that give your finished tapes a professional look.

With all this in one lightweight package, is it any wonder we think ED Cam is head and shoulders above any other consumer camcorder.

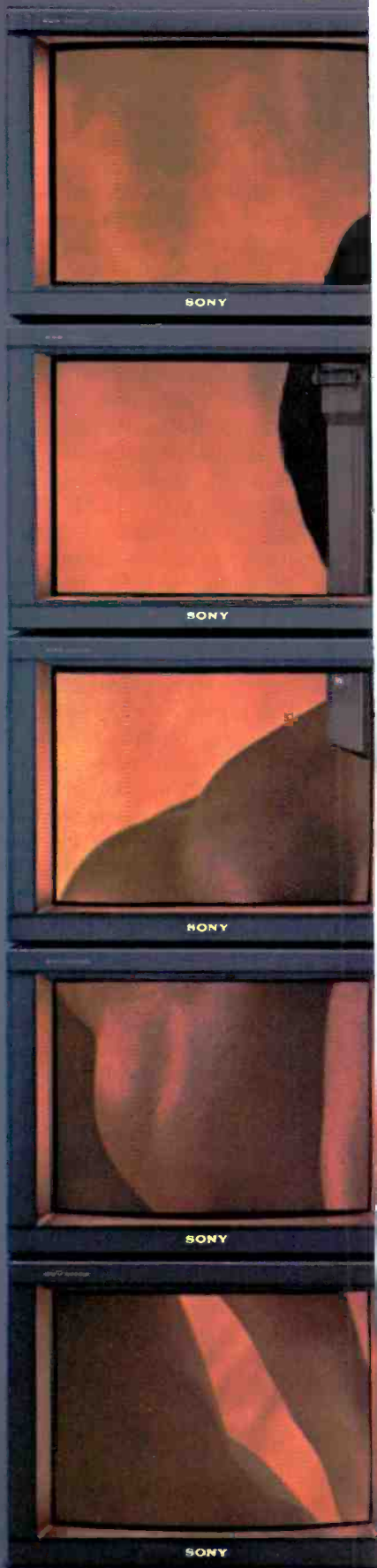
You can't beat the ED Beta System.

ED Cam and the Sony EDV-9500 ED Betamax® Editing VCR are made for each other.

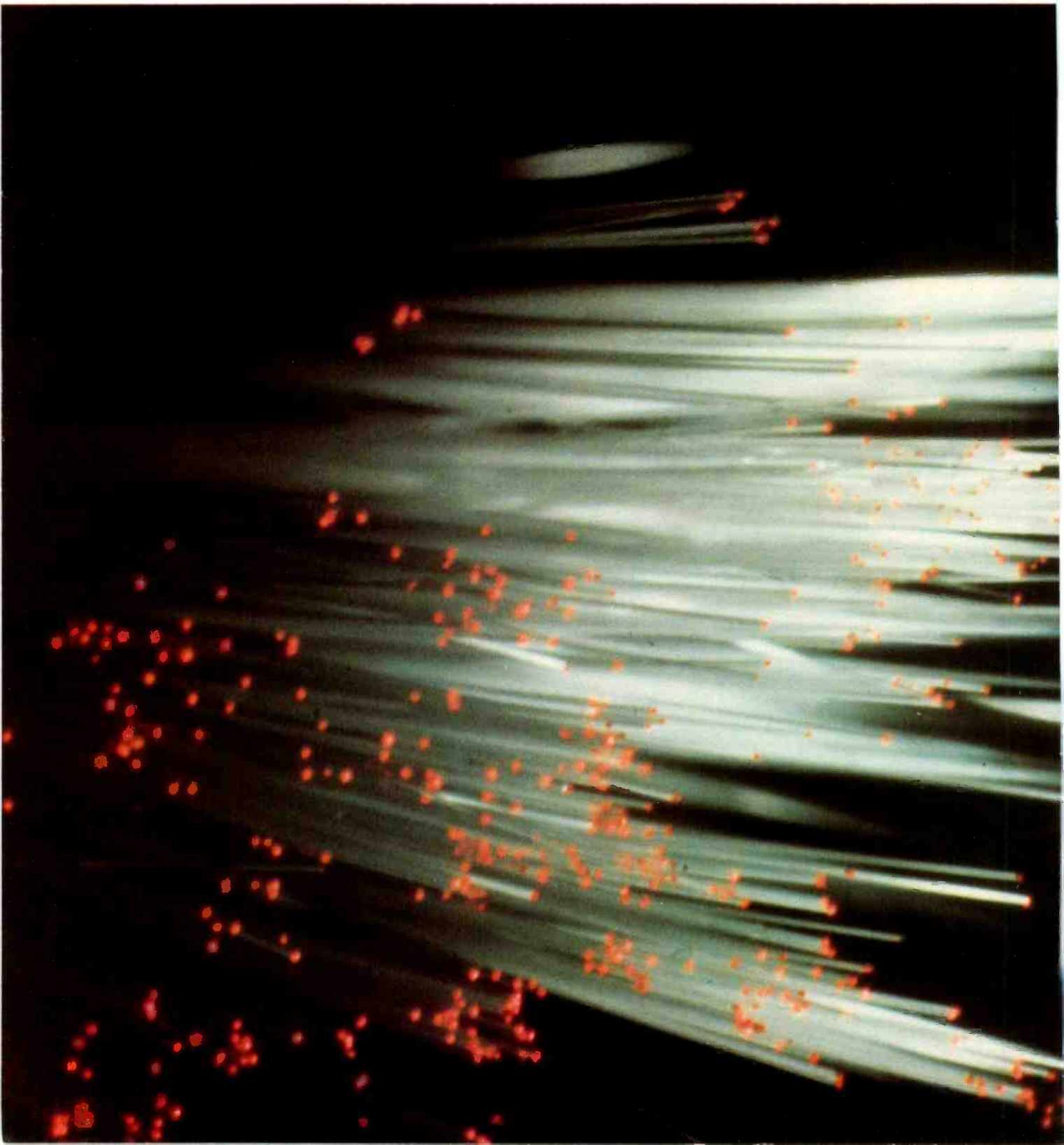
They're both part of the remarkable ED Beta format system of compatible and incomparable products. When used together, they produce the kind of results discerning videographers have always demanded.

For more information about ED Cam, just visit your nearest authorized Sony ED Beta dealer. Or call 1-201-930-7669.

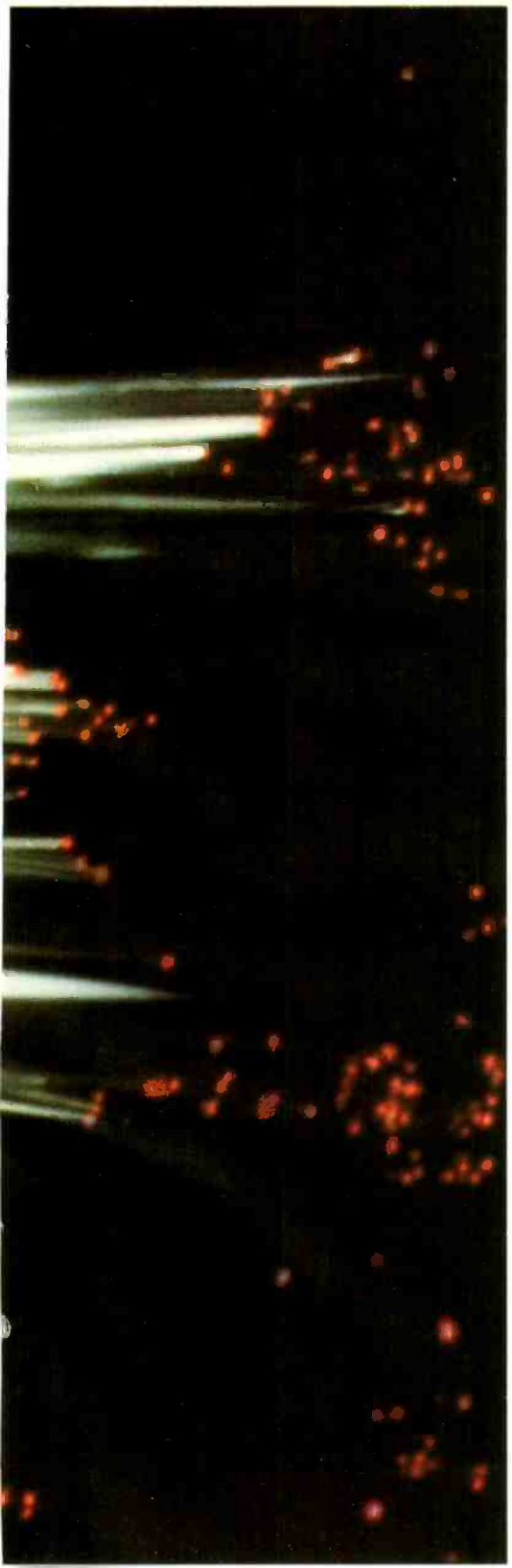
Work out with the ED Cam soon. You'll notice an immediate visible improvement in your definition. ED Beta



start at the shoulders.



INSIDE FIBER OPTICS



Fiber optics is giving engineers new transmission options. An understanding of the basic principles behind this new technology is essential.

Television transmission techniques have encompassed a broad range of technologies over the industry's brief history. Early methods utilized coaxial cable for medium and long haul transmission paths. Coaxial cable gave way to microwave as a more economical and reliable means of signal transmission. The space age ushered in the use of geostationary satellites, which rendered the old barriers of distance and geographic boundaries insignificant. At the same time, satellite transmission raised signal security issues, requiring the development of various encryption techniques.

While these developments were taking place, a relatively new distribution capability using fiber optic transmission techniques was evolving. Fiber optic transmission depends on a precision glass cable to transmit communication information using an infrared light beam. This medium allows high quality television signal

BY DAVID L. BOWER

Typical fiber optic cable and connectors. The actual fiber optic cable contained within the protective jacketing is roughly the size of a human hair.

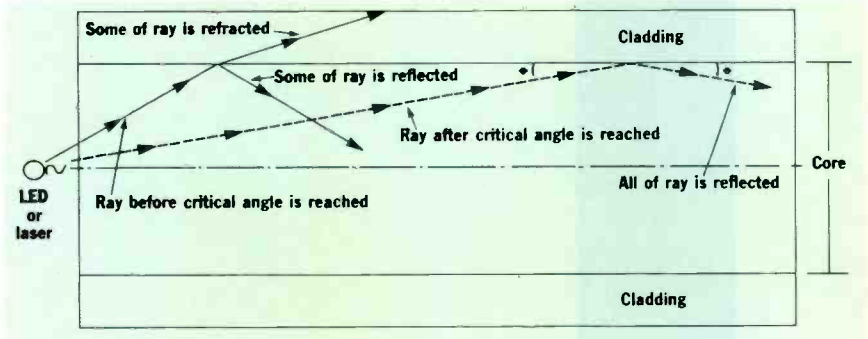
FIBER OPTICS

transmission with good security provisions. Intercepting or "tapping" fiber optic cable is very difficult.

Instead of an RF or video signal, fiber optic systems utilize a modulated light emitting source (either an LED or a laser) to transmit television information through a light guide system. This is very loosely analogous to a waveguide used for microwave transmission. Functionally, a light beam is fed into a glass fiber optic cable at a sharp angle. The glass cable is made of two different materials. Each type of glass has a different index of refraction (the angle at which it bends or refracts light). One type of glass, called the core, is in the center of the cable. The core is covered with a different type of glass called the cladding.

A property of optical physics involving Snell's Law makes it possible to propagate and contain a light signal within a "glass cable." According to Snell's Law, if a light beam meets a junction of two different types of glass with different refracting indices beyond a critical angle, the light is bent so much that it is entirely reflected back into the glass fiber optic cable. Under this condition, total internal reflection occurs and the light beam cannot escape from the fiber optic cable.

As a further step to understanding fiber optic transmission, the properties of reflection, refraction, and critical angle need to be clarified. A change in refraction occurs when light passes from one type of glass (or medium) to another with a different index of refraction. The amount of refraction depends upon the difference in the refractive index between the two types of glass. Reflection occurs when a light beam is sent back from a piece of glass (or other surface). The angle that the light wave is directed toward the glass (incidence) is equal



The important optical properties relating to fiber optic transmission through glass cable. Note that all of the light ray is reflected, not partially refracted, for angles after the critical angle is reached.

UHF BROADCASTERS

#2 IN A SERIES ON YOUR HDTV/STEREO FUTURE

BOGNER®

Subject: Competing with cable for HDTV and Stereo

Dear UHF TV Broadcasters,

Back in March we published an article summarizing our measurements of the very large amount of beam steering displayed by many broadcast antennas, especially waveguide designs. The potential harm from this effective loss of bandwidth, chrominance, and audio was described in detail.

Since then we have been told by various waveguide antenna purchasers that certain manufacturers claim to have essentially eliminated this problem. In order to verify this, we picked two stations for which this claim was made, and concentrated our measurements on those two particular stations. We found that the beam steering exhibited by these antennas was, if anything, even worse than average for waveguide antennas, despite attempts to reduce it by such techniques as very heavy null fill-in.

The first station about which we were told that the waveguide antenna supplier had claimed to have considerably reduced the steering effect was WNED, ch. 17 Buffalo, N.Y. We were informed that representatives of the station witnessed the antenna being tested at the manufacturer's plant, and were told that the steering problem was solved. However, we made many very precise measurements with clear line of sight to the tower within the range from 2 to 12 miles from the station, (which area includes most of the city of license) and found aural carrier levels more than 23 dB below visual in many locations, corresponding to an aural ERP of 12 Kw instead of the licensed 250 Kw.

The second station about which we were informed that the waveguide antenna supplier claimed negligible beam steering was WTOG ch. 44, Tampa, FL, just installed in June 1988. We were told that the purchaser witnessed tests at the manufacturer's plant demonstrating almost no beam steering. However, a series of line of sight measurements, very carefully made, showed aural carrier ERP 22 dB below visual (i.e. aural ERP of only 31 Kw, not the licensed 500 Kw) just in the range 5 to 12 miles from the station, proving that no reduction whatever in beam steering was achieved. Therefore the steering effect could be very severe on stereo or HDTV broadcasting, and the performance is not approaching what the station could and should get from its antenna.

There is no valid reason the broadcast industry must accept this performance detioration caused by a broadcast antenna, and risk loss HDTV and stereo to cable. Affordable and reliable designs are available, with very high input power capability, which exhibit no steering at all. Any owner who accepts this deterioration without at least a thorough investigation of his specific situation is putting his station at considerable and unnecessary risk.

We will continue to report periodically on the specific results of our testing of additional stations which have gone on the air with waveguide antennas, or changed to waveguide antennas, since March.

Yours very truly,

Bogner Broadcast Equipment Corp.

Richard D. Bogner
Technical Director

RDB/ch

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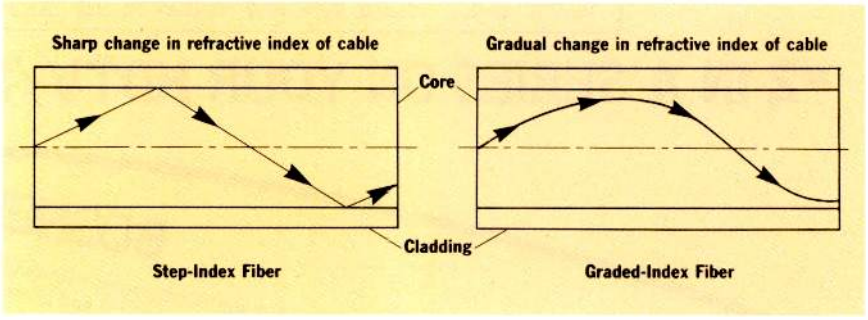
FIBER OPTICS

to the angle it is sent back (reflection). As an example, if the incident light beam is equal to 45 degrees, then the reflected beam is also equal to 45 degrees. Over a certain angular range, conditions occur where two different types of adjacent glass cause the same lightwave to be both refracted and reflected (a portion is refracted and the remaining amount is reflected).

At some critical angle called theta, the total amount of light begins to reflect back and none of the light passes to the second medium. In the case of fiber optic cable, when the angle of the light in the core exceeds the critical angle, there is no refracted light entering the second medium or cladding. Therefore, the light is reflected (or contained) within the core of the cable. This is the basic principle governing fiber optic transmission.

The critical angle is expressed as: cos theta = n2 (cladding)/n1 (core), where n1 is greater than n2.



A comparison of step-index and graded index fiber optic cable.

In this expression, n1 is the index of refraction for the core and n2 is the index of refraction for the cladding. As an example, assume that the core has an index of refraction equal to 1.48 and the cladding has an index of refraction equal to 1.46. Solving for theta, the angle would be approximately equal to nine degrees. Light with an angle beyond the critical angle (i.e., nine degrees or less) is contained (reflected) within the cable.

Ordinary window glass, if used as a transmission medium, would limit the transmission distance to about one foot. The glass used in fiber optic cable is so pure that a sheet approximately 50 feet thick would look almost perfectly transparent. Most of the impurities that would attenuate the light signal are carefully removed in the manufacturing process. Strict manufacturing procedures are followed to ensure precise optical and physical tolerances.

The optical physics mentioned, the purity of the glass material, and the precision fiber manufacturing methods are the primary keys to allowing

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It wasn't hard coming up with a name for a digital effects generator with astonishing video quality. DSC's new Paragon. In the dictionary, it means "model of excellence." In the studio, it means video transparency that sets the new standard of excellence.

Paragon features a dynamic input digital filtering system and pixel-level motion detection, for a quality of processed video that is unsurpassed. As well as D-1 inputs and outputs. Separate input memories for A, B and key. And a full bandwidth key path.

Achieve sophisticated effects, including double-sided page turns and scrolling in a single pass. Blur, soft edge, emboss, glare and shading effects. Infinite posterization. Curved effects and splits. Automatic cube building and 3-dimensional rotation with perspective. And many more.

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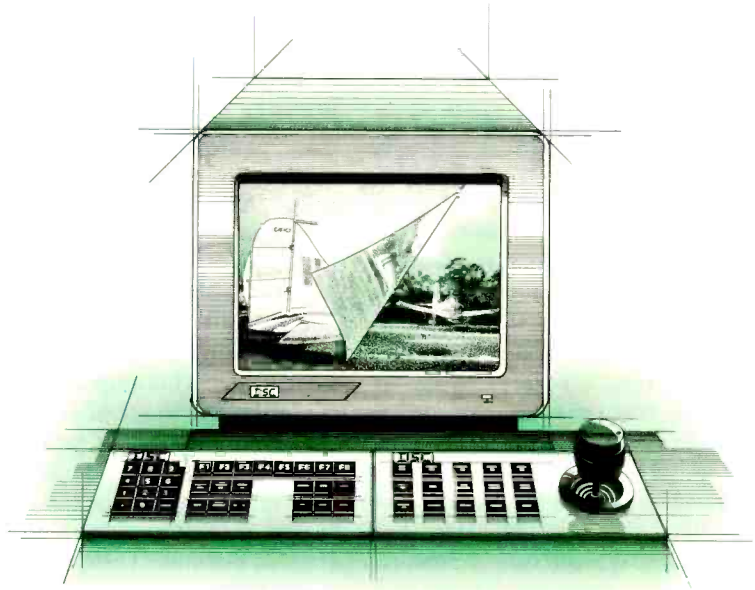

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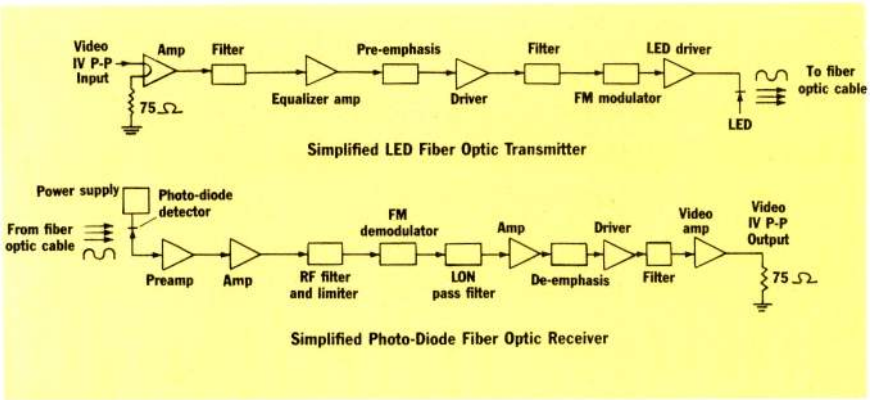


A simplified block diagram of an LED multimode transmitter and photodiode receiver. This diagram is based on Grass Valley transmission equipment.

FIBER OPTICS

the light beam to traverse substantial distances through the cable.

There are two common types of fiber optic cable transmission systems. In a *multimode* transmission system, light can enter at several different angles. As a result, several paths (or modes) of transmission can occur. Each path has a different delay time and, as a result, many modes (multimodes) of light beams are transmitted through the cable. For broadcasters, typical core diameters for this type of cable are 50 and 62.5 microns. The two common transmission wavelengths (nominally) are 850 and 1300 nm. LED transmitters are typically utilized. The maximum transmission distance is approximately 10 km. The loss at 850 nm is higher than at 1300 nm. 1300-nanometer equipment generally is more expensive than 850-nanometer hardware.

Two common types of cable are step index and graded index. Many multimode television transmission systems utilize a graded index fiber optic cable. With this cable, the refractive index profile varies with the radius of the core.

This means that the graded index cable has a variable refractive index that varies with the distance from the center axis of the core. This variable refractive index tends to equalize the path lengths for the rays. This lessens the time delay difference among the rays. Therefore, graded index cable reduces an undesirable characteristic called intermodal dispersion.

The second type of cable transmission system is referred to as *single-mode*. This fiber optic cable has a much smaller core diameter—nominally 8 microns (much less than for multimode). This smaller core diameter limits the angle of light entry so that a single mode of propagation is supported. Intermodal dispersion is greatly reduced. This results in improved signal bandwidth and transmission distance. Distances in excess of 40 miles without a repeater are practical with single-mode systems. Glass purity in manufacturing is more of a concern with single-mode cable.

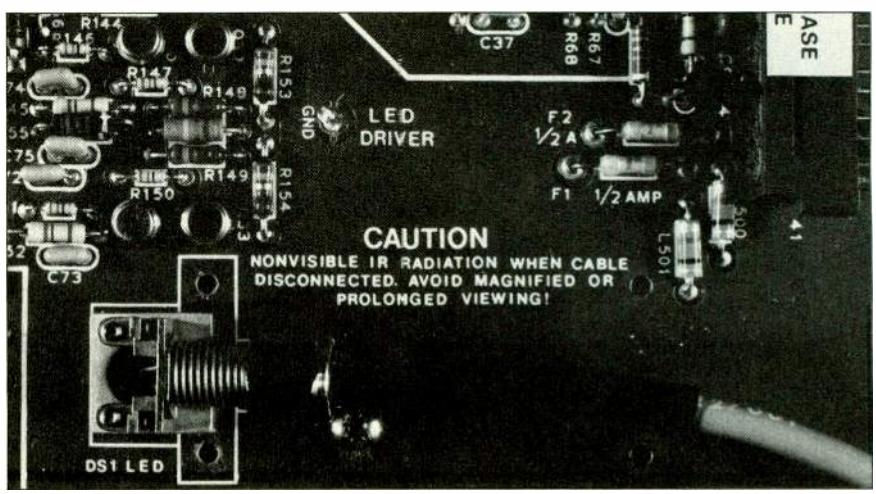
At the present time, 1550 nm allows for maximum transmission distances. For shorter transmission distances, 850 or 1300 nm can be used. Also, laser transmitting sources are utilized because of the higher available output power and the narrow spectral bandwidth. In practice, step-index fiber cable would be utilized since only one mode of transmission is involved. It should be noted that step index cable has a uniform (constant) refractive index within the core. Because only one mode is transmitted, intermodal dispersion is not a relevant factor for consideration.

Either LEDs or lasers may be used as transmission sources. The LED is characterized by greater amplitude stability than the laser. Lasers are relatively sensitive to temperature variation and this property must be controlled to minimize frequency drift.

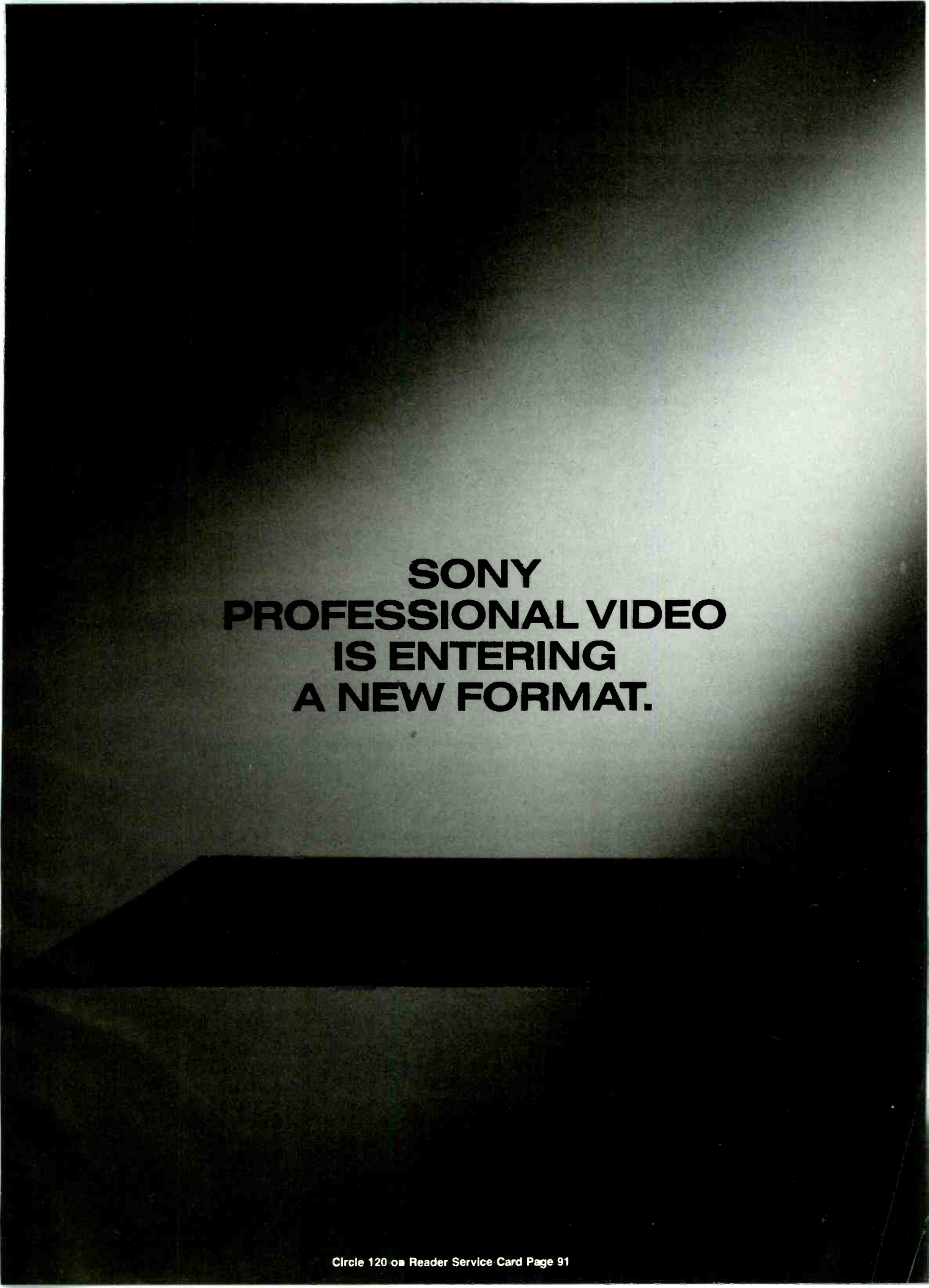
The spectral bandwidth for typical LED devices is 50 to 70 nm, suitable for the larger core diameter multimode cable. This bandwidth is too broad for the smaller core diameter that single-mode cable utilizes. Laser devices are normally designed to provide a significantly greater output power than LEDs.

Fiber optic transmission techniques are not complicated in terms of operational theory. Television signals simply modulate an infrared transmitting device for reception by a photodiode detector. The information is transmitted through a glass cable that contains the light signal inside the fiber optic cable. ■

David L. Bower is the engineering director for the Center for Educational Video at The Universtiy of Tennessee, Knoxville.



A Grass Valley multimode fiber optic transmitter. The launch device, a light emitting diode (LED), is located on the left side and mates with the fiber optic cable connector.



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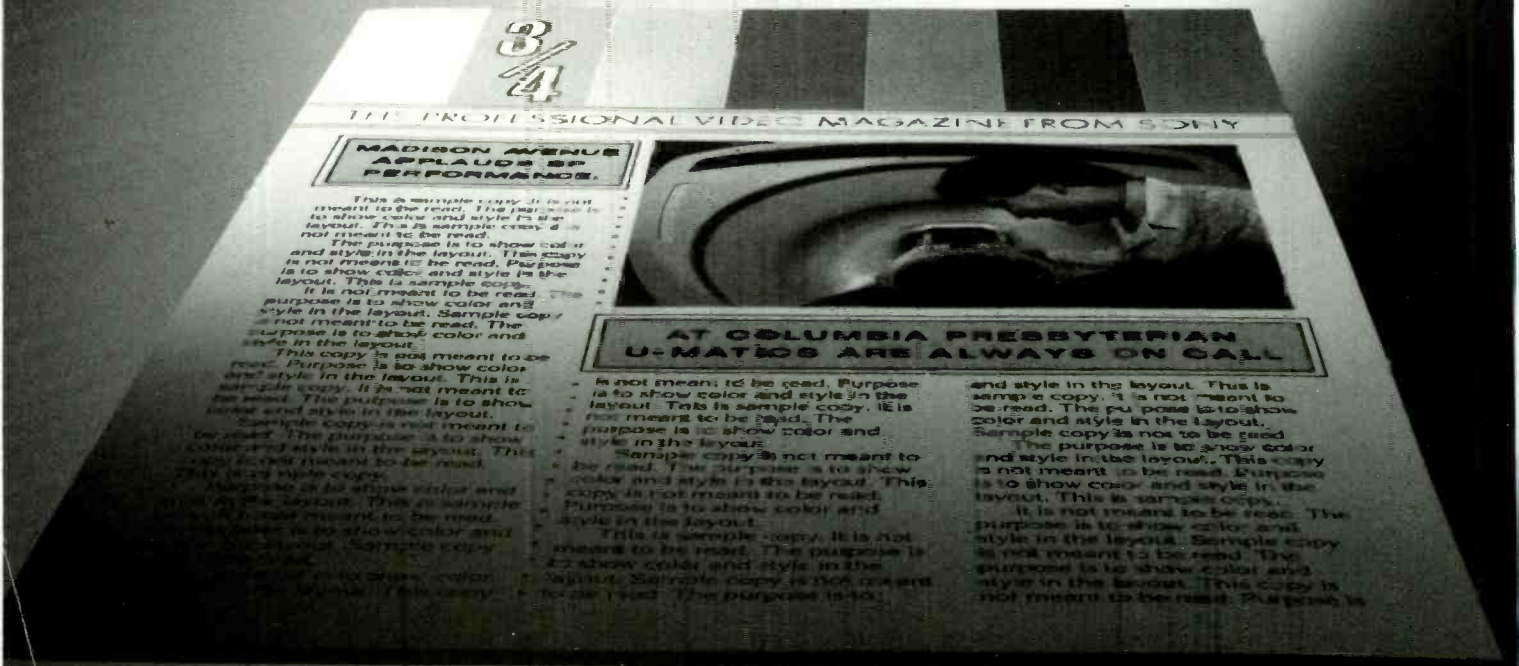
3/4 will appear in these pages three times yearly. To serve as a source of new ideas. And a form of communication. Between you and industry colleagues. Between you and Sony.

3/4 will be the format to look to. Today and in the future.



SONY

PROFESSIONAL VIDEO

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3/4

THE PROFESSIONAL VIDEO MAGAZINE FROM SONY

MADISON AVENUE APPLAUDS SP PERFORMANCE

If you think clients in general are hard to please, just try being Arthur Williams. Williams is president and one of the editors at Editing Concepts, a leading post-production house in mid-town Manhattan. Most of his clients are large, world-famous ad agencies. Which means that Editing Concepts doesn't just have to do great work for their clients. They also have to please their clients' clients. That's why Arthur Williams says he bought a Sony U-Matic SP™ system for off-line editing of commercials.

Williams' clients demand a cutting-edge facility "that can service them quickly. So they can keep up with the demands of *their* clients." He bought the equipment on the advice of an industry colleague, who called the U-Matic system "user-friendly and simple to operate." Williams says that the system is

continued on page 2

AT COLUMBIA PRESBYTERIAN U-MATICS ARE ALWAYS ON CALL

At Columbia Presbyterian Medical Center in New York City, U-Matic® technology is an integral part of surgery.

Many procedures are taped. The video workhorses at the medical center are Sony U-Matic recorder/players. And a new BVE-900 was recently added for editing, along with a new special effects generator.

"This gives us the latest capabilities," says Jeff Szmulewicz, video production manager in the Audio/Visual Service. "Yet it is still fully compatible with the existing equipment."

All of the operating rooms in the medical center are wired for video. In the Neurological Institute, cameras are mounted on the microscopes that guide neurosurgical procedures—to see and record what the surgeons see. Other surgeons wear "headlamp" cameras.

And all of the diagnostic imaging systems in the medical center—ultrasound, nuclear magnetic resonance and CAT scanners, for exam-

continued on back page

AT J.C. PENNEY, THE STYLE IS "MIX 'N' MATCH" U-MATIC

J.C. Penney is one of the most innovative users of video in retailing. Last year, the company upgraded its Sony U-Matic 3/4" technology to the higher resolution U-Matic SP™ products.

"We needed compatibility," says chief engineer Tony Delsol. "We have a huge library of 3/4" tapes that we still use in a lot of ways.

"Of course, you only get the higher resolution with an SP-made tape played on an SP machine. But any combination of tape and player gives us at least the same picture quality we've always gotten from U-Matic recorders."

Several times a week, the giant retailer stages a five-hour "buying network broadcast" complete with anchor desk, on which merchandisers display their samples to buyers. Each program is transmitted by satellite to 300 Penney stores across the U.S. for live viewing. At the same time, the program is recorded for later viewing on tape at hundreds of smaller stores.

"Ease of use is as important to us as compatibility," Mr. Delsol continues. "SP has really been a boon to the non-technicians who have to operate these systems. The U-Matic equipment has been so simple to work with that everything has been wonderfully smooth."

What does the future hold for video at Penney?

"We're putting together an editing suite based on U-Matics," Mr. Delsol responds. "We'll be doing SP-quality work on tapes for training, and for broadcast mastering."

MADISON AVE. *continued*

much more. "With SP, we can do things we could only do previously on one-inch. We can make second- and even third-generation tapes without degradation—for a client who wants it all done yesterday. With SP, we can do it all under one roof. Finally."

Nelson Leonard is Editing Concepts' off-line editor. Working on a commercial for a leading fabric softener company "there were two or three instances where scenes needed to be cut in reverse action and slowed down. The Sony U-Matic editor with the Dynamic Tracking™ feature lets us accomplish this easily and with perfect quality. So the agency was able to show the client a cut that was much closer to the final on-line version."

In Editing Concepts' business, quality is everything. SP allows them to meet their clients' demands for sophisticated editing techniques with endless revisions—without sacrificing quality. "There's always more than one way of seeing a concept," Williams says. Then with a grin he adds, "But it's always *after* the commercial is shot that ideas change."

"PLAY IT AGAIN, SONY."
THE VIDEO JUKEBOX IS BORN

Devotees of the jukebox, take heart. With a little help from U-Matic® technology, it's coming back on cable TV.

If you live near one of the fully automated cable television stations operated by Video Jukebox of Miami—well, you don't exactly drop a quarter in the slot. Instead, you dial a 976 phone number (like the weather announcements). You make your choice from a "menu" of music videos displayed on your TV and enter three digits through the key pad of your touch-tone phone.

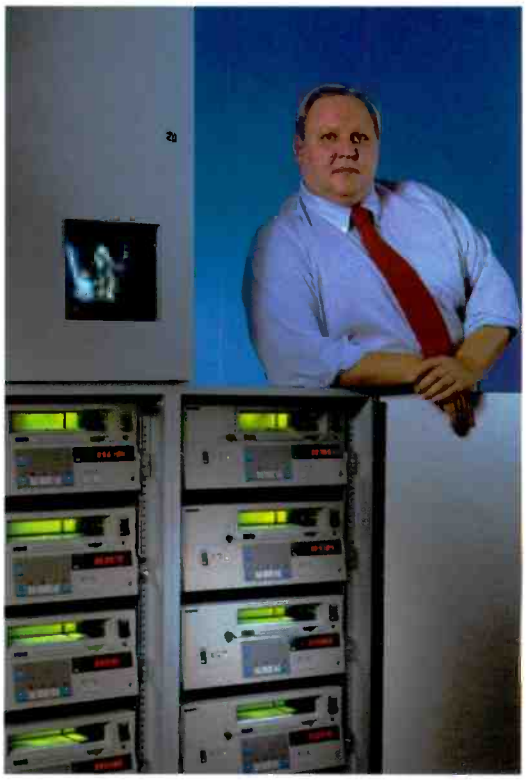
The menu drops away, and there's your favorite performer: on screen and in stereo. Later, you'll be billed for the play by your local telephone company. The phone company then relays payment to the Jukebox Network, which in turn splits the revenue with the cable operator.

When you make your selection, a computer at the station converts your three digits to a frame code "address" that's transmitted to a Sony VP-7000 Video Cassette Player. The VP-7000 accepts this digital code through an RS-232C computer interface, and responds by driving at high speed to the starting frame of the video you have selected.

"The computer generates graphics, programs the menus in and out, and directs the Sony VP-7000 to run commercials between play selections," explains Video Jukebox President Steve Peters. "The combination of the computer and U-Matic frame code capabilities is a potent one in creating this new enterprise.

"And obviously, the public likes it. Right now we have ten stations between Miami and Ft. Worth. We're about to open four more stations. And by 1990, we'll have over 100."

At Video Jukebox, U-Matic VTRs are key to it all. "Our VP-7000s work so well with the computer," Mr. Peters adds, "that we can run the stations completely automated. We visit them once a week or so just to load new tapes. And U-Matic VTRs are so reliable, we've been able to reduce our routine maintenance from once every 90 to every 120 days.



Mr. Steve Peters, President
The Jukebox Network.

"And finally," Mr. Peters says, "there's U-Matic VTR stereo. That capability is essential with music videos."

U-MATICS ON CALL *continued*

ple—are fitted with cameras and recorders.

"Our video equipment must be available 24 hours a day," Mr. Szmulewicz adds. "It runs non-stop. A lot of the units have been on the job for eight years. And they are still going strong."

The medical center makes recordings for legal, educational, and professional purposes. To create instructional videos, they edit much of this material into lecture, graphic and other footage. And the service works with biotechnology companies to make industrial videos.

Some of the editing is quite sophisticated. They have used split screens to provide a before-and-after view of a transplanted heart and three-way splits to show an organ before, during, and after a procedure.

Mr. Szmulewicz notes: "Our Sony U-Matic VTRs work as hard as the medical staff. They've always been there when we needed them. And so has Sony. We couldn't have asked for better service."

U-MATIC AND YOU

These days, you can do more than ever with U-Matic® equipment. Because Sony's doing more than ever to enhance the format.

Consider the BKU-901A Time Base Corrector, used with the BVU-900 U-Matic SP™ Player and BVU-950 U-Matic SP Recorder/Player. As recently as two years ago, it was a separate rack-mounted unit. Today, it's digital—a single plug-in board made of integrated circuits.

More importantly, it makes possible the new BKU-902 Digital Noise Reducer, also a plug-in board, which gets rid of as much as 6 dB of noise across the entire video bandwidth. The DNR has enough memory to store an entire frame or field in digital form. And it uses a memory-based technique to identify and eliminate the noise in the video.

Stay tuned to this setting for more tips.

TRANSMISSIONS FROM THE FUTURE

They say good things come in small packages. And if the future shapes up the way we at Sony anticipate, even better things will come in even smaller packages.

One day, devices like time base correctors and noise reducers (see above) may be reduced to just one or two integrated circuits. And if the past is any indication, they will also work better, cost less and be even more reliable.

Digital technology is one key to the future. A possibility that has Sony engineers excited is computerized self-diagnostics. Another is digital special effects. A third is improved, computerized machine control. And large-scale integration of digital circuits will increase reliability and reduce machine size, cost and weight.

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PROFESSIONAL VIDEO

WIRED!

Interconnecting and timing a state-of-the-art teleproduction facility can pose many challenges. The challenges are being met with new routing systems and innovative approaches to plant wiring designs.

BY TIM WETMORE

Wiring up a state-of-the-art, multi-room teleproduction facility has never been an easy afternoon's job. Today more than ever, as the number of tape formats proliferates and plant designs become more complex, the wires and signals that form a facility's "cardiovascular system" need to be centrally coordinated. If done with forethought and creativity, "it makes things better and easier," maintains Andy Delle, director of engineering for The Post Group, "but if you don't pay attention to detail, you'll have nagging problems for the entire life of the facility."

Detail in the hidden world of interconnections means choosing the type of wiring necessary for the job as well as proper labelling. Perhaps even more important, in today's advanced facility, is the routing and timing schemes used to manage all of those signals and wires.

Delle has designed the signal flow and control system for The Post Group's newest facility, located within the new Disney-MGM Studios at Disney World. Though the facility is not yet complete, the design and routing concepts have been determined, and are being carried out.

Supervisor of engineering David Jones inspects connections for a bank of Sony D-2 digital VTRs at Disney-MGM Studios, new facility.

"It's the same system we used in Los Angeles," relates Delle, "so any machine can be used by any of the six edit bays." The facility deviates from a totally centralized machine room concept in that most of the small-format machines, Sony BVU950s and BVW65s, are located in the edit bays and not in the machine room. In addition, there are four Ampex VPR-300

Vista United Telecom engineer Perry Lockhart prepares fiber optic cabling for a Disney-MGM Studios patch panel.

WIRED!

D-2 machines in edit bay one.

Sony BVH-2000s and DVR-10s fill out the machine room equipment roster. Also in the machine room is the machine control, routing and quality control station. The latter function allows the operator to view monitors and keep track of the quality of signals as they are shifted around the plant.

The routing system, of course, is the heart of such a facility and The Post Group has theirs set up in two ways. The first system is a Grass Valley Horizon, currently with an 80x96 video and 64x64 time code and audio configuration. These operate in channels one and two. Channels three and four contain a 64x64 setup for handling the plant's four channel audio wiring, mandated by the four channel audio capability of Betacam and the digital video formats.

Complementing that system is a Horizon 32x32 601 digital router that processes all the digital tape machines and the digital effects.

"The idea is that for the high-end work, the sophisticated layering, we want to make sure we keep that clean and route it digitally," relates Delle.

The computer console that operates the machine control and routing incorporates proprietary software. One feature of the software is that serial protocol is used to switch automatically between two machines. If, for example, the facility needs to dub from one D-2 machine to another, the operator inputs only the machine numbers and the software tells the D-2 machine to output digital, knowing that the destination machine is digital. If the signal is being sent to an analog machine, the software would instruct the D-2 machine to send it through its analog output.

Nevertheless, the needs of the entire system exceed software functions when it gets to routing signals to each individual edit suite. This is where the zero-timed plant comes into play. When the central machine room concept is employed, allowing any edit room to access any machine at any time, the timing of the whole facility is critical. It wouldn't do to have video showing up at a switcher a frame late. Cable lengths can sometimes be a problem, but at the Disney post facility all layouts were carefully calculated. A decision was made not to use delay lines because of the signal degradation, and in a place willing to pay for a couple of D-1 machines and several D-2s, signal degradation doesn't cut it. Instead, equalized amplifiers are used in the Grass Valley delay distribution amps to compensate for the delay in the routing switcher. And since the switcher is the end of the chain for timing, to coordinate all feeds from the machines in the central room, all signals are referenced in time to the output of the house routing switcher.

For many facilities, the use of a technologically advanced routing switcher and zero-timing the entire plant are new methods of operation. The actual cabling obstacles to be cleared, however, are common to most teleproduction houses. As an interesting aside, there is a new electrical code (CL2) that is a more stringent application of cable rating requirements.

The Post Group solved its cabling problems with color coding. All NTSC composite signals run through Gepco, blue 9231 equivalent cable. Everything else is on smaller RG59 cable to save space. Black wires carry black; red, green and blue cables carry the RGB signals; white cable carries timing signals only, including sync, blanking and subcarrier. Yellow-covered wires are the key signals, while orange is for status information. Inmark computer cable handles all the RS-422 and 601 digital information.

All the cabling is of the standard copper type, with no fiber optic cable located within the plant itself. To link the post facility with the other video operations at the Disney-MGM Studios, however, the facility relies on fiber optics. In fact, there is fiber located throughout the 43 square miles of the park. Pedestal hookups are lo-

WIRED!

cated at strategic points so a remote crew can drive out to a site, plug in the terminal equipment to the pedestal, and send video either back to the machine room for taping or to the World Link satellite control for live broadcast.

"We have already done quite a bit of live broadcast from Disney World," says Tom Cormier, manager of broadcast operations. "KTLA did live feeds back to California, we did news feeds to Puerto Rico and we did *Good Morning America* live from the Magic Kingdom, as well as many taped shows." All of this is on the fiber optic network feeding the entire park back to a control console next to the one operating the post production equipment. It then travels to another part of the building that houses the control center for World Link.

There are two transmit and four receive fiber systems to World Link and a 4/4 setup to/from the new sound stages.

"The control console is located in the post facility because it would have tied up things in production at the sound stages," Cormier explains. "At the three sound stages we have a control room for two of them with standard wiring and connections."

In control are five Sony one-inch, five Sony D-2 machines, five 3/4-inch and two SP machines, along with two VHS decks. Signal routing is handled by a four-level Grass Valley switcher configured for 64x64 with copper cabling throughout the sound stage/control room facility. Fiber is used only for the distance runs and to feed World Link.

One aspect of the design that affected everything in the facility was the tour schedule. Disney's plans for the facility call for sightseeing tours to pass by the sound stages, the satellite headend and post-production. Glass walls surround many parts of the facility. In fact, as Delle noted, "The tour was incorporated into our thinking about the design from the beginning. It even changed the way we do our racks. Since part of the machine room will be visible on the tour, the racks are tiered, and we had to fill up the top part of our rack first so there wouldn't be any unsightly holes during the tour. We also had to leave room for expansion, but at the bottom of the racks." Showbiz is never easy.

NFL Films Video operations manager Jeff Howard in the facility's CMR (central machine room). Photo: Jeanne Constanza/NFL Films.

Disney-MGM Studios is not the only new facility in the Orlando area. Century III Teleproductions, a company with plants throughout the country, has built a new post house at Universal Studios Florida. Miles Ptacek, chief engineer at CIII, has embraced the central machine room concept.

"We call it a 'virtual edit suite' because it allows us to have each of our six on-line suites configured on a virtual basis, with only remote control heads in the edit rooms and all tape machines in a central location," he reveals.

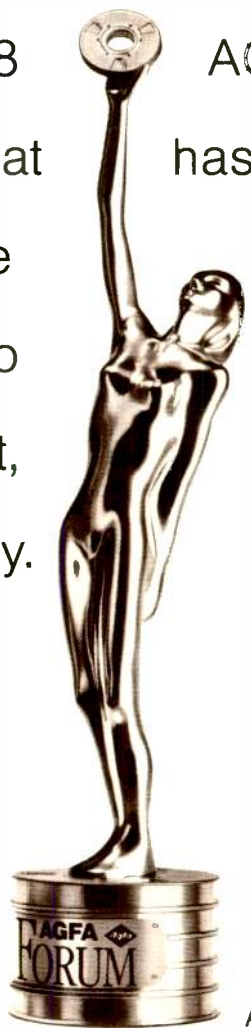
In the machine room are six Sony Type Cs, two D-1s and five or six D-2s (yet to be determined). Rounding out the complement of decks are Beta SP and 3/4 SP units. "The central machine room is wired and setup so it will not change," Ptacek claims, "other than to add to its capacity."

To make sure the wiring and interconnect goes smoothly in such a plant, Ptacek maintains, "You start with the building design, making the proper raceways for the wiring, leaving room

AGFA FORUM AWARD '88 FOR BEST SHORT VIDEO PRODUCTION

Man and technology. This is an especially important subject for today's creative video producers. As such, it has been selected as the theme of this year's AGFA FORUM Award, celebrating special achievements in video production. This annual, international contest will honor the short video production  that most effectively uses the visual medium to address the issue of mankind's relationship to machine and new technology. Prize: $ 15,000

Entry Date: December 16, 1988 AGFA FORUM is an international organization that has been formed to encourage and facilitate professional dialogue in the audio and video industries. It is sponsored by Agfa-Gevaert, the world leader in magnetic tape technology. We Care.



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AUDIO VIDEO PROFESSIONAL

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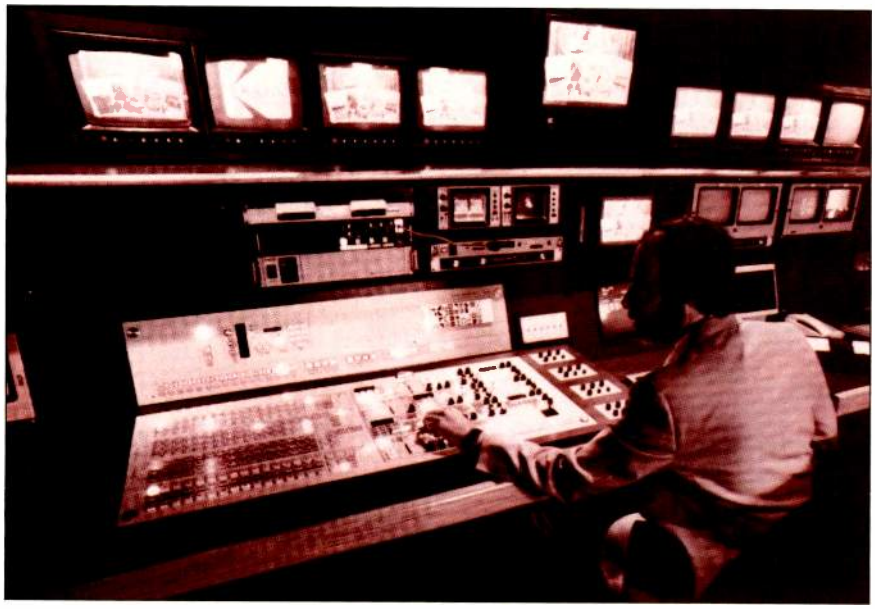

Typical edit bay setup at NFL Films Video.

WIRED!

for expansion." Once the layout is done, it is time to decide on the cable itself. Ptacek chose copper, with fiber being used only for egress. These outgoing cables connect to the teleport and the stages Universal has set up for live shows. CIII operates the post facility and the teleport.

"We have the ability to pull fiber anytime in the future to hook up any part of the facility," Ptacek allows. "That was part of the building plan, but for now we'll keep everything between rooms on copper."

Here too, signal routing is covered by Grass Valley, and is routed as composite NTSC because that's the way the machines and plant are designed, though dubs are machine-to-machine, parallel path. Ptacek says only one routing system is necessary for the facility because the Grass Valley expands to 256x256 by adding plug-in cards for the six edit rooms.

Once again, fundamental operation of the plant gets down to timing of signals. CIII uses a Grass Valley timing system with master generator and timing modules set for each machine. Interface standards have not been a problem for even a plant as sophisticated as those mentioned. The RS-422 serial ports are used for communication protocol and, since the manufacturers publish their protocol information, a machine controller can talk to just about any machine.

Part of the reason for a facility to adopt the "virtual edit suite" design or the central machine room concept, beyond efficiency in wiring and routing, is economic. "There is a financial incentive," confesses Steve Schifrin, vice president of operations at NFL Films Video. "You don't have to continually add complete machines to each room every time you get more clients. That way, you'd end up going bankrupt. On the other hand, it forces you to plan and schedule properly."

It also means that a facility has to be prepared to justify the time and expense, up front, for designing and implementing the routing and interconnecting systems planned for such a facility.

"If you are going to spend upwards of $200,000 for a routing switcher in addition to the other expenses," Schifrin adds, "it means you have to have a facility with more than two rooms and with multi-generation, multi-machine edits being very common practice."

Time-sharing of effects devices and other gear as well tape machines was the reason NFL went to the central machine room concept. And Schifrin emphasizes that zero-timing becomes critical for anyone thinking of going this route. Even though it appears costly in the beginning, he states, "It will ultimately save a lot of time which, in turn, saves the facility a lot of money. It also allows the house to leave a lot of flexibility in the wiring and interconnect scheme because of the sophisticated routers, like our Utah Scientific, which means in the long run, it's a more cost-effective plant that can do a lot more."

With plenty of wires and plenty of challenges, today's teleproduction facilities are combining creative design with experience and are coming up with the right solutions. ■

Wetmore is a New Jersey-based freelance writer who specializes in broadcast technology.

Canon is proud to introduce a lens designed to perform flawlessly in a wide range of broadcast applications, whether in the field or in the studio. And despite the J15X9.5B IRS' compact size, it boasts a long list of impressive features. Like a powerful 15X zoom with built-in 2X extender and macro focusing as close as half-an-inch. And full compatibility with all 2/3" CCD cameras. Yet this incredible lens is affordable too, making it the perfect choice for any size TV station, the educational marketplace and everyone else in between.

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do more. An optional positional focus control system and a zoom shot box allow you to customize the lens to specific broadcasting requirements. And like every Canon broadcast television lens, the J15X9.5B IRS provides years of dependable service thanks to superior optical and mechanical design and construction.

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SPECIFICATIONS:

Focal Length: 9.5-143mm (19-286mm w/2X extender)
Max. Relative Aperture: 1:1.8 (9.5-121mm), 1:3.6 (19-242mm)
Angular Field of View: 49.7° at 9.5mm, 26.1° at 19mm, 3.5° at 143mm, 1.8° at 286mm
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TESTING VISUAL/AU

As TV broadcasters, as well as antenna manufacturers, we are greatly concerned about a major problem we have come upon—a problem that could impede our efforts, and those of other station operators, to provide HDTV, stereo or SAP.

We have found that certain types of TV transmitting antennas can cause large reductions in effective bandwidth, and in chrominance and aural levels, at receive locations. These reductions, caused by a condition known as antenna beam steering, could result in terrestrial broadcasting being seriously blocked from advanced uses of the TV spectrum.

All that is required to determine if this problem exists at your station are a few simple field measurements of visual-to-aural carrier level ratios. These measurements, especially important if your station is using bottom-fed coaxial or waveguide slot array transmitting antennas, should be performed now, before you start broadcasting additional services.

The reason for performing these tests now is that later may be too late to first become aware there is a problem. If, as appears likely, an HDTV system is selected that critically depends on use of the full 6 MHz channel width, large ERP reductions toward the upper end of the channel will have a particularly deleterious effect. This would not normally be apparent, however, until a station actually attempted to broadcast an advanced TV system, since broadcast antennas have not previously been suspected of causing major reception difficulties.

More elaborate testing, such as direct measurement of color subcarrier level, or viewing demodulated video and observing color burst strength, could also be performed. However, the least complex of these is recommended here. If a problem is noted, additional measurements should then be made.

Performing line-of-sight visual-to-aural carrier ratio measurements using a directive receiving antenna and a field strength meter.

The only equipment needed to test visual carrier to aural carrier ratios is an accurate, portable field strength meter, a small directive receiving antenna, and a topographic map covering at least a 10-mile radius from the tower. Measurements must be made only in locations from which there is a clear line of sight to the transmitting antenna, and which are generally clear of wires and large reflecting objects.

For accurate measurements of the dB difference between the received visual and aural carrier levels, several sets of readings must be taken a few feet apart at each location. The visual to aural difference for each of these sets of readings should all be the same within 0.5 dB for the data to be considered valid.

Ideally, of course, every reading at every location will be the same, and be equal to the number of dB the aural is set below the visual at the transmitter output. Readings should not show a difference of more than, say, 3 dB from this set value. If the aural is adjusted to be, for example, 10 dB below the visual at the transmitter, readings should not anywhere be smaller than 10 - 3 = 7 dB nor larger than 10 + 3 = 13 dB for good reception of picture detail, color and sound.

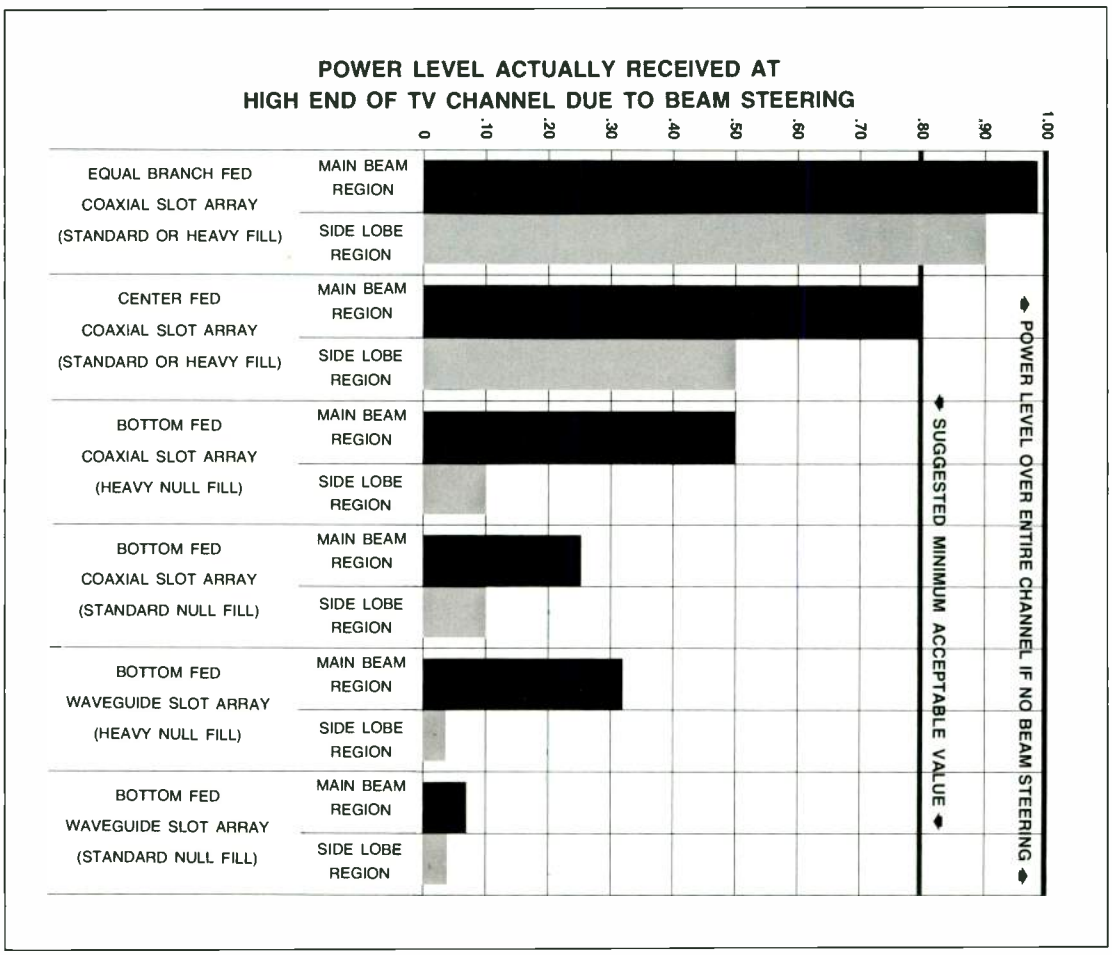
Locations that correspond roughly to the first null of the vertical plane radiation pattern will generally exhibit the largest ERP reduction, and therefore should be measured first to determine if a problem exists at all. These locations can be calculated from simple geometry, knowing the pattern, the height of the tower, and the terrain, and are usually five to eight miles from the tower.

Since even small ERP reductions of

BY RICHARD D. BOGNER

RAL RATIO

Antenna beam steering can result in ERP loss, which may impede SAP or MTS broadcasting. Proper testing of the visual/aural ratio can warn engineers of this condition.



Actual losses of received signal with different types of transmitting antennas. All measurements were made with clear, line-of-sight paths on operating full-service TV stations using current antenna designs.

only -5 dB or -6 dB may well create problems in effective transmission of stereo, SAP, or HDTV and cause some loss of picture quality, it seems unwise not to make a few simple measurements which will reveal whether a problem exists. Reductions greater than 10 dB to 12 dB have already been observed at some stations, and those certainly will require some correction.

When replacing or modifying an antenna, a station should ask the supplier to demonstrate that the product offered exhibits minimal beam steering over a TV channel and will result in less than a few dB of ERP loss in any part of the station's coverage area.

If stations perform the recommended visual/aural ratio tests, and use antennas that have been warranted against significant dB loss, they will minimize any surprises when the time comes to install new services like HDTV, second audio, or stereo. ■

Bogner is technical director of Bogner Broadcast Equipment Corp., Westbury, NY.

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ENGINEERING INNOVATIONS FLOOD SMPTE CONFERENCE

The latest technologies will converge at this month's SMPTE conference.

STAFF REPORT

While official conference themes often sound forced, none could be more descriptive than that for this month's 130th SMPTE Convention and Equipment Exhibit, which convenes at New York City's Javits Convention Center October 15 through 19. "Innovations in Imaging and Sound," the title of this year's meet, couldn't be more apt.

The busy conference schedule reflects the innovation and controversy that characterize the television industry in 1988. Two major sessions are devoted to advanced television transmission and another two to advanced television production, reflecting the urgency now surrounding this issue. The focus on transmission carries over to a session on fiber optics and another on satellites. Another session will feature digital distribution and transmission of TV signals.

Other sessions that promise to be hot include two on television post-production, reflecting the new impact of digital videotape recording, and a session on TV automation that will highlight robotic camera systems, among other developments. The session on small-format video recording will include a progress report on MII and reports on small-format digital recording.

At the conference, the society will honor 22 of its members for outstanding service and will also induct 14 Fellows. SMPTE's highest honor, the Progress Medal, will be awarded to Dr. Kerns H. Powers, the former RCA Laboratories engineer (now a consultant to the David Sarnoff Research Center) who contributed significantly to the development of color television. Stefan Kudelski of Kudelski, S.A. and Kenjiro Takayanagi of Victor Co. of Japan will become honorary members.

SMPTE TECHNICAL PROGRAM

Saturday Morning
Opening Session

Saturday Afternoon
Session A: Archival and Lighting
Session B: Digital Distribution/Transmission of TV Signals
Session C: TV Post-Production I

Sunday Morning
Session A: Film Production Technology
Session B: Advanced TV Transmission Systems I

Sunday Afternoon
Session A: Film Laboratory Technology
Session B: Advanced TV Transmission Systems II
Session C: TV Post-Production II

Monday Morning
Session A: Film Presentation Technology
Session B: Advanced Television Production Systems I*
Session C: Satellites

Monday Afternoon
Session A: Sound Technology
Session B: Advanced Television Production Systems II
Session C: Graphics

SMPTE

Tuesday Morning
Session A: Post-Production (Film/TV)
Session B: Fiber Optics
Session C: Automation for TV

Tuesday Afternoon
Session A: Post-Production (Film and HDTV)
Session B: Small-Format Video Recording

Wednesday Morning
Session A: Video Processing
Session B: New Technology in Imaging and Display I

Wednesday Afternoon
Session A: Audio for TV
Session B: New Technology in Imaging and Display II

30 SUPER SMPTE SIZZLERS

With its engineer's slant, the SMPTE Convention is the place to be for the latest information and trends in audio and video technology. The show's importance as a vehicle for new equipment introductions has grown dramatically in the past few years, mirroring the conference's vital role as a forum for the latest technical information.

To help guide you through the maze of new technology that will cover the SMPTE exhibit floor this month, we've identified several areas that we feel will be especially hot. The products that follow are all unusual or interesting in some particular way, but they're hardly the only things worth seeing on the SMPTE show floor. Be sure to check out the booth-by-booth listings that follow for many more significant new products.

ADVANCED TELEVISION

With standards still up in the air, proponents of various ATV systems are going head-to-head. Some developments in this area:

■Central Dynamics will unveil its Prism-1 line of digital coders and decoders for enhanced NTSC.

■Toko America will introduce the VT-500, a video framestore for digitizing and storing HDTV signals.

■Magni will address the HDTV testing problem with its 2030 programmable test signal generator for HDTV.

DIGITAL VIDEO

The vertigo-inducing pace of development in digital video technology shows no signs of abating. Along with the further maturation of 19 mm digital tape recording, both component (D-1) and composite (D-2), expect:

■Panasonic/Matsushita's D-3 digital recorder, based on the half-inch MII format, will be seen in prototype. Composite D-2 may offer the potential to bring digital into field acquisition.

■A digital version (DVC-1000S) of Sony's Library Management System, introduced at NAB.

■DSC's new Collage/DiSK unit will combine digital disk recording with digital video effects.

■BTS will unveil new digital encoders and decoders for conversion between digital 4:2:2 and analog component.

CHARACTER GENERATORS

This mature and well-saturated market isn't the usual place one would expect to find competition heating up. But that's exactly what's happening this month:

■Ampex is entering the character generator market for the first time with Alex, an antialiased CG with all the bells and whistles and then some.

■Chyron, long a leader in this field, is introducing the ACG real-time character, graphics, animation and video effects system.

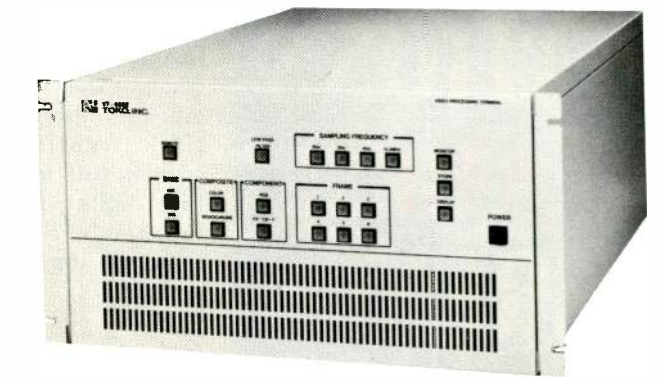
■The A72 from Abekas, which caused a sensation at NAB with its real-time font resizing, should be a major hit at its first SMPTE showing.

GRAPHICS AND EFFECTS

■ALTA Group, now under the Dynatech umbrella, will unveil the Pictoris, which combines digital video effects with video compression.

■ColorGraphics will introduce the DP4:2:2 digital paint system.

■Microtime will have a brand-new, low-cost 3D digital effects system, complete with rotation and



Above, Toko America's VT-500 HDTV framestore. The Abekas A72 character generator, below.

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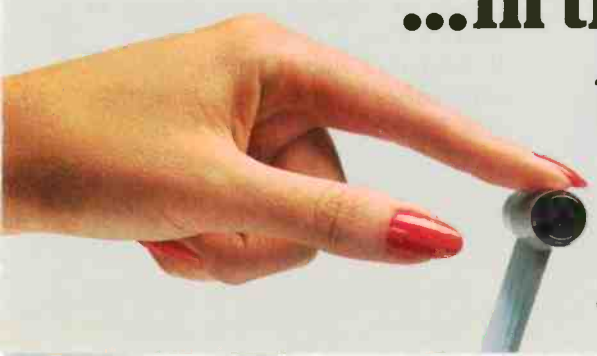

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SMPTE

perspective.
■Digital F/X's hot DF/X 200 integrated system will have several important upgrades, including keyframe editing, advanced paint and typography.
■Harris HarrisVws still store/ graphics system now boasts paint, titling and composition modules.
■Pinnacle will unveil its latest effects device, the Prizm.
■Rank Cintel will have a new, optical-disc-based stills library with a "polyphoto" display for storyboarding and playout list visualization.
■Comprehensive Video will add the PC Overlay Board, a device that converts any IBM PC or clone into a "legal" NTSC video source and mixer.

AUDIO PROCESSING

Again, trends are MIDI, SCSI, RS-422 interfaces and manipulation of signals which stay in the digital domain.
■Adams-Smith adds a MIDI port, subframe accurate GPI outputs and automatic ATR track select capability to its 2600 A/V Audio-for-Video Editor.
■New from Neve: the Prism Series of rack-mounted four-band parametric equalizers derived from the V-series console. Also hot: the U-series DTC (Digital Transfer Console) used for preparation for Compact Disc.
■Aphex will unwrap a new auto 612 expander-gater-ducker. Look too for the Model 124 audio level interface and the 120 audio routing switcher for distribution amplifiers.

AUDIO PRODUCTION

Digital audio workstations and consoles that do everything but make tea take off as producers look to origination and audio-for-video that starts digital and stays that way. Flavor of the month: MIDI with everything.
■E-Mu Systems' Emulator III digital production system samples in stereo, features 16 voices and can cut-and-paste. It's based on a 40 megabyte internal hard disk drive.
■SSL will bring its 01 Digital Production Center to its first SMPTE showing, along with the HarrySound unit, developed in conjunction with sister company Quantel.
■The Fostex DAT machine functions as a digital audio master recorder; it can chase and lock with video.
■New England Digital, the doyenne of DAWs, bows a 96-voice, 64 Mbyte RAM Synclavier with a high-resolution graphics workstation. Look for heavy Macintosh II graphics capability.
■Amek fits its BCII broadcast and post-production console with the ESM 32 serial interface, enabling remote control from all major edit controllers.

SMPTE EXHIBITION HOURS

Saturday October 15
2:30 p.m. to 6:00 p.m.

Sunday October 16
10:00 a.m. to 6:00 p.m.

Monday October 17
10:00 a.m. to 6:00 p.m.

Tuesday October 18
9:00 a.m. to 4:00 p.m.

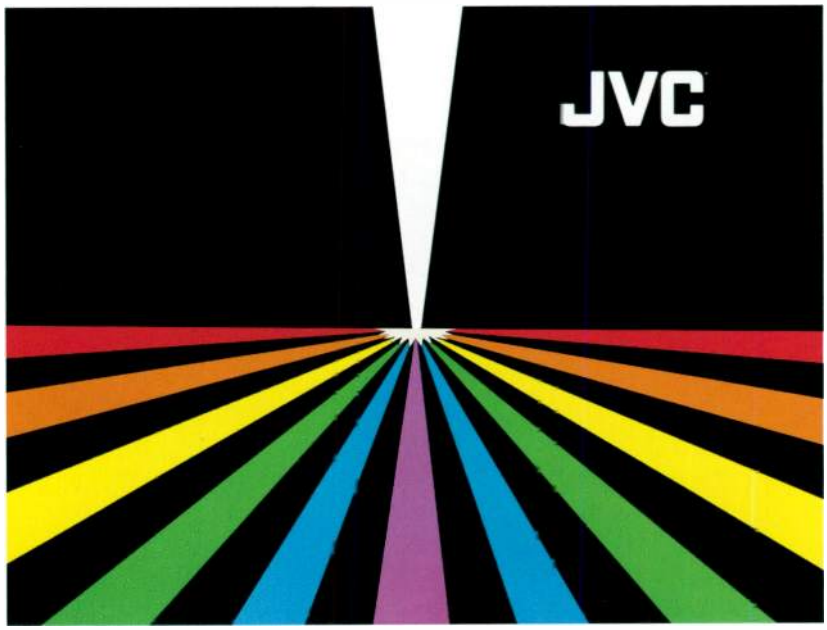
CAMERAS

CCDs, now widely accepted for ENG, are starting to elbow their way into the studio:
■BTS, among a raft of new camera entries, will pull the wraps from its LDK 900 CCD production camera system. Another noteworthy new camera from BTS will be the KCH 1000 flexible-standard high-definition camera system.
■NEC will introduce the EP-3, a CCD camera designed for studio as well as EFP applications.

CAMERA SUPPORT

Camera support hot? This traditionally staid category will see at least a couple of unusual new entries at SMPTE this month.
■Ultimatte's Memory Head, designed especially for blue-screen compositing, "learns" complex moves for precise recreation.
■Computer Prompting's latest teleprompter, the CPC-1000, runs on an IBM-compatible laptop computer. ■

The Adams-Smith 2600 A/V audio-for-video editor, above. Below, Solid State Logic's 01 Digital Production Centre.



MULTI-FORMAT INTEGRATION

WHAT YOU SHOULD KNOW ABOUT MULTI-FORMAT INTEGRATION.

Multi-Format Integration is an exciting, cost-effective way to merge your existing video equipment with today's technology and tomorrow's expectations. The result is superior performance and enormous versatility. Best of all, Multi-Format Integration doesn't come with a high price tag.

The beauty of Multi-Format Integration is its ability to get the most out of key formats — MII, ¾", S-VHS, and VHS. Combine them, and you've got much more than any single format can provide. And JVC is the only manufacturer who can offer all four.

Unfortunately, there is a widespread misconception that these formats cannot work together. That each format was created separately to work separately. That one format can and should serve all your video needs.

It's just not true.

For example, the ¾" format was never designed for camcorder applications. When ¾" was introduced, it simply wasn't possible to put all the necessary components into a small package. While ¾" technology has evolved brilliantly over the years, it still doesn't have the portability, convenience, or playing time necessary for all field applications. JVC's full array of S-VHS camcorders solve the problem. They offer two-hour playing time, outstanding resolution, one-person operation, and all the features you'd expect in a product designed for the professional. You can make superb tapes in the field without a support staff to carry the equipment. JVC's S-VHS camcorders are true camcorders — the ones you never had. And there's one designed especially for you.

So how can you shoot with JVC's S-VHS camcorders, and integrate them with your existing systems?

Simple. Transfer raw S-VHS footage through JVC's KM-F250U Multi-Format Frame Synchronizer/ Time-Base Corrector right to JVC's KR-M800U MII Editing Recorder.

Now you can edit the best way possible — in component video. Your edited master will have the quality of your original S-VHS

footage. Since you're editing in component form, you'll retain that quality from generation to generation, with virtually all the resolution and fidelity of

the original raw footage. So you can make as many copies as you want — in any format.

It's a dream come true in post-production applications, where multi-generation quality is absolutely essential.

Think about it. The field performance of S-VHS, the component editing qualities of MII, and the ability to continue a commitment to your present format. It makes sense. And you can reap all these benefits for a lot less than you'd expect.

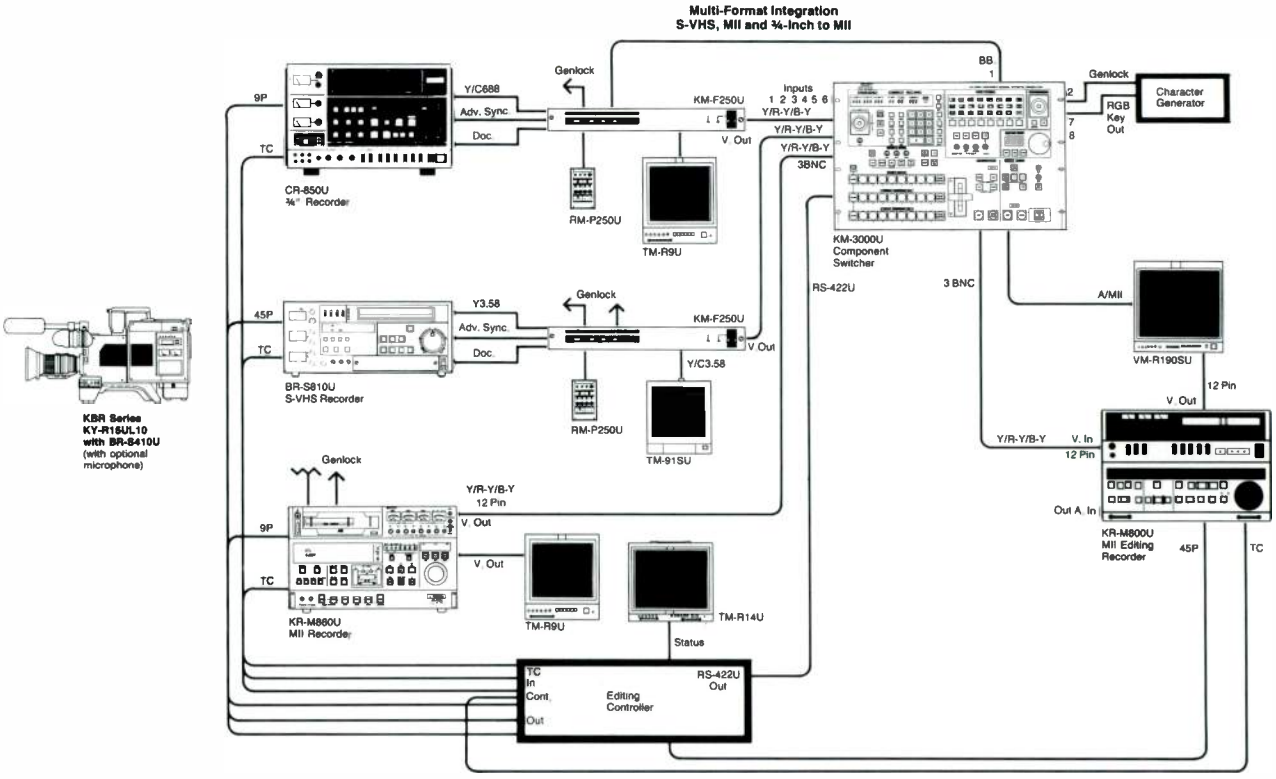
It's just one more way JVC keeps you a step ahead. At JVC that's more than a slogan. It's a promise.

To see how MII, ¾", S-VHS, and VHS work together, call JVC PROFESSIONAL PRODUCTS COMPANY, 1-800-JVC-5825. You'll see how Multi-Format Integration lets you link your past, present, and future video technologies.

JVC
MULTI-FORMAT INTEGRATION

JVC®
ALWAYS A STEP AHEAD...
TO KEEP YOU A STEP AHEAD.

MULTI-FORMAT INTEGRATION S-VHS, MII AND ¾-INCH TO MII.



You have versatility in the world of Multi-Format Integration. Shooting in S-VHS with the KBR Series camcorders your S-VHS raw footage is output into the editing system via the BR-S810U S-VHS VCR.

From here the footage is transferred through a KM-F250U Multi-Format Frame-Synchronizer/Time-Base Corrector, to a KR-M800U MII editing recorder. The footage is now in component form.

Produce your edited master on the KR-M800U MII editing recorder. This master tape will have the qualities of the S-VHS footage, with one big advantage — copies can now be made in any format, without significant degradation.

The beauty of Multi-Format Integration is that it incorporates the advantages of all four formats.

So you can make copies in MII, ¾", S-VHS, or VHS. Each copy will have superior performance, because the footage was shot in S-VHS, which has outstanding first generation performance. That quality will be maintained because the edited master was made in MII, a component format.

This is just one configuration in a Multi-Format Integration system. To find out how your existing video equipment can be integrated call JVC PROFESSIONAL PRODUCTS COMPANY, 1-800-JVC-5825, for a professional analysis.

For more information call or write:

JVC®

JVC PROFESSIONAL PRODUCTS COMPANY, 41 Slater Drive, Elmwood Park, NJ 07407

SMPTE EXHIBITORS

A

A.F. ASSOCIATES 1212
Standards converters; robotics.

ABEKAS VIDEO SYSTEMS 1870
A62 composite digital disk recorder; A64 and A60 component digital disk recorders; A42 still store; A53-D and A52 digital special effects; A72 digital character generator.

ACMADE INTERNATIONAL 1273
Pic-Sync 35 mm audio synchronizer.

ADAMS-SMITH 1019
New: Zeta-Remote autolocator/controller; ADR capability for System 2600.

System 2600 audio-for video editor; tape synchronizers; time code equipment.

ADCOM COMMUNICATIONS 1265
Chroma keyers; time code equipment; Ross production switchers.

ALEXANDER BATTERIES 1058
Batteries; battery chargers.

THE ALLEN PRODUCTS CO. 1743
Film processors.

ALTA GROUP 1660
New: Pictoris video compression/digital effects unit.

Cygnus TBC/switcher; Pyxis, Pyxis-E frame synchronizer/production switchers; Centaurus electronic still store.

AMEK/TAC US OPERATIONS 1905
New: BCII audio mixing console.

On-air and post-production audio consoles; studio automation equipment.

AMPEX CORP. 1402
New: Alex antialiased character generator system; component analog version of AVC Vista production switcher.

VPR-300 Series D-2 DVTRs; ACE 25 video editor/controller; Zeus Port Type C-to-D-2 interface; CVC-7 color video camera; CVR-200 camcorder; CVR-22 Betacam SP playback deck; Control System Enhancement package for ADO; AVA video art system; ESS composition graphic/storage system; Type C VTRs.

AMPEX MAGNETIC TAPE DIV.
New: 297 Master Broadcast U-matic SP videotape.

319 D-2 digital videotape; one-inch, half-inch, 3/4-inch videotape.

AMTEL SYSTEMS 1640
TRANSform-1 post-pro management system; TRANSform-LM list management system; Evertz time code equipment.

ANGENIEUX CORP. OF AMERICA 1150
ENG and studio video lenses; motion picture lenses.

ANTON/BAUER 1834
Batteries and power supplies; lighting equipment.

APHEX SYSTEMS 1012
New: Auto 612 expander/gater/ducker.

Model 124 audio level interface; Model 120 audio routing switcher; audio processors.

APOLLO AUDIO VISUAL 1262
PC Presenter LCD computer projection displays; furniture; 35 mm projector lenses.

ARRIFLEX CORP. 1124
Lighting equipment; lenses; camera support equipment.

ASTON ELECTRONICS 1274
Aston 3, Aston 4, Aston 3B character generators; Wallet stillstore.

AUDIO PRECISION 1042
System One audio test set.

B

BARCO INDUSTRIES 1269
Video monitors; NTSC decoders.

BENCHER 1279
Copymate video stand.

BI-TRONICS 1859
New: coded snake cable; MIDI cable assemblies.

Cable and connectors.

THE BROADCAST STORE 1376
New and used broadcast equipment.

BTS 1414
New: LDK-900 CCD camera; LDK-90 triax camera; KCH-1000 HDTV camera; DCR-100 D-1 DVTR; KCB-590, BCB-75, BCB-35, BCB-65, BCB-22 Betacam SP recorders;

SMPTE

EPIC; XD CD and XD DC digital encoder/decoder; PD TV digital test pattern gen; XD NR 4:2:2 noise reducer; XD SMAC CD S-MAC encoder; TVS/TAS-2001 video/audio switcher.

Studio/field cameras; CCD cameras; Pixelerator; Vidifont/Viditext character/graphics system; BVA-350 DA line; telecine equipment; MC switchers; station automation; video monitors.

C

CAM-LOK 1861
Quick disconnects for power distribution/lighting.

CANON USA 1106
Video lenses; camera support equipment.

CARPEL VIDEO 1156
Distributor of videotape.

DWIGHT CAVENDISH CO. 1046
Videocassette duplicators.

CEI TECHNOLOGY 1854
Video assist for film cameras; remote control units for video assist.

CENTRAL DYNAMICS 1160
New: Prism 1 line of digital encoders/decoders for enhanced NTSC.

Production switchers; master control switchers; video routing switchers, DAs.

CENTRO CORP. 1560
Facility planning; system integration; mobile facilities; consoles, racks and furnishings.

CENTURY PRECISION OPTICS 1154
Lenses.

CHYRON CORP. 1668
New: ACG real-time character, graphics, animation and video effects system.

Chyron 4 Series, Scribe, SuperScribe, Scribe Jr. character generators; Chameleon 2D graphics system.

CINE 60 1550
Power supplies, batteries.

CINEMA PRODUCTS 1650
Camera support equipment; cine lenses.

CINEMILLS CORP. 1045
Lighting equipment and accessories.

CIPHER DIGITAL 1004
Time code equipment; VTR emulator; audio editing systems.

CMX SYSTEMS 1668
New: 330S multi-machine editing system with internal A/V switcher.

CMX 6000 random-access editor with two-headed videodisc players; 3600 editing system; 3100A editor with new four-channel audio and audio/video crosspoint selection.

COHERENT COMMUNICATIONS 1831
Portable audio consoles; wireless mics; time code equipment.

COLORGRAPHICS SYSTEMS 1812
New: DP4:2:2 paint system.

ArtStart 3D plus paint and animation system; Liveline 5 weather graphics system.

COMPREHENSIVE VIDEO SUPPLY 1112
New: PC Overlay Board to convert a PC into a legal NTSC source and mixer; TCG-1000 SMPTE time code reader, generator, inserter.

Character generators; Edit Master video editing systems; video routing switchers & DAs; audio routing switchers.

COMPUTER PROMPTING CORP. 1847
Computerized teleprompters; closed captioning systems.

CONRAC CORP. 1556
New: component analog inputs for 6545 studio color monitor.

Video monitors.

CORPORATE COMMUNICATIONS CONSULTANTS 1576
Color correctors; telecine control systems.

D

H.L. DALIS, INC. 1651
Distributor of electronic components.

DESISTI LIGHTING/DESMAR 1255
Lighting and grip equipment.

DIGITAL F/X 1568
DF/X 200 digital production system.

DOLBY LABORATORIES 1218
SDU4 surround decoder unit; SRA5 spectral recording cinema processor; noise reduction equipment.

DSC 1668
New: Paragon digital effect system; Collage/DiSC combination D-2 digital compositing system and digital disk recorder.

Eclipse digital video effects system.

DUBNER COMPUTER SYSTEMS 1624
3D modeling and animation; weather graphics displays; turbo digital art/paint system; Graphics Factory; Texta, 10K, 20K character generators.

DYNATECH CORP. 1812
See ColorGraphics Systems, Quanta Corp., Utah Scientific, ALTA Group.

E

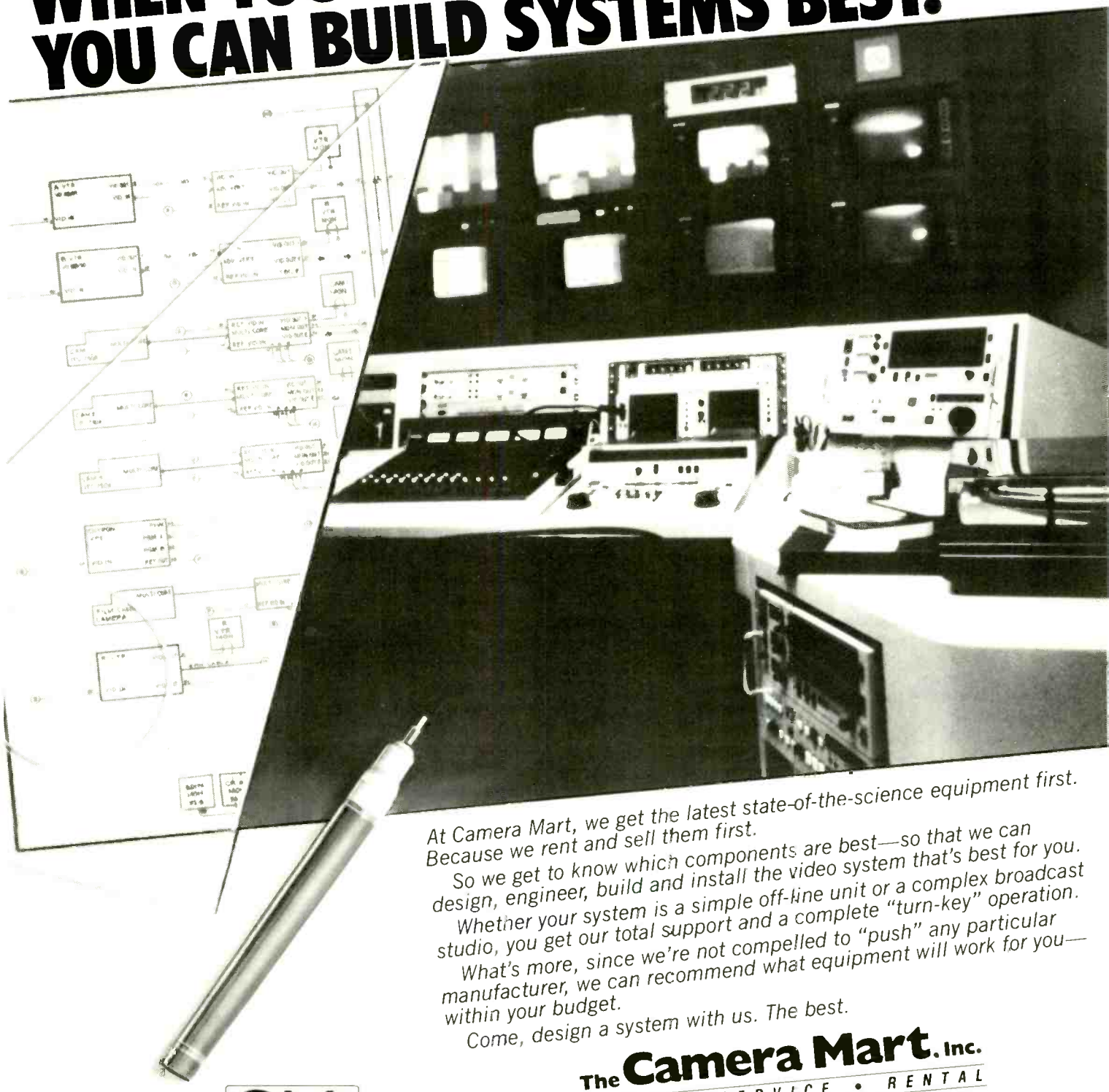
E-MU SYSTEMS 1568
New: Emulator III digital sound production system.

EASTMAN KODAK CO. 1602
Videotape; film stock.

EDITRON USA 1055
Video edit/controllers; multisource video editors; tape synchronizers.

EVENTIDE 1857
BD1000 digital video delay; Harmonizer audio special effects; Timesqueezer audio time compression.

WHEN YOU KNOW EQUIPMENT BEST, YOU CAN BUILD SYSTEMS BEST.



At Camera Mart, we get the latest state-of-the-science equipment first. Because we rent and sell them first.

So we get to know which components are best—so that we can design, engineer, build and install the video system that's best for you.

Whether your system is a simple off-line unit or a complex broadcast studio, you get our total support and a complete "turn-key" operation.

What's more, since we're not compelled to "push" any particular manufacturer, we can recommend what equipment will work for you—within your budget.

Come, design a system with us. The best.

The Camera Mart, Inc.

SALES • SERVICE • RENTAL

Headquarters/New York
456 West 55th Street, New York 10019
(212) 757-6977
Telex: 275619/FAX (212) 582-2498

California
1900 W. Burbank Blvd., Burbank, CA 91506 (818) 843-6644

Video Systems designed, engineered, serviced by

CMV SYSTEMS

SMPTE

EVERTZ MICROSYSTEMS 1825
New: e2 Model 7200 VHS interface for video editors; 623EDL EDL generator; S622 standalone VITC-to-LTC translator.
Time code equipment; ATR synchronizers; Emulator audio interface for video editors.

F

FAIRLIGHT INSTRUMENTS 1470
Audio and video special effects.

FAROUDJA LABORATORIES 1368
CTE-N NTSC encoder; CFD-N NTSC precision decorder.

FGV PANTHER CORP. OF AMERICA 1741
Panther camera support system.

FOR-A CORP. OF AMERICA 1134
New: FA-210 heterodyne TBC.
TBCs, frame synchronizers; video processors; character generators; digital effects; video editors; production switchers; video routing switchers, DAs; time code equipment; color correctors.

FORECAST INSTALLATIONS 1375
Consoles and task-oriented furniture.

FOSTEX CORP. OF AMERICA 1558
DAT digital master recorder; monitor speakers; mics.

FREZZOLINI ELECTRONICS 1806
Lighting equipment.

FRIES ENGINEERING 1016
Cine cameras.

FUJI PHOTO FILM 1442
One-inch, half-inch, 3/4-inch videotape.

FUJINON 1442
HD high-depth lenses; pan and tilt unit; ENG/EFP broadcast lenses.

FUTURE PRODUCTIONS 1054
New: MCU-400 EFP multi-CCU; MMC-100 and MMC-500 monitor main controls.
Video duplicating systems; audio/video DAs.

G

G&M POWER PRODUCTS 1659
Power supplies, batteries.

GEFEN SYSTEMS 1374
BBC compact disc libraries; CD cataloging.

GENERAL ELECTRIC CO. 1844
Lighting equipment.

GEOCAM CORP. 1050
Matte boxes.

THE GRASS VALLEY GROUP 1612
Model 300 and 100 production switchers; Horizon video routing switchers; master control systems; multisource video editors; Kaleidoscope digital video effects; audio mixers.

H

HARRIS VIDEO SYSTEMS 1434
New: Paint, composition and titling applications for HarrisVws 1000 and 5000 graphics workstations.
HarrisVws graphics workstation; IRIS II Plus digital still store; 642 and VW-3 frame synchronizers.

HARRISON SYSTEMS 1260
New: AP-100 broadcast console series.
AIR-790 and PRO-790 audio consoles; VSI video switcher/editor interface.

HEDCO/SUBSIDIARY LEITCH VIDEO 1634
New: HD-1600 series video, stereo audio and data routing switchers.
Video routing switchers, DAs; HSG-100 sync and pulse generators.

KARL HEITZ, INC. 1017
New: Gitzo Inter Pro Studex tripod and fluid head; Rhino armored adjustable bags.
Gitzo tripods, fluid heads, levelling balls, dollies; mic fishpoles.

HIGH RESOLUTION SCIENCES 1776
NTSC-compatible advanced television system.

HITACHI DENSHI AMERICA 1702
Studio cameras; HDTV cameras; ENG, CCD cameras; optical disk recorders; one-inch VTRs; DVTRs; video test equipment.

I

IKEGAMI ELECTRONICS 1642
HL-791 ENG camera; HL-55 FIT ENG camera; HC-230 CCD camera; HK-323 and HK-323P studio camera and portable camera; EC-1125 HDTV camera; TV projection systems; wideband encoding/decoding systems; portable microwave links; video monitors.

ILC TECHNOLOGY 1661
Lighting equipment.

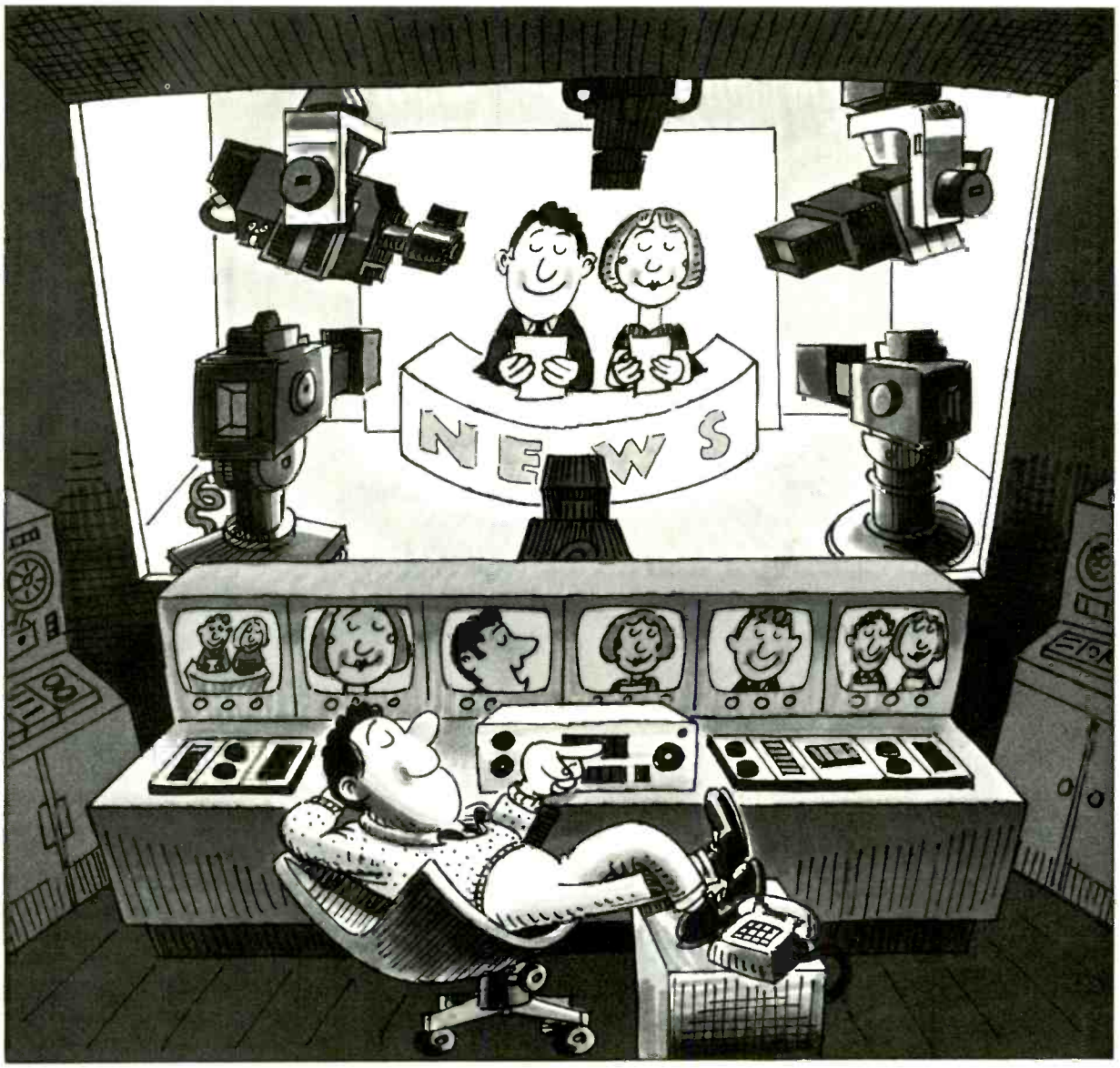
IMAGE VIDEO 1805
Manual and automatic MC switchers.

INNOVISION OPTICS 1277
Lenses.

INTELVIDEO 1655
New: IV-4 professional NTSC color decoder.
NTSC encoders and decoders.

INTERGROUP TECHNOLOGIES 1006
New: Model 9512 production switcher.

ROY ISAIA/THE EQUIPMENT BROKER 1754
Used equipment broker.



MULTIPLE CAMERAS. ONE OPERATOR.

Impossible? Not if your cameras are mounted on EPO Servo-Controlled pan and tilt heads. These extraordinary, labor-saving devices, which first found favor in legislatures where remote-controlled, unobtrusive coverage was a key factor, are now the basis for complete remote-controlled news studios.

Just look at these outstanding features:

- Up to 500 preprogrammed positions per camera, including control of iris and black levels
- Programmable fade modes that provide smooth transition from preprogrammed shots
- Ability to zoom and focus
- Unobtrusive
- Can be operated via telephone lines or microwave in a remote studio away from the main studio location
- Wide range of pan and tilt heads, for full studio cameras with teleprompters to ENG type cameras
- Wide range of control options, from panels with multiple-shot memories to simple joy stick remote controls.

It's flexible, affordable—and it's sold and serviced exclusively in the U.S.A. by A.F. Associates.

THE RADAMEC EPO REMOTE CAMERA CONTROL SYSTEMS

Your news show's bottom line will never look so good.

A.F. ASSOCIATES INC.
ADVANCED SYSTEMS AND PRODUCTS FOR THE VIDEO INDUSTRY
100 STONEHURST COURT NORTHVALE NJ 07647 (201) 767-1201
IN THE WEST: 10650 SCRIPPS RANCH BLVD. SUITE 200 SAN DIEGO, CA (619) 530-2970

Circle 131 on Reader Service Card Page 91

SMPTE

ITE 1468
Camera support equipment.

J

THE J-LAB CO. 1174
Beta playback modifier; title area generators.

JVC 1512
KY-80U, KY-75U, KY-950BU, KY-320BU three-tube video cameras; KY-15U CCD camera; KR-M800U, KR-M860U, KR-M460U, KR-M260U MII recorders; color video monitors; KM-3000U component SEG; MI-3000U audio mixer; MI-F30U audio fader; KM-F2500 multi signal standard frame sync; BR-S810U, BR-S610U, BR-S410U S-VHS recorders; CR-850U 3/4-inch recorder.

L

LEE COLORTRAN 1242
New: 270 W HMI Reporterlight battery kits; 2 kW and 5 kW Baby Fresnels.
Lighting equipment.

LEITCH VIDEO OF AMERICA 1342
New: MTG modular test generator package.
DFF-3100 still store; 601 digital amps; master clock systems; DAs.

LEXICON 1104
Opus random access digital audio production system; 480L digital audio effects system; Model 2400 stereo audio time compressor/expander; Model 2400 TCF time code follow.

LISTEC VIDEO CORP. 1809
New: A-5000 PC live, on-line prompter.
Computer prompters.

LOWEL-LIGHT MFG. 1000
Lighting equipment.

LTM CORP. OF AMERICA 1555
New: special purpose HMI lights.
Lighting equipment; mic accessories.

M

3M MAGNETIC MEDIA DIV. 1701
One-inch, 3/4-inch, half-inch videotape.

MAGNA-TECH 1202
Film recorders and reproducers; time code equipment.

MAGNI SYSTEMS 1268
New: Model 2030 programmable HDTV test signal generator; Model 1515SP component/composite test signal generator for Betacam SP.
Analog-digital transcoders; PC graphics encoder/genlock systems; video test equipment; sync and pulse generators.

MARTIN AUDIO/VIDEO CORP. 1476
Dealer of audio equipment.

MATTHEWS STUDIO EQUIPMENT 1735
New: break-apart cam-remote head.
Camera support equipment.

MCCURDY RADIO INDUSTRIES 1474
Audio test equipment; CS9400+ digital intercom system; audio DAs; line amps; monitor amps; VU, LED and PPM meters.

MERLIN 1801
Video standards converters.

MICROTIME 1250
New: low-cost 3D digital video effects system with rotation and perspective; new version of ImagePlus graphics system; Tx3 FIT format interchange TBC; dual-channel version of RP-1 video efx system.
Tx4 TBC; S-134 four-field synchronizer; S-234 TBC/synchronizer.

MICROWAVE RADIO CORP. 1062
New: ProStar 2 GHz and 7 GHz microwave transmitters; ProStar MRC dual-conversion receiver.
ENG microwave; M/A-COM STLs.

MIDWEST COMMUNICATIONS CORP. 1035
Mobile facilities construction; Technalogix TV transmitters; DPS-270 TBCs; DPS-165 frame synchronizers; A.C.E., Arena production switchers; A.C.E. video routing switchers; DPS-185 sync and pulse generators; encoders, color correctors, transcoders.

MILLER FLUID HEADS 1755
Camera support equipment.

MITCHELL CAMERA CORP. 1142
Camera support equipment.

MITSUBISHI ELECTRIC SALES 1746
New: AM-3501R 35-inch Autoscan color monitor; BV-1000 S-VHS VCR; CP-100U color video copy processor.

MITSUBISHI PRO AUDIO GROUP 1460
Digital audio recorders; audio consoles.

MOLE-RICHARDSON CO. 1324
Lighting equipment.

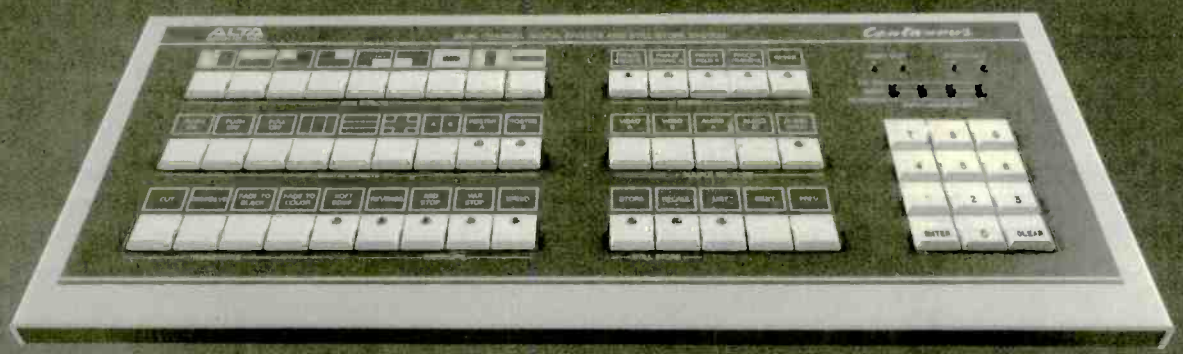
MONTAGE GROUP 1850
Montage Picture Processor II nonlinear video editor.

N

NAGRA MAGNETIC RECORDERS 1116
Portable ATRs.

NEC AMERICA, BROADCAST EQUIP. DIV. 1102
New: SP-30 CCD ENG camera; EP-3 CCD EFP/studio camera.
SP-3A CCD ENG camera; DVE-10 digital video effects device; VSR-10 solid state video recorder; PCN-1400 VHF transmitters; PCU-900 UHF transmitters.

NEMAL ELECTRONICS INTL. 1768
RF crimping tools; connectors; video jackfields.



One Still Store Does More Than Just Store Pictures

Simply Storing Pictures Isn't Enough Anymore.

Your still store had better deliver absolutely pristine images and be a multitasking production center, or you're not getting your money's worth.

Can Any Still Store Really Do This?

One can. ALTA's Centaurus. Look at our bandwidth, for example. We don't just meet broadcast specs. We exceed them with high-speed component processing throughout. That means you get the sharpest image possible.

Store More For Your Money!

Now compare Centaurus' storage capacity. All on-line, for instant recall at the lowest cost per picture.

And when your storage requirements grow, we'll grow with you. With additional on-line storage, and a digital tape cartridge for unlimited off-line storage.

No Other Options Needed!

Our dual synchronizers and TBCs are built right in. So you can work directly with images from tape, camera, microwave and satellite feeds, whatever. All without having to invest in additional equipment.

Becomes a Master of Effects in Minutes!

Put some polish on your productions. Centaurus gives you more effects to work with, on a keyboard that's simple to operate. Plus its built-in switcher and dual TBCs let this still store stand alone, so you won't tie up your entire studio.

How Can This Be?

How can we make a full-featured, dual channel still store for less than the cost of other single-channel systems? Simple. We've been doing it for years. In fact, ALTA engineers were among the pioneers of the digital still store. That's why our warranty is twice as long, and our still store gives you twice the value.

So if you're looking for a still store that does more than just store pictures, choose the one that does more for your money.

Choose Centaurus.

Specifications	ABEKAS A42	ALTA Centaurus	AMPEX ESS-5	HARRIS ESP II
Bandwidth	4.2 MHz (±0.25dB)	5.5 MHz (-3dB)	5.9 MHz (±5dB)	5.0 MHz (±0.5dB)
Signal to Noise	52 dB	58 dB	?	56 dB
Storage Capacity*	200 fields 100 frames	250 fields 125 frames	207 fields 207 frames	200 fields 200 frames
Synchronizer	—	Dual	—	Dual
TBC	—	Dual	—	—
Production Effects	1 wipe dissolve —	9 wipes dissolve 7 digital	1 wipe dissolve —	3 wipes dissolve 3 digital
Warranty	1 year	2 years	1 year	1 year
Single Channel Dual Channel	$19,900 $24,900	— $16,900	— $31,500	$26,333 $30,995

*Basic System

Based on available data as of June, 1988.

ALTA GROUP, INC

535 Race Street, San Jose, CA 95126 • FAX 408-297-1206 • Tel. 408-297-ALTA

SMPTE

NEVE 1234
New: Prism Series rack-mount, four-band parametric equalizers.

V-Series audio consoles; DTC digital transfer console; 8232 multitrack console.

NEW ENGLAND DIGITAL CORP. 1824
PostPro/Direct-to-Disk line of multitrack audio recorders, with new MacIntosh II high-resolution graphics workstation, MaxTrax track expansion software, time compression, VITC sync and CMX conversion software; Synclavier digital audio workstation.

NIKON 1760
Lenses.

NOVA SYSTEMS 1845
New: NOVASync video frame synchronizer.
Time base correctors; frame synchronizers.

NURAD 1549
Microwave for ENG.

O

O'CONNOR ENGINEERING LABS 1100
Camera support equipment.

ODETICS/ BROADCAST DIV. 1734
MERPS multi-cassette decks; playback automation.

OKI ELECTRIC INDUSTRY LTD. 1576
Digital standards converters.

OPTICAL DISC CORP. 1658
Videodisk recording equipment.

ORION RESEARCH 1671
NewsMaker on-air audio console; NewsMaker, SoundStar post-production consoles.

SMPTE

OTARI CORP. 1469
New: MTR-100A two-inch 24-track ATR; MX-55 1/4-inch two-track ATRs, model TM with center-track time code; MX-50 1/4-inch two-track ATR.

Studio ATRs; audio tape duplicators; audio tape winders; time code equipment.

P

PALTEX 1512
New: E Series modular videotape editor/controllers; Elan editor with 20 serial ports; Esprit Plus; SID RS-422-to-parallel VTR interface.

Abner, Elan, ES/D multsource video editors.

PANASONIC BROADCAST SYSTEMS CO. 1542
New: D-3 digital composite studio VTR.

AK-400 three-CCD camera; camcorders; AU-660, AU-650, AU-640, AU-630, AU-620, AU-500, AU-550 half-inch VCRs.

PEERLESS SALES CO. 1863
Speaker mounting brackets.

PERROTT ENGINEERING LABS 1450
Batteries, chargers, accessories; lighting equipment; camera support equipment.

PHILIPS LIGHTING CO. 1020
Lighting equipment.

How Good is Our 3rd Generation?

TBC-200 Time Base Corrector

IFP-C4 Editing Interface

UTP-1 Signal Transcoder

AG-7400 Portable VCR

AG-7500A Editing VCR

AG-A750 Editing Controller

CCD Cameras

SVHS Video Cassettes

Take a Look at Our 5th!

PERFORMANCE DATA
(AG-7500A)

	1st Generation	3rd Generation w/o TBC	3rd Generation w/TBC-200	5th Generation w/TBC-200
Horizontal Resolution (Color Mode)	400	370	360	350
S/N Ratio (dB)				
Luminance (Color Mode)	57.2	51.7	52.0	49.0
Chrominance (AM)	51.8	47.5	51.4	44.5
Chrominance (PM)	44.3	40.1	43.8	35.2

Data represents measurements by independent engineering evaluation. VCRs taken at random from invertory.

- Signal Source: Shibasoku TG-7/1
  - Luminance: 50 IRE flat field w/burst
  - Chroma: 50 IRE w/100 IRE p-p
  - Resolution: Monoscope Shibasoku 58A/1
- Noise Meter:
  - Y-S/N: Rohde & Schwarz UPSF2/UPSF2E2 200 kHz HPF, subcarrier trap on 4.2 MHz, LPF, weighted
  - C-S/N: 100 Hz HPF 500 kHz LPF, unweighted

From the first to the third, even to the 5th generation Panasonic SVHS Pro Series specifications speak for themselves. And they say "outstanding." Here are some of the reasons:

The AG-7500A editing VCR with its new laminated amorphous heads produces superb quality generation after generation.

The AG-A750 editing controller has everything you need for highly accurate single event editing.

And the AG-7400 portable 2-hour VCR is a natural performer in the field.

Our TBC-200 time base corrector has a 16-line correction window, chroma plus/ enhancement, chroma noise reduction and no-roll circuitry. To make multi-generation recordings even better.

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The Panasonic SVHS Pro Series. In a word it's outstanding.

For more information on the Panasonic Pro Series, call Panasonic Industrial Company at 1-800-553-7222, or your local Panasonic Professional/Industrial Video dealer.

S-VHS

Panasonic
Professional/Industrial Video

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SMPTE

PINNACLE SYSTEMS 1535
New: Prizm digital effects device.

3000E graphic design workstation; 2000 Series dual-channel workstation.

Q

QUANTA CORP. 1812
Orion, Delta antialiased character generators; Microgen 100+, QCG500 CGs; Quantapaint 100 and 200 video paint systems; Artista animation system.

QUANTEL 1224
Cypher, Cypher Sports character generators; Harry digital production center; Paintbox 2D graphics system; 6031 digital component still store; Mirage, Encore special effects devices; HarrySound audio production center.

QUANTUM/ WEIRCLIFFE 1903
BTE 90B high-energy and BTE 29 SVHS bulk tape degaussers.

R

RANGERTONE/ MULTI-TRACK MAGNETICS 1351
Telecines.

RANK CINTEL 1534
New: Optical disc stills library; ADS-2 CCD 4:2:2 telecine.

Enhanced MkIIIC Digiscan 4:2:2 telecine; dual still storage/management system.

RANK PRECISION INDUSTRIES 1164
Cooke cine lenses.

RESEARCH TECHNOLOGY/ LIPSNER-SMITH 1804
Telecines.

RF TECHNOLOGY 1829
New: Low-noise receiver for ENG/EJ sports applications; 950 mega-wireless mic system.

Microwave for ENG; power amps.

ROSCO LABORATORIES 1030
Lighting equipment and filters.

S

SACHTLER CORP. OF AMERICA 1334
New: Video 80 with OB tripod system; Video 10 system; two-in-one tripods for ENG/EFP.

Camera support equipment.

SCHNEIDER CORP. 1104
Video lenses and accessories.

SCHWEM TECHNOLOGY 1815
Image stabilizer lenses; mini zoom lenses.

SENNHEISER 1840
New: MD 518 handheld dynamic mic; MKE 4032 handheld stage condenser; MKH 20 omnidirection recording mic; MKH 30 bidirection digital recording mic; ENG 2003 portable diversity system.

Microphones; headphones.

SESCOM 1040
Amps, preamps; field newsbridges; mic combiners; mic/line drivers; mic mixers; audio signal processing; audio test equipment.

SIGMA ELECTRONICS 1811
New: Computer graphics integrator to time frame buffers into systems (prototype); test equipment for component video.

Video processors; video test equipment; audio and video routing switchers, DAs; sync and pulse generators.

SKOTEL CORP. 1901
Time code generator for film-to-tape transfer.

SOLID STATE LOGIC 1350
New: 01 Digital Production Centre; HarrySound digital audio editing system.

SL 5000M Series on-air, post-production audio consoles.

SONY COMMUNICATIONS PRODUCTS CO. 1500
DVC-1000S digital Library Management System; DVR-10 D-2 DVTR; DVR/DVPC-1000 D-1 DVTR; BVH-3000 Type C VTR; Betacam SP recorder line; BVP-7, BVP-50 Betacam SP cameras; BVP, DXC CCD camera lines; BVU-950 U-matic VCR; BVU-900 U-matic SP player; BKU-901 plug-in TBC for BVU-950; SEG-2550 special effect generator.

Professional Audio products: APR-5003V two-track ATR; PCM-2500 digital audio multichannel recorder; MXP-2016 audio mixing console; MP-29 mixer; WRR-27 UHF portable tuner; ECM-672 shotgun mic; Series 400 VHF wireless mic system.

SOUND IDEAS 1372
Sound effects, production music libraries.

SOUND TECHNOLOGY 1819
Model 1710 alpha distortion measurement system; 1510A audio test system; 1530A MTS test system; 3000A programmable audio test system; MSAT programmable switching system.

SOUNDMASTER INTERNATIONAL 1922
Audio editing systems.

STEADI-FILM CORP. 1860
New: Manipulator motion control system; Video Cue video cuing device; 35 mm high-speed lens; telecine notch guide; X-Y zoom for telecines; Turbo Telecine upgrade package.

Pin-registered film gate for telecines.

STEENBECK 1361
Telecines.

STRAND LIGHTING/GTE 1800
Lighting equipment.

STUDER REVOX N/A
New: A810 TC FM/NEO; TLS4000 SMPTE resolver/synchronizer.

A727 and A730 professional CD players; SC

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Introducing PRISM*1 E-NTSC encoders. They represent a new proprietary technology* and the most advanced Digital Signal Processing and filtering techniques for eliminating NTSC artifacts.

If you paid the price for D1 high quality images...you can maintain that look when converting to NTSC.
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Enhanced NTSC

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Using a powerful computer Real-time Video Simulation system (one of the few in the world) multi-dimensional diamond shaped FIR filters were developed. These unique designs shape the NTSC spectrum and separate chrominance and luminance. This completely eliminates cross-color and cross-luminance artifacts. These FIR filters are phase linear and will always respond correctly to any incoming signal combination or noise level.

Adaptive comb filtering schemes cannot make these claims. And that's a fact.

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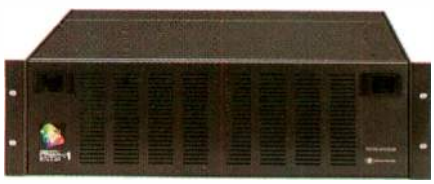

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4008 system controller for post-production and editing.

T

TASCAM/TEAC Corp. 1745
On-air, post-production audio consoles; audio cassette recorders; multitrack ATRs; CD players; parametric & graphic equalizers.

TEKTRONIX 1524
New: 1780R video measurement set; 750 BTSC aural modulation monitor/decoder; TSG-170D digial composite test signal generator; TSG-422 digital component generator; TSG-100 test signal generator; SDP-300 signal development program; DP-100 digital video probe.

Waveform monitors; vectorscopes; sync and test signal generators; demodulators; automatic measurement equipment; audio and video synchronizers; stereo audio monitors.

TELEMETRICS 1663
New: TM-880 pan/tilt system; TM-8650 triax camera control system.

Remote motion control systems; camera support equipment.

TELEPAK 1853
Camera and VTR cases.

TELESCRIPT 1039
Teleprompters.

TELEX COMM. 1843
New: FMR25TD true diversity receiver; FMR25 wireless mic receiver.

WT-25 RF mic transmitter; HT-100 ProStar handheld mics.

TIFFEN 1051
Lens filters.

TIME BASE CONSOLES 1275
Video production consoles and cabinets.

TOKO AMERICA 1851
New: VT-500 HDTV framestore; time base correctors; electronic still stores.

TROMPETER 1849
Patch fields; RF attenuators, loads, connectors; cable and connectors.

TRUEVISION 1770
Video graphics boards for PCs; graphics software.

TSM/TOTAL SPECTRUM MFG. 1424
Camera support equipment; titling stands; MultiController camera motion control system.

U

ULTIMATTE CORP. 1261
New: Ultimatte Memory Head computerized tripod head.

Video image compositing systems.

UNILUX 1163
High-speed stobe lights.

UNION CONNECTOR 1919
Connectors and wiring devices.

DIGITAL SYSTEMS

Wouldn't it be great if somebody built a distribution system for digital video signals, D-1 and D-2, integrated with analog distribution, and backed with a full ten-year warranty?

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Now there is a single-source supplier for D-1 or D-2 routing and distribution systems. The DVS-1 from Utah Scientific offers 10-Bit performance and maximum reliability in a wide variety of configurations to handle all of your Digital Video switching requirements, both composite and component.

Designed for flexibility, the DVS-1 can be supplied in a variety of sizes, all fully prewired for plug-in expansion to 32 inputs as your digital switching requirements increase.

The DVS-1 can operate as a stand-alone system or can be integrated into a new or existing analog switching system, using the industry's most comprehensive range of control panels and routing system accessories.

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SMPTE — Booth 1812

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SMPTE

UNIVERSE STAGE 1578
Lighting equipment.

USHIO AMERICA 1739
Lighting equipment.

UTAH SCIENTIFIC 1812
Audio and video routing switchers; digital video switching and distribution systems; machine control systems; MC switchers; station automation systems; color correction systems.

V

VEAM, DIV. LITTON SYSTEMS 1657
Cable, connectors.

VEGA, A MARK IV COMPANY 1038
*New:*R-33 miniature wireless receiver; PRO 2 true-diversity studio system; C-466C quad case.

Wireless microphones; intercoms.

VIDEO SERVICES UNLIMITED 1855
Camera support equipment.

VIDEO STORAGE CONCEPTS 1669
Tape storage systems.

VIDEOMEDIA 1653
New: V-Law Universal Control Network for RS-232 control of VTRs from PCs.

VTR editor/controllers, multisource video editors.

VIDEOTEK 1751
New: Prodigy production/post-pro switcher; VDP-8000 frame store/synchronizer.

Video test equipment; RS-103A Series video routing switchers; VSG-201, Times Six sync and pulse generators; video monitors.

VINTEN EQUIPMENT 1360
New: Tracking base system for film and video cameras; Vision ENG/EFP pneumatic pedestals; MK VIIA fluid cam pan/tilt head.

Camera support equipment; Microswift remote control camera system.

W

WAVEFRAME CORP. 1565
Digital audio workstations.

WIDE RANGE ELECTRONICS 1140
Tape degaussers; time code equipment.

WINSTED CORP. 1369
Tape storage systems; video furniture systems; equipment cabinets and racks.

Z

ZAXCOM VIDEO 1060
New: SDR400 TBC digital remote control for D-2; MTBC multiple TBC control system; EDL interface for TBC control system; DP800 Data Parrot GPI-to-RS-232/422 converter.

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M T E

The Sound Heard Round the World®

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It's a lot easier to be done than to be satisfied.

You've been there—locked in the battle between perfection and reality. There's always one more thing you'd like to try. And the last thing you need to worry about

is the tape. So choose ours. Because, in our products and service, 3M is committed to one goal: We won't be satisfied until you are.

3M

RADIO ENGINEERING

NUMBER TWO SPECIAL SECTION OCT. 1988

Harris Acquires Allied Broadcast

In a move which strengthens international equipment availability, Harris Corporation has acquired the radio equipment distribution business of privately held Allied Broadcast Equipment Corp.

Based in Richmond, IN, Allied is the largest U.S. full-line distributor of broadcast radio equipment. Allied will now operate as a new subsidiary and part of Harris Corp.'s Communications Sector, headed by senior vice president and sector executive Guy W. Numann.

Allied founder and CEO Roy Ridge will continue as head of the acquired business.

Harris and Allied sales forces have "co-operated" since April 1987 and while "overlapping representation" is expected to be eliminated, the acquisition will strengthen the established relationship, Harris said. Allied operates a network of field offices and has particular strength in the South American and emerging Chinese markets. Harris operates directly and is particularly strong in Third World countries.

Guy W. Numann, senior vice president of Harris Corporation (left) and Roy Ridge, president of Allied Broadcast Equipment Co., sign an agreement under which Harris will acquire Allied. "The acquisition of Allied demonstrates Harris's more than 66-year commitment to the radio industry," Numann said, adding the move helps Harris growth in the United States and worldwide.

Harris is currently a leading producer of radio and television broadcast transmitters; it will become a full-line supplier of studio and transmission equipment to the radio broadcast industry as a result of the acquisition.

Business coming with Allied will include the international distribution of radio broadcast products, the design and installation of radio broadcast systems and the provision of radio broadcast satellite equipment. Allied Telecommunications, which serves the custom audio/visual market, was not part of the acquisition.

NAB Will Make Test CD

The National Association of Broadcasters is readying a "high tech" test compact disc designed for radio. The project follows the Association's success with the benchmark NAB test record. Designed to enable station engineers to make equipment measurements formerly difficult or impossible without expensive signal processing equipment, the NAB test CD can be used with any good-quality CD player.

The disc will contain common test signals for measuring frequency response and harmonic and intermodulation distortion, as well as specialized broadcast test signals. These will include Bessel calibration tones (for FM deviation calibration), NRSC noise and reference signals, VU/PPM meter calibration signals, precise pilot frequencies, EBS/DTMF tones and preemphasis/deemphasis curve sweeps.

Currently in the mastering stage, the NAB test CD will be available late in 1988. For further information, contact the NAB at (202) 429-5391.

CONTENTS

In related news, Harris Corporation has agreed in principle to acquire GE Solid State from the General Electric Company.

Headquartered in Somerville, NJ, GE Solid State designs and fabricates semiconductor chips for automotive, military and industrial markets. Annual sales are around $550 million.

Contingent on generating a definitive agreement and government review, the GE business will become part of the Harris Semiconductor Sector, a worldwide operation based at Harris headquarters in Melbourne, FL.

Harris currently supplies standard, custom and semicustom integrated circuits for military and commercial markets. Annual sales are some $300 million. The acquisition is designed to complement existing Harris semiconductor business, according to Harris chairman and CEO John T. Hartley. It will also strengthen Harris' market position in analog, digital signal processing, data acquisition and OMOS logic.

The transaction is expected to be completed by the end of 1988. GE's Microelectronics Center, Research Triangle Park, NC, is not included in the proposal.

Chrysler and Ford Switch on AM Stereo

Despite AM stereo availability amounting to "the industry's best-kept secret," almost one-third of all new cars sold in the U.S. are equipped with AM stereo, according to new information from Motorola, Inc.

"Not only are new car customers surprised to find they have AM stereo equipped as standard in some cases, car dealers are often surprised it's an option, too," said Oscar Kusisto, a special Motorola consultant.

All 1989 model Chrysler radios will be stereo only and include the C-Quam AM stereo format, according to Kusisto. 1989 Fords will also offer C-Quam AM stereo as an option. Motorola currently estimates that over 15 million AM stereo-capable radios are in use worldwide, crediting American auto manufacturers offering the format as an option for the bulk of the penetration.

Some 760 stations worldwide currently broadcast in AM stereo.

NAB Radio Board Chairman Lowry Mays tunes in "Radio of the Future."

Back to the Future for NAB Radio

Despite a 24-hour launch delay attributed to "a glitch with the solder," the NAB unveiled its "radio receiver of the future" at the Radio '88 convention.

Termed "the ultimate radio", the unit was commissioned by the NAB, which invested some $50,000 in the project, and designed by audiophile tuner designer Richard Sequerra, Bayside, NY. The prototype receiver is part of a long-range project aimed at improving the quality of AM and FM broadcasting, according to NAB Radio Board chairman L. Lowry Mays of Clear Channel Communications (above), who demonstrated the unit with Sequerra and NAB executive vice president John Abel.

The radio—which was designed to be manufactured for around $50 and sell at retail for several hundred dollars—incorporates AM stereo, continuous tuning from AM to FM bands and an adjustable shielded loop antenna for AM reception, which reduces interference before it enters the receiver.

In addition, the receiver is digitally tuned and incorporates NRSC AM deemphasis, AM stereo, AM noise blanking and FMX noise reduction. An "intensity-modulated" tuning indicator controls the antenna.

The NAB hopes the prototype—a standard tabletop unit with detached speakers— triggers interest in making high-quality consumer receivers. The Association will work with manufacturers to develop them, Mays said. ■

Let Us Give You A Quote On Our Audio Switcher.

"When we designed our new 23,000 square-foot facility at KLBJ AM-FM, a primary goal was to maximize operational flexibility. So, we looked at the alternate ways to route audio signals. We compared features and specs, as well as costs.

"ITC's AUDIO SWITCHER turned out to be an easy choice. One reason is it's designed specifically for audio applications.

"With the AUDIO SWITCHER, we're wired to and from every satellite, network, studio, and workstation. We're even wired to the Program Director's office. And installation was easy.

"That was September '87. Since then? The AUDIO SWITCHER has worked out wonderfully, and staff reaction has been very, very positive. Changes are easy, and when we reconfigure something, we save both time and money. As far as our return on investment goes, it's been excellent."

—Bryan King,
Chief Engineer, KLBJ AM-FM

What more can we say?

If you'd like detailed information on how you, too, can easily and effectively route audio signals, call International Tapetronics, 3M Broadcasting and Related Products Department toll-free at 1-800-447-0414. In Alaska and Illinois, call collect, 309-828-1381.

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3M

Digital studio-to-transmitter links are a reality—but are they worth the trouble and expense?

DIGITAL STLS

BY SKIP PIZZI

Digital audio first entered the radio station—as it did all other audio systems—in the area of storage media. For the next decade or so, radio stations will use a mixture of analog and digital source material for recorded programming.

But as this transition progresses, storage media need not be the only realm digital audio inhabits within the radio station. Areas of a station's signal path can also benefit from digital audio's improvements. The trend of digital replacement will continue incrementally, always seeking out the weakest remaining analog link. For a station that has substantially digitized its source material, the next "squeaky wheel" may be its studio-to-transmitter link (STL).

A rack of T-1 hardware. The number and/or types of channels on the T-1 carrier can be reconfigured simply by changing cards in the racks at both ends of the circuit.

To date, several stations have implemented digital STL systems. They have found that the conversion is not as straightforward as replacing a turntable with a CD player.

Unlike an analog STL's "single-box" approach, current digital STLs consist of two stages—the digital audio processor, and the RF segment.

The digital audio processor performs two basic functions: analog-to-digital conversion of stereo audio, and output formatting into a standard form of signal suitable for modulation on a carrier. It is this output which is then fed to the appropriate input of a suitable transmitter. The process is reversed at the receive end, and the decoded analog audio finally fed to the broadcast transmitter.

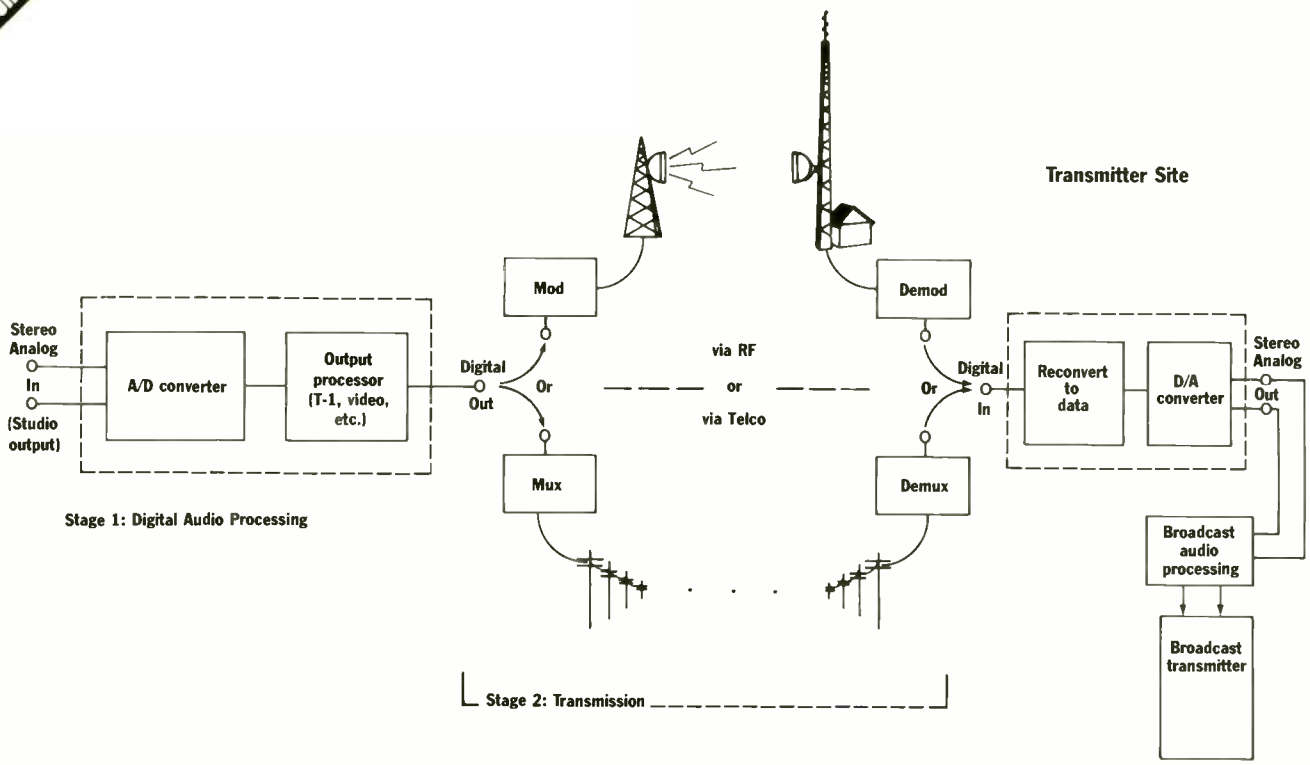
Currently available formats of the digital processor include the so-called "pseudovideo" systems, video subcarrier systems, and the "T-1" format.

A pseudovideo system converts two channels of analog audio into a single digital datastream, and then loads it into frames which are output as NTSC (or PAL) video signals. These signals can be recorded or routed around like normal video, independent of the digital processor.

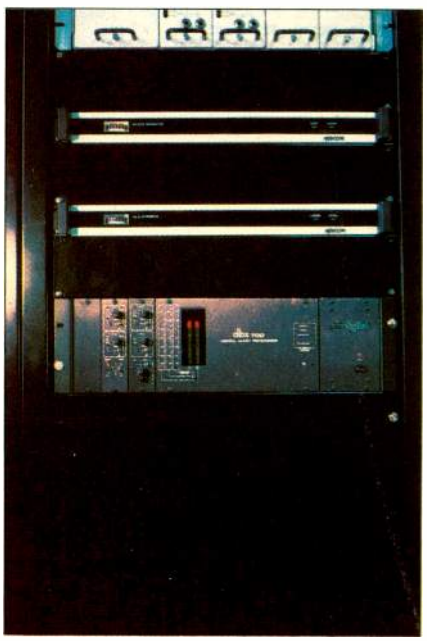
Among pseudovideo systems in popular use for STLs are two relatively inexpensive and mutually incompatible formats. The EIAJ system (or "F-1," as it is more widely known, after the model name of the first such product introduced by Sony in the early 1980s) uses a 14 or 16-bit PCM (pulse-code modulation)/44.1 kHz sampling rate (fs) method of digital encoding. The dbx Model 700 format uses 700 kHz sampled "companded predictive delta modulation" (CPDM).

Both systems output a standard monochrome video signal, which can be fed to any video input. A video channel can carry these signals to a corresponding video receiver, at which point they can be reconverted to analog audio by feeding the received video through another processor.

For radio stations that are affil-



Digital STL block diagram (above). Below, a 23 GHz duplex pseudovideo STL system at WJHU-FM, Baltimore. Shown here is the rack at the station end. From top, M/A-COM 23CC transmit, M/A-COM 23CC receive, and dbx Model 700 digital processor.



STLs iated with a television station and can share an STL, Graham-Patten Systems of Grass Valley, CA, makes a relatively inexpensive system, the VAMP-2, that encodes digital stereo audio onto a video subcarrier with a 1 MHz bandwidth, via DQPSK modulation. The manufacturer recommends use of the 6.0 MHz subcarrier, but this is not required. A 48 kHz sampled 16-bit linear PCM algorithm is employed, providing a quoted 87 dB dynamic range. If such a subcarrier space is available on an appropriate STL, this could provide a simple and quick way to digitize the link.

The T-1 system is a digital encoding protocol used primarily by telephone companies; it transmits data at a rate of 1.544 Mb/s. How this data stream is configured for audio is up to the user. It is normally a duplex system, so bidirectional transmissions are possible. A typical arrangement for an STL application could include two 15 kHz channels from station to transmitter, a 5 kHz return from transmitter to station (for RPU receive), a 5 kHz channel from station to transmitter (for feeding an SCA), and some bidirectional narrowband voice/data lines (for ENG communications or transmitter control) as well as other applications.

Various levels of digital resolution (8-bit nonlinear through 16-bit linear PCM) are also available, and although the higher levels take up more space on the T-1 carrier, they are recommended for all serious musical programming. For speech or heavily precompressed signals lacking wide dynamic range, lower levels may be acceptable, thereby increasing capacity on the line.

Any of the above systems can be used on telco loops. The pseudovideo uses a single video circuit for its stereo audio. Subcarriers on the video circuit can be used for auxiliary channels from the station to the transmitter. The VAMP-2 video subcarrier system can be implemented onto a wideband subcarrier on a telco video circuit as well.

T-1 service is ordered as such from telco (where available), and configured as necessary. Circuit path is at present usually wideband copper for intraLATA service, and often fiber optic for intercity hookups. A few locations may already use fiber optics for intraLATA as well.

Advantages of T-1 over the others are its bidirectionality, greater capacity, and its "soft" configuration. T-1 also exhibits less delay time through the system than the frame-buffer RAM of pseudovideo systems (about 30 ms), a delay which has been known to annoy on-air talent who are moni-

toring off-air while announcing. Disadvantages of T-1 are its slightly higher hardware costs and possibly steep telco installation charges. If some flexibility of configuration and duplex operation can be sacrificed, however, Graham-Patten's VAMP-3 will encode a single stereo pair with 48kHz/16-bit linear PCM onto a full T-1 carrier in one direction only, at modest price.

Telco rates for T-1 service are becoming competitive with standard audio line charges for the same number of individual lines. In fact, if bidirectional needs are high enough, T-1 interconnection may provide substantial savings. Reliability may not be any better than analog telco service, but audio quality will be greatly improved, and perhaps cost effectiveness as well.

Putting either pseudovideo or T-1 on an RF STL poses another set of problems. The RF channel bandwidth required is necessarily wide, 4 to 5 MHz minimum, using standard FM techniques. This obviously rules out the use of traditional aural STL frequencies with their narrower limits of a half-megahertz or less. The FCC is currently licensing such wideband STLs in the 18 and 23 GHz bands. Channel bandwidth here is typically 50 MHz.

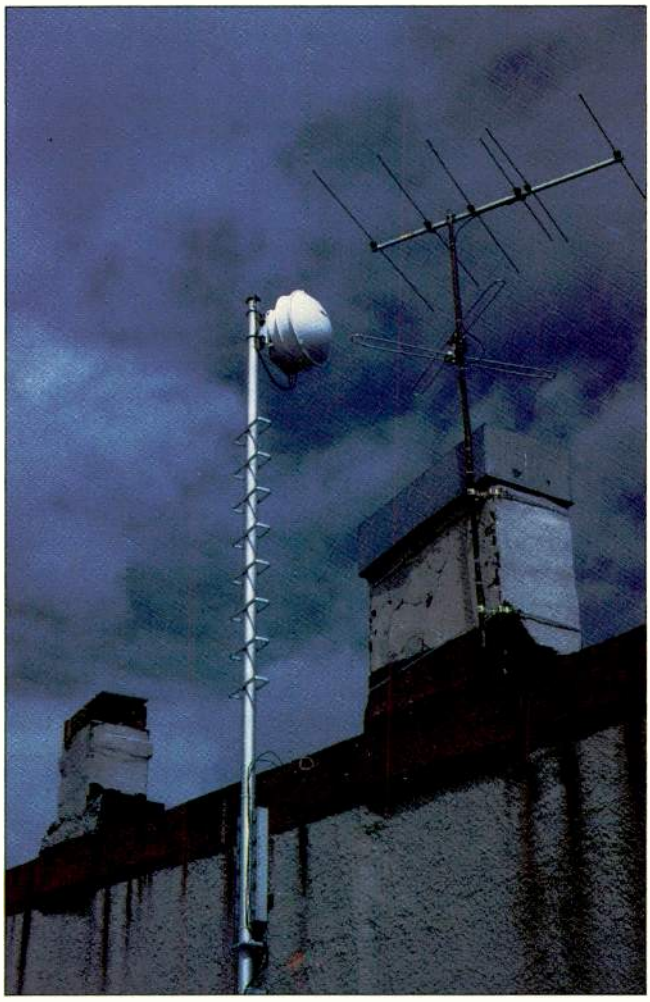
Operating at these frequencies presents a few advantages and several disadvantages. In some markets, the aural STL bands are fully occupied, so operating at 18 or 23 GHz is an advantage simply due to its availability. The narrower beam width of these microwave transmissions, compared to the 950 MHz aural STL band, for example, allows for less Fresnel effect, meaning that obstructions in the line-of-sight path will require less beam clearance. This provides greater flexibility in tower location and often allows lower antenna height.

On the downside, however, are the relatively high costs of 18 and 23 GHz hardware (although some moderately priced equipment is available in 23 GHz equipment), a practical path length limit of five to 10 miles, and susceptibility to outage during heavy rain. Countering the narrow beam width advantage mentioned above is the disadvantage of momentary outage from wind blowing the antenna out of beam alignment, just from normal broadcast tower flexing in a stiff breeze.

Finally, the high frequencies employed here require the transmit and receive RF stages to be placed up on the tower with the antennas; only a short piece of waveguide can be between these stages and the antennas. This requires a trip up the tower for any maintenance on these stages, and usually includes removal for repair to the bench, plus another trip back up to reinstall. This can be a real headache for those used to simple aural STLs, and can create unforeseen costs in the operation of such a system.

The 18 GHz band is even more wide open than 23 GHz, and a bit less susceptible to the rain-fade and distance problems, but so far, the relatively few equipment offerings here have been prohibitively priced for radio STL applications. Also, the FCC has mandated that emissions in this band all have a data efficiency of at least 1 bit/Hz, meaning that more exotic modulation techniques involving quadrature amplitude or quadrature phase schemes must be used; this will conspire to keep RF hardware costs for this band higher.

The problems of STL operation at these frequencies due to bandwidth requirements have been observed,



Station-end 23 GHz STL antenna at WJHU-FM, Baltimore, using M/A-COM two-foot dishes. Because of high-rises along line-of-sight path to preferred transmitter site, a 950 MHz STL here would have required substantially higher tower, which was prohibited by zoning laws. Narrower beam width of 23 GHz system allowed use of this lower tower.

STLS and solutions are emerging. Dolby Laboratories has proposed a system using bit-rate reduction techniques on a PCM-based encoding scheme, employing their knowledge of the masking properties of sound in the human hearing sense, and implementing only moderate error correction; the system is extremely efficient in the bandwidth requirements of its output due to its low data rate.

The Dolby system, the Model 500 series, can encode two 15 kHz audio channels plus a narrowband auxiliary channel into a 384 Kb/s data stream, with audio specs and sound roughly equivalent to the other systems. If an advanced modulation technique such as QPSK is employed in the RF section (1.7 bit/Hz), this system could occupy less than 250 kHz of RF bandwidth. A 10 kHz stereo (plus aux channel) version will also be available for AM STLs, requiring under 175 kHz. More exotic modulation schemes might make even narrower RF bandwidths possible.

These bandwidths would for the first time allow a digital STL system to be used in conventional aural STL bands, such as the 950 MHz band which is currently being licensed by the FCC in blocks of 25 kHz with a 500 kHz maximum. This kind of system would still be feasible even after the FCC's upcoming reduction of maximum channel bandwidth allotment to 300 kHz in 1990. FCC approval will most likely be required for these types of emissions in the 950 MHz band, in any case.

But as with all the other systems, the Dolby Model 500 is also only a digital processor, and a separate RF stage must be still be interfaced with it for a complete STL. Prices for both stages should be quite reasonable, though. The system is currently in development; Dolby is in discussion with other manufacturers regarding the RF segment.

The STL is a portion of the audio chain which is ripe for improvement, and a digital audio process may be the best method of doing so. It is a more complex and expensive function than its analog counterpart, and may require operation in much higher frequency bands or on coaxial or fiber optic cable links to obtain necessary bandwidths. Emerging technologies of data compression in purpose-built processors and the use of advanced modulation techniques may allow digital transmissions over more limited bandwidths, however, thereby easing the pain of transition somewhat. Greater audio channel capacity per RF block may also result. Stay tuned. ■

Thanks to Dick Kohles at WJHU-FM, Baltimore, MD, John Huntley at KCRW-FM, Santa Monica, CA, Bill Ruck at KFOG, San Francisco, Carl Gustaferro at M/A-COM, Tom Monahan at RF Specialties of Pennsylvania, Tim Prouty of Graham-Patten Systems, and Lou Fielder at Dolby Labs, for sharing their understanding and experiences with these systems.

Pizzi is BME's *contributing editor.*

Digital System	Processor[1] Cost	Audio Channels	RF Hardware Requirement	Occupied RF Bandwidth (FM)	RF Costs[5]	Telco Requirement[9]	Comments
dbx 700	$9000[2]	2	23 Ghz STL	4 to 10 Mhz	$12,000 +[6]	video ckt.	30 ms delay can bother announcers.
Sony F-1*	3500[2]	2	23 Ghz STL	4 to 10 Mhz	12,000 +[6]	video ckt.	30 ms delay can bother announcers.
Graham-Patten VAMP-2	5000	2	video STL subcarrier	1 Mhz	---[7]	subcarrier of video ckt.	Easy & cheap if video STL already in place. No delay.
Graham-Patten VAMP-3	5000	2	23 Ghz STL	5 Mhz	10,000 +[6]	T-1 ckt.	Cost effective, one-way T-1, no delay.
"Telco" T-1 rack	7 to 10,000	var.	23 Ghz STL	5 Mhz +	15,000 +[8]	T-1 ckt.	Bidirectional, easy expansion; no delay.
Dolby Model 500 Series	4000[3]	2 + 1 aux	950 Mhz STL	250 Khz or less[4]	10,000 or less	384 Kbls/s data ckt.	Spectrum efficient; can use aural STL.

*-Only current model available is Sony PCM-601ES; requires outboard interface for pro audio (+4 dBm/balanced) operation, included in price shown.

Practical digital audio STL systems and their approximate costs. 1.) Cost for both ends. Total system prices include encoder and decoder, but no spares. Some systems have differently priced hardware at each end. All prices approximate; 2.) Availability on these units is low at present; 3.) Tentative projected price. Availability date unknown; 4.) Using QPSK or other non-FM process; 5.) Total system cost for both ends, including typical antennas, but excluding installation and tower construction. Assumes single hop; 6.) Can include up to three 15 kHz analog audio subcarriers; 7.) Assuming video STL already exists, and 1.0 Mhz-wide subcarrier is available, no additional RF costs are incurred with this system. Subcarrier generator included in unit; 8.) Duplex STL required for full use of bidirectional T-1 system. Can be used one-way for approx. $10,000. Processor cost decrease somewhat for one-way operation as well; 9.) Corresponding costs vary. Check with your local telco for rates.

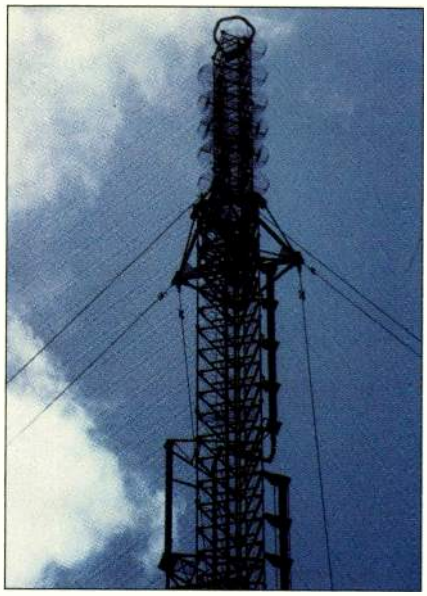
AN FM COMBINER THAT WORKS

FM combiner systems can make technical and economic sense in many markets, but only if properly implemented.

BY SKIP PIZZI

Multistation combined FM antennas have popped up at several places around the country, but none with the performance of the Gannett tower in Miami, FL. Here, nine Class-C FM stations' transmitters are combined into a single antenna system. As these systems go, this is large, although not the largest—an antenna in Houston has 12 stations combined—but it is unique in several respects, and defines the state-of-the-art in electrical performance of combined systems today.

The Gannett system, owned by Guy Gannett Broadcasting Co., which also owns one of the stations on the combiner, WZTA, excels in the areas of RF baseband response (flat for each station to +200 kHz from center frequency) and group delay (›50 ns for each station to +150 kHz from center frequency). The antenna is a broadband unit for the entire FM spectrum, so the system can accommodate any FM station on the dial. In fact, the system is full to power capacity at the moment, but there is a waiting list to get on this antenna, according to Guy Gannett's director of engineering, Richard L. Edwards.



Close-up view of top of tower, showing directional FM at top and three UHF-TVs below.

The antenna is directional, another feature unique to combined systems, so nine FMs share essentially the same desirable pattern, contoured to the market's population.

"There's no sense sending out signal to the alligators in the west and the sharks in the east," says Edwards of the "modified peanut" pattern. The directional antenna permits the stations to use transmitters about five-eighths the power they would have needed in an equivalent omnidirectional installation. It provides a gain factor of about five in the main lobes. The stations are putting about 20 kW TPO each into the combiner, meaning about 180 kW of wideband RF is being sent to the antenna.

All but one of the stations purchased new transmitters when they moved to the new site, which first went on-line in January 1985. Construction had begun less than 12 months earlier, an extraordinary feat considering the tower's 1049-foot height, 12-foot triangular face, three-million pound weight, 100-pound windload tolerance and 22,500-pound FM antenna weight, all superlatives in their class. The tower now includes three TVs and numerous two-way, paging and other industrial users.

But the FM combiner system is the crown jewel of the installation. Shively Labs of Bridgeton, ME, designed and built the system, to the very strict tolerances Gannett specified, due in part to their earlier experiences with combiners. Rick Edwards recalls of WZTA's former site atop a highrise in downtown Miami, "We had one of the first [combiner systems] ever done, and it stunk so bad that I swore that I was never going to do it again. But if you have a bad experience, you learn." And learn they did.

Several manufacturers refused to bid on the combiner project because its specs were so demanding. "Some told us we were dreaming," remembers Edwards. Shively's eventual product met or bettered most of the specs.

The advantages provided by these stringent requirements are many. The wide RF baseband allows each station to utilize the current and future possibilities of the FM band to their fullest, so the system is not likely to become obsolete soon. This

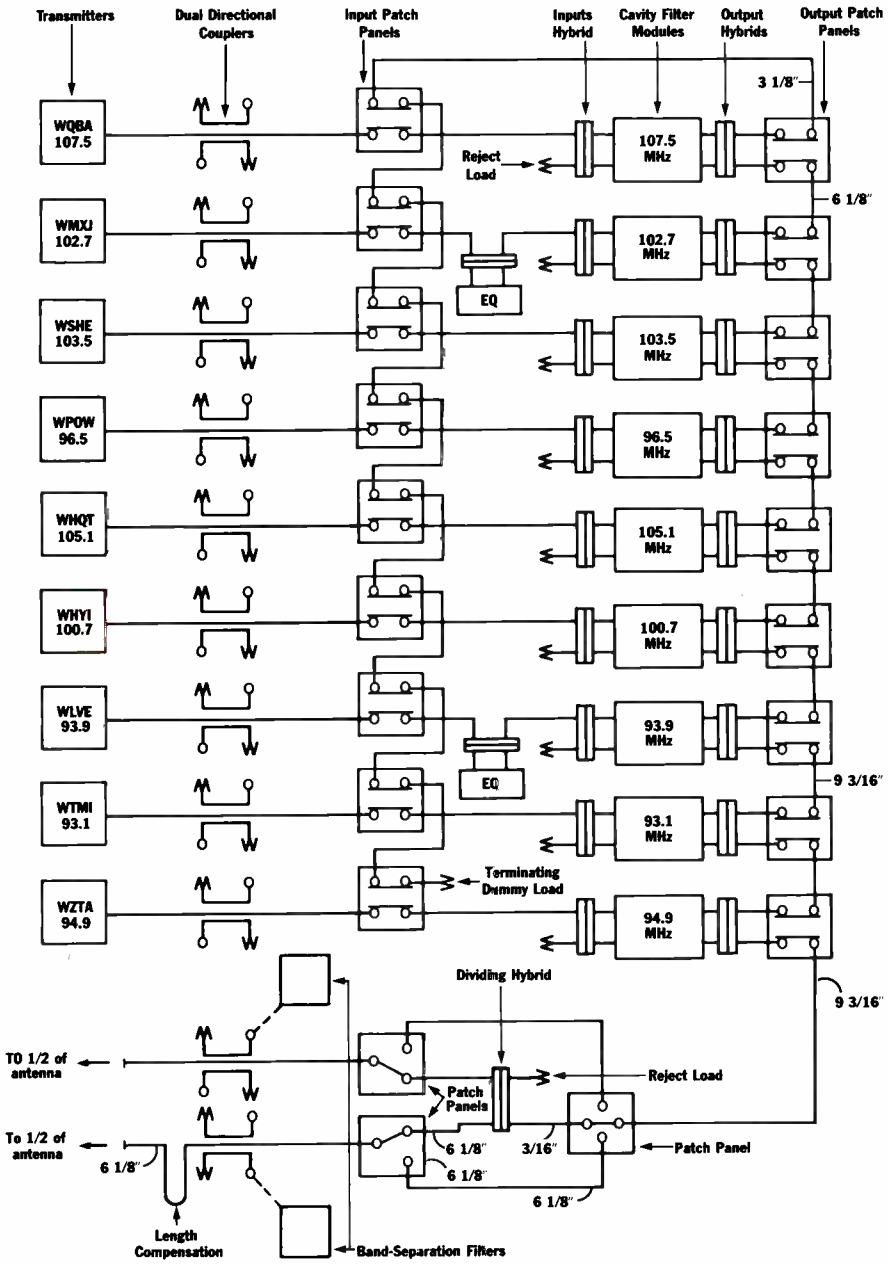
flatness (+0.5 dB), plus excellent group delay characteristics and low reflected power levels for all stations on the system, guarantee high efficiency, low noise, excellent stereo separation (up to 53 dB has been measured—the limit of the test equipment used) and low SCA crosstalk for everyone, as well as keeping source-induced multipath quite low. In fact, this multistation installation outperforms many single-station transmission systems in these respects. The transmitters, not the combiner/transmission line/antenna, are the limiting factors.

To complicate matters, there are two 0.8 MHz-spaced station pairs on this system, the closest spacing allowed between FMs in the same market. Providing symmetrical bandpass and group delay while maintaining isolation between these stations created an additional challenge to the design.

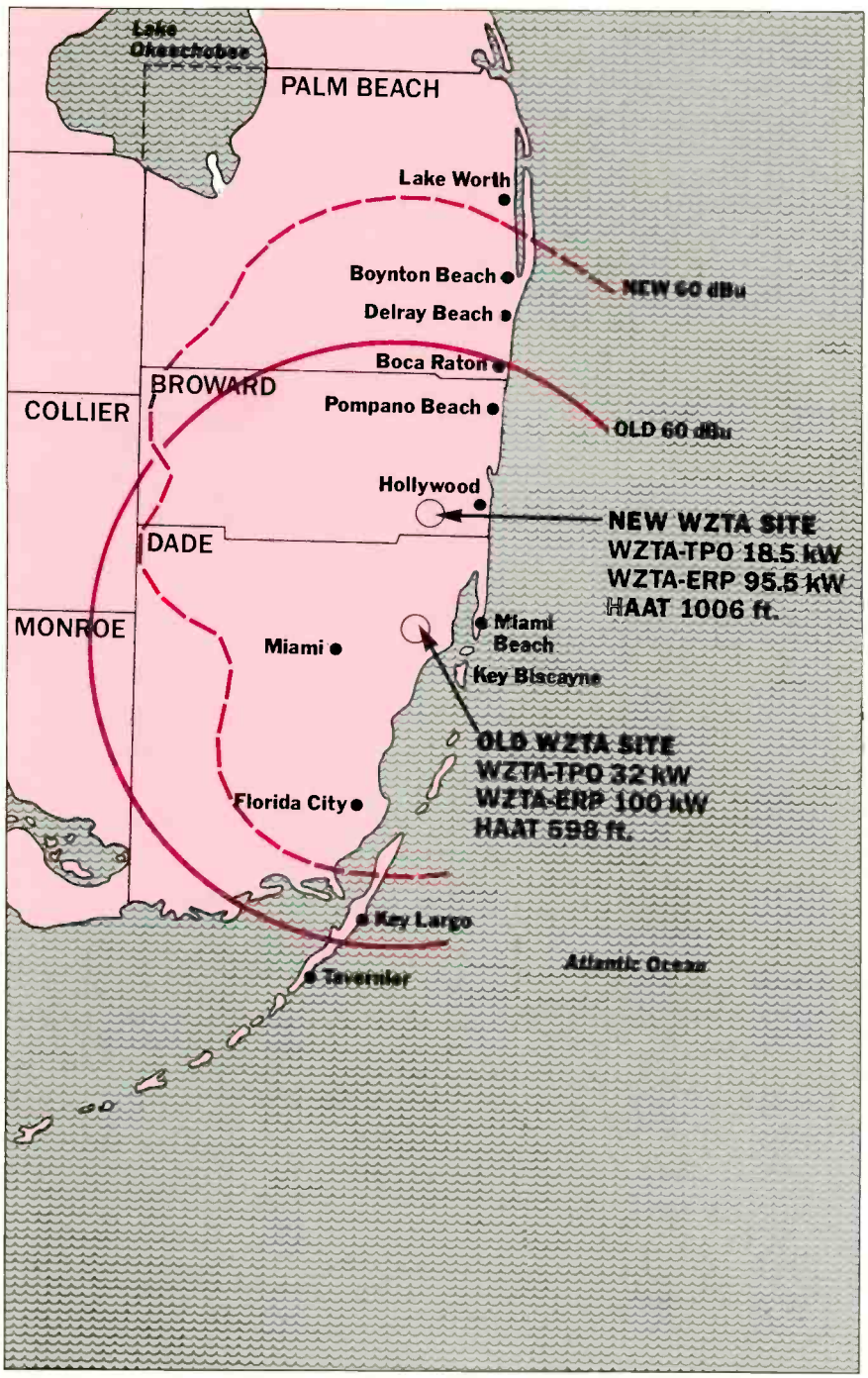
The primary design difference between this combiner and most others is the use of exclusively bandpass rather than bandreject ("notch") filters. Previously, to achieve sufficient isolation, notch filters were always used. Bob Surette, manager of RF engineering for Shively Labs, and one of the designers of this system, cites a computer modeling approach of optimization as the breakthrough here, to provide the best compromise between frequency response, VSWR, insertion loss and group delay, while still maintaining excellent isolation and spurious emission rejection.

"Up until this combiner system," recalls Surette, "no one had even measured group delay." Since the results with this system have become known, "the industry is now heading for all-bandpass filter combiners," he claims.

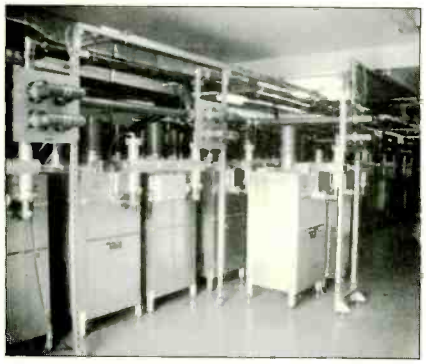
The combiner's output is split in two and fed to two separate halves of the Harris panel antenna. If either half should fail, patch configurations can be changed, and all stations can operate at half-power through the remaining half of the antenna. Any further redundancy (standby transmitter, backup power, etc.) is the responsibility of the individual stations, although Gannett Tower Co. (a subsidiary of Guy Gannett Broadcast-



A block diagram of the combiner system showing the dual-directional couplers used for direct and reflected power monitoring, RF patching for redundant pathways, hybrids and filters for combining outputs in cascade fashion with minimal interaction, and "equalization" (really group delay compensation) for "predistorting" the upstream member of 0.8 MHz-spaced station pairs such that combined output will provide symmetrical group delay on both stations. Note also varying coax diameters as combined power level increases and finally splits to the two antenna halves, band-separation filters for monitoring individual stations' powers after combining, and length compensation for quadrature shifting caused by the final dividing hybrid.



WZTA's 60 dBu contours from its old and new antenna sites. All stations on the new antenna share essentially the same pattern. WZTA covers about 5.5 percent more area using almost 40 percent less transmitter power than at its former site. Multipath is also greatly reduced for most reception areas.



The Shively FM combiner. Large aluminum boxes are the cavity filters. RF patch panels above are for emergency routing around individual sections of the combiner. Red cylinders atop filters are protective "no-tweak" covers on filter tuning inductors. Small gray box left of center is a reject load for balancing input hybrid, handling about 7 W.

ing) does provide 24-hour security service, using only FCC-licensed staff, trained in emergency transmitter measures.

Dealing with over a dozen STLs all converging on the site was another challenge, but Edwards credits good cooperative measures by all the stations involved in keeping any major difficulties at bay. "We're doing something right," claims Edwards, "because since we've been operating from this site, no one has experienced any major downtime."

The system makes economic sense, too. Gannett Tower owns the site, and leases tower space to the participating stations in a traditional fashion. Each station that joined the combiner bought and paid for its combiner section and its transmitter space and improvements. Each station is responsible for its own utilities.

But since the participating stations did not have to finance a tower construction project, and didn't have to buy an antenna (directional, no less!), the cost to each station was rather favorable, especially with the number of stations involved. The increase in coverage and reduction in the multipath created by the ever-increasing number of downtown highrises are the real benefits of such a move. Increased revenues to Guy Gannett Broadcasting from tower rental are an economic fringe benefit as well, helping to defray the original cost of the site and tower construction.

Edwards sees this approach as the wave of the future. In addition to the often overwhelming regulatory obstacles to erecting a tower, especially in a

non-highrise area, Edwards also cites such a system's efficient use of land, airspace and broadcast equipment.

"The only negative I can possibly think of," says Edwards, "is from strictly a marketing standpoint of the individual stations. If everybody's on an even keel, it doesn't give anybody a technical advantage."

Bob Surette of Shively Labs credits Edwards with getting the project accomplished. "Rick was the spearhead behind it," he says, without which such a large system might still be mired in bureaucratic, financial and technical delays. For these reasons, Surette sees smaller systems of two to four station combiners as a more likely developing trend.

Meanwhile, Edwards and his staff at Gannett aren't resting on their laurels. Their AM station (WINZ) has a problem with Cuban interference, and Edwards wants to try synchronous AM broadcasting to counter it. So far, the FCC has thwarted his testing attempts, but he hasn't given up yet. It's a safe bet that we'll be hearing of more pioneering from these can-do broadcasters in Southeastern Florida. ■

Pizzi is BME's contributing editor.

			BASEBAND FREQ. RESPONSE (dB)						GROUP DELAY (NS)	
			+	−	+	−	+	−		
FREQ. (MHz)	VSWR	INSERTION LOSS (dB)	55	55	100	100	200	200	−150	+150
			Khz FROM fc						Khz FROM fc	
94.9	< 1.1 ± 400khz	.31	0	.02	.02	.03	.2	.2	(−)50	(+)40
93.1	< 1.1 ± 300khz	.35	0	.02	.01	.03	.08	.10	(−)35	(+)50
93.9	< 1.1 ± 150khz	.65	.02	.03	.1	.1	.2	.5	(−)50	(+)35
100.7	< 1.1 ± 300khz	.38	0	.01	.02	.03	.18	.17	(−)30	(+)40
105.1	< 1.1 ± 400khz	.39	0	.02	.01	.04	.16	.28	(−)40	(+)30

Measurements taken just after sign-on with original five stations on combiner showed these excellent results.

ERP's Up!

By Rob Yaw

When the time comes to design a new FM facility or to modify an existing one, the broadcast engineer is faced with the job of selecting the transmitter, antenna, transmission line and all of the other components associated with a project of this kind.

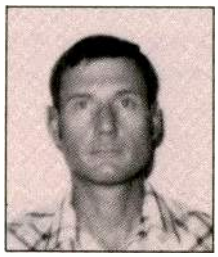
One of the first decisions that must be made when designing a transmitting facility is what the desired ERP should be. Once this has been decided, there are any number of transmitter, antenna and transmission line combinations that will achieve the desired results. The ERP.BAS program is designed to help the engineer perform the necessary mathematical calculations and to make it easy for him to consider several different combinations of transmitter power and antenna gain. The program should save about half the time it would take to punch it out on a calculator.

Lines 10 to 70 print a simple explanation of what the program will do. Line 80 offers the user his choice of either an antenna incorporating beamtilt or one without. Line 110 or 120 then transfers control to the appropriate section of the program.

If, for example, an antenna with beamtilt is selected at line 80, line 110 sends the program to line 130 which is the beginning of the parameter input statements. Lines 130 to 210 then input the main lobe ERP, the main lobe antenna power gain, the horizontal antenna power gain, the transmission line loss and the transmission line length.

Calculations for the beamtilt antenna begin with line 230 which divides the maximum ERP by the maximum antenna power gain to give the power delivered to the antenna.

Line 240 calculates the efficiency of the transmission line by first calculating the loss of the chosen length of line in dB and using this figure in the mathematical relation: Efficiency = $\log^{-1}$ dB Loss / 10. Line 250 calculates the transmitter power output by dividing the power delivered to the antenna by the efficiency of the transmission line. Line 260 calculates the horizontal ERP by multiplying the power delivered to the antenna by the horizontal power gain of the antenna. Line 270 calculates the power dissipated within the transmission line by subtracting the power delivered to the antenna from the transmitter power output.



Lines 280 to 460 print the results of the calculations. Then line 520 lets the user select between doing another set of calculations or leaving the program. If the user elects to do another set of calculations, line 560 gives him the second option of either repeating the calculations for an antenna with beamtilt or doing the calculations for an antenna without.

If at line 80, the user selects an antenna without beamtilt, line 120 sends the program to line

Yaw is the chief engineer for North Montana Broadcasters, Inc., Havre, MT.

```
Ok
RUN
This program is designed to assist in the power calculations as required in
the FM section of FCC form 301.  After inputting the desired ERP, transmission
line loss, and transmission line length, the program will calculate the
horizontal component of ERP, transmission line loss, and transmitter power
output necessary to achieve the desired ERP with the chosen antenna.

Select:  1) Antenna with beamtilt  2)  Antenna without beamtilt? 1

Enter the maximum (main lobe) ERP in kW? 100

Enter the main lobe antenna power gain in dB? 5.54

Enter the horizontal antenna power gain in dB? 5.3

Enter the transmission line loss in dB/100'? .14

Enter the transmission line length in feet? 120
```

Figure 1: *demo screen for ERP.BAS.*

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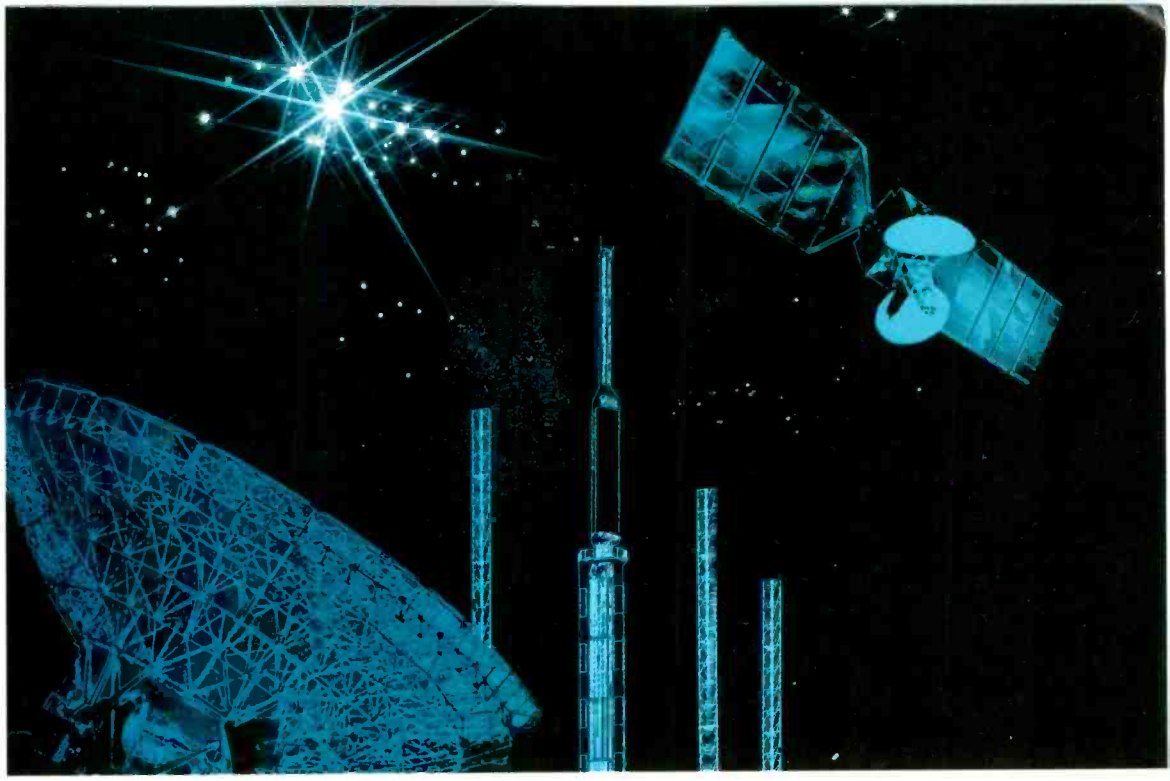

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610. Lines 610 to 670 are the parameter input statements for the antenna without beamtilt. In this case, the horizontal antenna gain and the horizontal ERP are also the maximum values.

Lines 710 to 740 are the calculations for the antenna without beamtilt. They are the same as the calculations for the antenna with beamtilt except that in this case the horizontal ERP is also the maximum ERP.

Lines 750 to 860 print the results of the calculations. Line 920 lets the user select between doing another set of calculations or leaving the program. If the user elects to do another set of calculations, line 960 gives him the second option of either repeating the calculations for an antenna without beamtilt or doing the calculations for an antenna with beamtilt.

In addition to providing the engineer with a method of quickly analyzing different combinations of transmitters and antennas, the program is also useful in preparing FCC Form 301, "Application for Construction Permit."

FCC Form 301, Section V-B, page 2, item 9(a) requests the ERP in the horizontal plane. This is what was calculated in line 260 of the program. Item 9(b) of the same section requests the ERP in the main lobe (plane of the beamtilt) of the antenna radiation pattern. This is the maximum ERP which was the starting point of the program.

All the information required by the program is information that should be readily available from manufacturers of transmitters, antennas and transmission lines. Remember, when supplying the antenna gain figures, the program requires the antenna gain to be the power gain, not the dB gain. Also, the transmission line is in dB/100 feet of line, which is a very common way of expressing line loss.

This program was written on an AT&T 6300 computer using GW BASIC. Since the computer is an IBM compatible, the program can easily be modified to fit other versions. ■

```
10 PRINT "This program is designed to assist in the power calculations as requir
ed in"
20 PRINT "the FM section of FCC form 301.  After inputting the desired ERP, tran
smission"
30 PRINT "line loss, and transmission line length, the program will calculate th
e"
40 PRINT "horizontal component of ERP, transmission line loss, and transmitter p
ower"
50 PRINT "output necessary to achieve the desired ERP with the chosen antenna."
60 PRINT
70 PRINT
80 INPUT "Select:  1) Antenna with beamtilt  2)  Antenna without beamtilt";X
90 PRINT
100 PRINT
110 IF X = 1 THEN 130
120 IF X = 2 THEN 610
130 INPUT "Enter the maximum (main lobe) ERP in kW";PM
140 PRINT
150 INPUT "Enter the main lobe antenna power gain in dB";A1
160 PRINT
170 INPUT "Enter the horizontal antenna power gain in dB";A2
180 PRINT
190 INPUT "Enter the transmission line loss in dB/100'";Z
200 PRINT
210 INPUT "Enter the transmission line length in feet";L
220 PRINT
230 PA = PM/A1
240 E = 10^((-2*(L/100))/10)
250 TPO = PA/E
260 HERP = PA*A2
270 PLOSS = TPO-PA
280 CLS
290 PRINT
300 PRINT
310 PRINT
320 PRINT USING "Antenna Main Lobe Power Gain                    ##.## dB";A1
330 PRINT
340 PRINT USING "Antenna Horizontal Power Gain                   ##.## dB";A2
350 PRINT
360 PRINT USING "Transmitter Power Output                       ###.## kW";TPO
370 PRINT
380 PRINT USING "Transmission Line Length                      #####.## ft";L
390 PRINT
400 PRINT USING "Power Input To Antenna                         ###.## kW";PA
410 PRINT
420 PRINT USING "Power Dissipation Within Transmission Line      ##.## kW";PLOS
S
430 PRINT
440 PRINT USING "Maximum (Main Lobe) ERP                        ###.## kW";PM
450 PRINT
460 PRINT USING "Horizontal ERP                                 ###.## kW";HERP
470 PRINT
480 PRINT
490 PRINT
500 PRINT
510 PRINT
520 INPUT "Select:  1) Do another calculation  2) Quit";X
530 PRINT
540 PRINT
550 IF X = 1 THEN 560 ELSE END
560 INPUT "Select:  1) Antenna with beamtilt  2) Antenna without beamtilt";C
570 PRINT
580 PRINT
590 IF C = 1 THEN 130
600 IF C = 2 THEN 610
610 INPUT "Enter ERP in kW";P
620 PRINT
630 INPUT "Enter antenna power gain in dB";A
640 PRINT
650 INPUT "Enter transmission line loss in dB/100'";Z
660 PRINT
670 INPUT "Enter transmission line length in feet";L
680 PRINT
690 PRINT
700 PRINT
710 PA = P/A
720 E = 10^((-2*(L/100))/10)
730 TPO = PA/E
740 PLOSS = TPO-PA
750 CLS
760 PRINT USING "Antenna Power Gain                              ##.## dB";A
770 PRINT
780 PRINT USING "Transmitter Power Output                       ###.## kW";TPO
790 PRINT
800 PRINT USING "Transmission Line Length                      #####.## ft";L
810 PRINT
820 PRINT USING "Power Input to Antenna                         ###.## kW";PA
830 PRINT
840 PRINT USING "Power Dissipation Within Transmission Line      ##.## kW";PLOS
S
850 PRINT
860 PRINT USING "ERP                                            ###.## kw";P
870 PRINT
880 PRINT
890 PRINT
900 PRINT
910 PRINT
920 INPUT "Select:  1) Do another calculation  2) Quit";X
930 PRINT
940 PRINT
950 IF X = 1 THEN 960 ELSE END
960 INPUT "Select:  1) Antenna with beamtilt  2)  Antenna without beamtilt";Y
970 IF Y = 1 THEN 130
980 IF Y = 2 THEN 610
```

***Figure 2:** program listing for ERP.BAS, a radiated power calculation program.*

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FCC Protection: How Far Does It Go?

By Harry Cole

The Commission's continuing efforts to improve the lot of existing radio broadcasters have continued unabated over the last several months. In July, the FCC announced it was beginning consideration of two sets of proposals—one for FM and one for AM—which would, if adopted, enable stations to improve service significantly. The Commission also announced an unrelated action, the commencement of an investigation into allegations that a particular individual, possibly acting in cooperation with friends or family members, is guilty of filing applications for the purpose of seeking settlements rather than for acquiring broadcast licenses. Taken together, these actions demonstrate how much the FCC is able and willing to do to protect the interests of the broadcast industry.

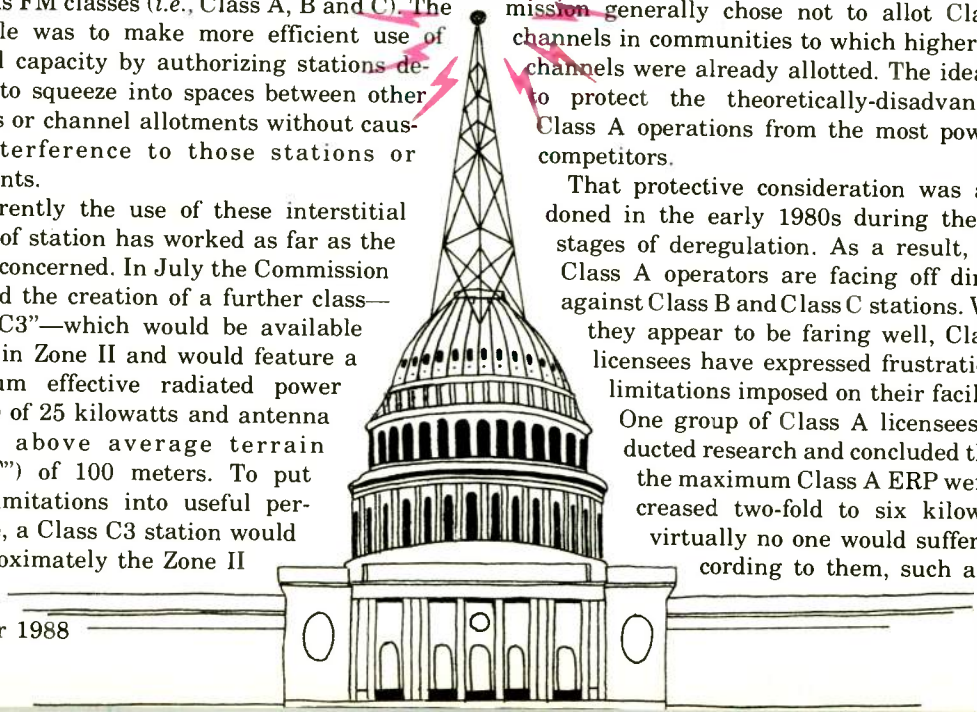
On the FM side, the Commission has proposed another step aimed at making the channel allotment scheme more flexible. Previous steps included the initial overhaul of the FM channel allotment system undertaken in Docket No. 80-90, which created three new classes of FM channel—Class C1, C2 and B1—to supplement the three previous FM classes (*i.e.*, Class A, B and C). The rationale was to make more efficient use of channel capacity by authorizing stations designed to squeeze into spaces between other stations or channel allotments without causing interference to those stations or allotments.

Apparently the use of these interstitial classes of station has worked as far as the FCC is concerned. In July the Commission proposed the creation of a further class—"Class C3"—which would be available for use in Zone II and would feature a maximum effective radiated power ("ERP") of 25 kilowatts and antenna height above average terrain ("HAAT") of 100 meters. To put these limitations into useful perspective, a Class C3 station would be approximately the Zone II equivalent of a Class B1 station (Class B and B1 stations are available only in Zones I and I-A). A Class C3 station would thus fit snugly between Class A stations (presently limited to three kilowatts ERP at 100 meters HAAT) and Class C2 stations, with ERP between 3.1-50 kilowatts and HAAT of no more than 150 meters. Zone II represents most of the continental U.S. except several north-central to eastern states and most of California.

At the same time the Commission also announced it is considering increasing the maximum ERP available to Class A stations. As indicated above, Class A stations enjoy the lowest ERP/HAAT specifications of all commercial FM stations. While Class A channels can be allotted anywhere in the country (*i.e.*, irrespective of the FCC's geographic zones), those channels were historically "protected" by the FCC's policy against "intermixture". That is, for about the first 20 years of FM regulation, the Commission generally chose not to allot Class A channels in communities to which higher class channels were already allotted. The idea was to protect the theoretically-disadvantaged Class A operations from the most powerful competitors.

Cole is partner in Bechtel, Borsari, Cole & Paxson, a Washington, DC-based law firm.

That protective consideration was abandoned in the early 1980s during the first stages of deregulation. As a result, more Class A operators are facing off directly against Class B and Class C stations. While they appear to be faring well, Class A licensees have expressed frustration at limitations imposed on their facilities. One group of Class A licensees conducted research and concluded that if the maximum Class A ERP were increased two-fold to six kilowatts, virtually no one would suffer. According to them, such an in-



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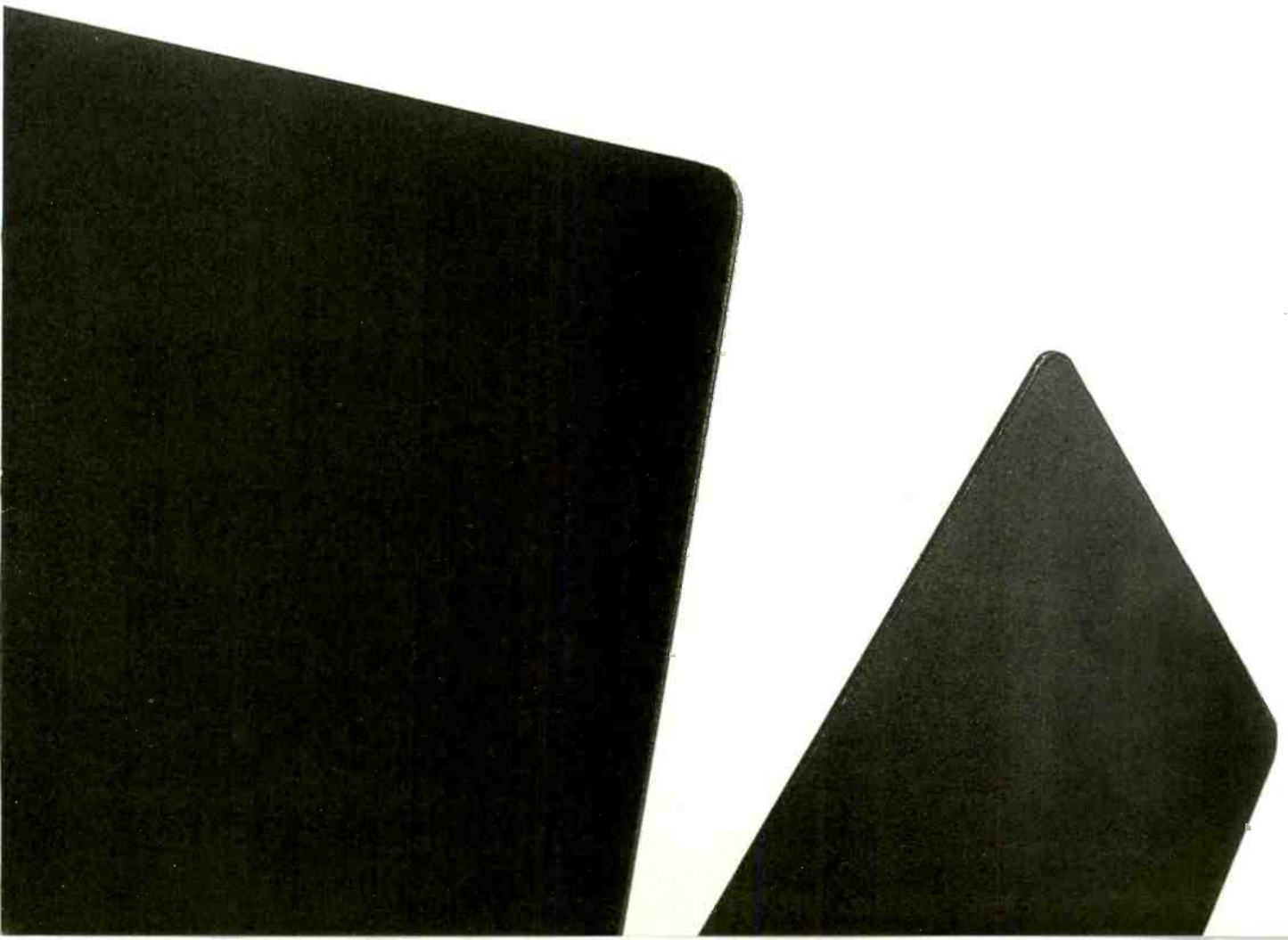

crease would not cause any significant objectionable interference as defined by the Commission's protection standards to adjacent channel stations, including Class B and Class C stations. Thus, these Class A licensees filed a petition for rulemaking and lobbied hard in support.

After an extended struggle with the Commission's staff and other industry forces reluctant to cede additional power to Class A stations, the Class A'ers appear on their way to victory. (See "Radio News", September BME, p.65.) While the Commission intends to consider comments, it is extremely likely the FCC will adopt this proposal.

Summing up, these two FM proposals are clearly aimed at the more than 2000 Class A stations across the country. If the proposals are adopted, such stations can look forward to significant increases in their facilities: at least a doubling of ERP, and possibly as much as an eight-fold increase. This will obviously help to bring a greater level of parity to the commercial FM industry, where relatively lightweight three kilowatt Class A stations now have to compete with relatively heavyweight 100 kilowatt Class C stations. While such a change will likely make everyone's competitive road a little rougher, it will at least tend to smooth out the playing field and ideally lead to more efficient use of the FM band.

On the AM side, the Commission has advanced two proposals aimed at improving the quality and coverage of AM stations. The first involves an attempt to reduce adjacent channel interference (NRSC 1); the second is a modification of acceptance criteria which would in turn permit stations to improve coverage (NRSC 2 or "RF Mask"). (See "NRSC Update:" **BME**, 9/88.)

With respect to adjacent channel interference, the FCC has offered at least two possible approaches. Implementing the NRSC standard would limit a station's maximum audio frequency to about 10 kHz and limit the amount of audio pre-emphasis, or "boost", which a licensee could use to brighten its sound. Since such pre-emphasis can aggravate adjacent channel interference, a Commission-imposed limitation would, theoretically, help reduce such interference. However, the ultimate effectiveness of this approach would be significantly determined by a variety of transmission system performance factors. In other words, while the NRSC standard might look good on paper, its actual usefulness in the real world would depend on factors which might be difficult to control without detailed regulation aimed at assuring appropriate transmission system performance.

Either approach is likely to involve the Commission in a greater degree of regulation ("micromanagement") of AM operations.

An alternate approach suggested by the Commission is an RF emission limitation which would take into account all factors which would cause interference. This approach would be difficult for the Commission to administer on a day-to-day basis because compliance would be determined by a variety of variables, a process which would likely be cumbersome at best.

The interesting, and somewhat discouraging, aspect of the FCC's initiative here is that either approach is likely to involve the Commission in a greater degree of regulation (or, in the *mot du jour*, "micromanagement") of AM operations. For the last eight years the Commission has been trying with some success to get out of that role. It is perhaps a measure of the difficulties presented by the state of AM broadcasting that the Commission is considering re-entry into the regulatory role.

Finally, the Commission has launched an investigation into allegations that a particular individual has abused the Commission's processes, mainly by filing applications which were essentially fradulent. From the information the FCC has gathered thus far, it appears that the individual may have filed applications for new broadcast stations solely for the purpose of reaching settlement agreements, rather than for the purpose of obtaining construction permits. The Commission as well as Congress expects that an applicant is, in fact, attempting to acquire that for which it has applied. If you file an application without intending to fight for the permit and to build the facilities if the application is granted, you are technically subject to criminal prosecution, with a potential fine of up to $10,000 and five years imprisonment for each violation.

Of course, most broadcast applicants caught in comparative proceedings occasionally become convinced that their opponents may not be prosecuting their applications in good faith. But those feelings are more often the result of the strains of the competitive comparative process. There is seldom enough evidence available to warrant bringing formal charges, and the Commission evinces interest if charges are raised even more seldom. Thus the FCC's own decision—taken on the FCC's own motion—to proceed in this case demonstrates serious concern on the Commission's part.

The items above are not likely to yield short-term results, but they are nevertheless significant right now. The Commission is clearly interested in advancing the interests of the existing broadcast industry—by giving existing Class A FM licensees opportunities to upgrade, by continuing its search for ways to help the AM industry, and by making a public example of an alleged abuser of the Commission's processes. It remains to be seen what other steps the Commission may be willing to take. ■

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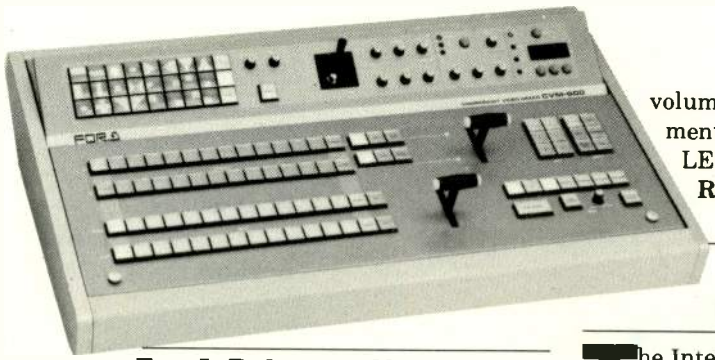
EQUIPMENT

For-A's Latest Switcher... Wireless Mics from Telex...Intelco Power Meters...Jensen Transformers... And More New Products



For-A Releases New Compact Switcher

The CVM-600 compact component video switcher has 12 inputs and both black and color background for effective editing. Transcoding for each component input and output is fully independent, and either RGB or Y/PR/PB can be set at each interface, with scaled Y/PR/PB component signals processed internally. Systems options for the CVM-600 include the EXKEY chroma keyer and the EXTROL effects memory.
Reader Service #201

Telex Introduces Thrifty Wireless Mics

The new Telex FMR-25 series oflow-priced wireless microphone systems operate in the 165 to 185 MHz high band frequency range and have special IF filters, allowing simultaneous multiple systems operation from one location without interference. The two receivers offered in the series, the single-antenna FMR-25 and the true diversity FMR-25TD, are both half the size of the Telex FMR-50, have removable antennas to facilitate rack mounting, and such monitor and function controls as a carrier indicator LED, a power on LED, and a peak reading volume indicator with segmented LED color bar.
Reader Service #201

Intelco Has New Optical Power Meter

The Intelco 141 optical power meter can both read and record in memory the maximum, minimum and long-term average optical power simultaneously with the current power reading. With autoranging measurements over the range of + 5 to more than -70 dBm via a large area InGaAs detector, the unit can perform optical power monitoring and testing of all fiber types and sizes, and provides a resolution of .01 dB and an accuracy of .2 dB.
Reader Service #203

Jensen's New Output Transformer Bows Low

The latest addition to Jensen's "M" series, the JE-11-EMCF, is a small-size, super-low distortion 80 percent-nickel-core output transformer. It can handle + 18 dBm at 20 Hz (+ 24 dBu at 40 Hz), and the 80 percent nickel bifilar design performs with a wide range of source impedances.
Reader Service #204

Optical Disk Sound Library From N.E. Digital

New England Digital has announced an optical disk-based sound effects library, developed in conjunction with Sound Ideas, Inc.

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of Toronto. It is designed to take advantage of New England Digital's proprietary optical disk storage and retrieval system. The effects, created from digitally recorded and sampled source material, consist of those most frequently used in post-production, sweetening and music applications.
Reader Service #205

Nakamichi Offers Low-Cost High-Def Tuner Amp

The TA-1A is a 35 W/channel entry-level AM/FM stereo receiver that features discrete output circuitry, for high peak-current capability and quality sound at a lower price. It has Nakamichi-style controls, a defeatable loudness contour and a third line-level input to switch the audio feed from a video source. The preamp regulator uses the isolated-ground topology, and low-noise operational amps. Suggested retail price is $329.
Reader Service #206

Kay Unveils T-Series Rotary Phase Converter

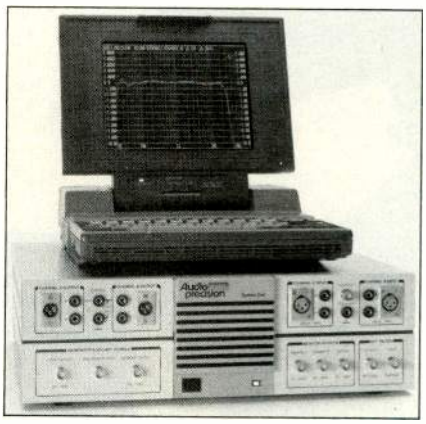
Engineered for both AM and FM radio and TV transmitters, the T-series Phasemaster features a load range control to match the converter output to actual transmitter load. It converts an existing single-phase supply to an output virtually identical to three-phase service, making it a cost-effective alternative to utility three-phase. In addition, the Phasemaster provides immediate power availability, improved line voltage stability, and short-term ride-through during voltage dips.
Reader Service #207

Crosspoint Latch Introduces S-VHS Switcher

Operating in both composite and Y/C (Super VHS) modes, the 6119YC has six inputs, three buses, two levels of keying with key invert on DSK, and a GPI interface standard. This Super VHS version of the 6119 switcher features 12 wipe patterns, a joystick positioner, and a two-fader handle design permitting dissolves to a split-screen or fade to black from a split screen with a key. Other features include an internal sync generator, four black burst outputs, and the unique test mode. Price is $5995.
Reader Service #208

Audio Precision's System One Now Interfaceable

The RS-232 is the new interface version of the Audio Precision System One professional audio test set, capable of operation from the



serial port of lap-top IBM-compatible computers. The RS-232 can measure audio transmission links and remote facilities without a PC at the other end, using dial-up telephone lines and modems. Broadcast station, microwave and satellite link end-to-end tests can be made from one control point, with data graphing in real time on a computer screen at the control point. Accessory switchers allow testing of multiple points of a distant installation.
Reader Service #209

PCO'S Fiber Optic System Beams Live Remotes

The PCO-5010 fiber optic video/audio transmission system is a lightweight portable unit that can transmit broadcast-quality video signals live via transmission links up to 65 km. It can also transmit digital data at up to 8 Mbits/s. With analog FM, it transmits NTSC video and stereo over single mode or multimode fiber at either 1300 or 1550 nm. The unit may be used as a wideband (12 MHz) analog link and uses a laser or LED transmitter. The standard setup of chassis, LED transmitter, receiver card and power supply costs $4,700.
Reader Service #210

See-Thru Doors For Racks From Winsted

The Winsted Corp. has announced a new line of steel-framed locking doors specially designed for Winsted Rack Cabinets. Smoke-tinted for easy viewing of electronic equipment, the see-through plexiglas doors are recessed 1-1/2 inches to allow for control knobs and switches, and can be mounted for right- or left-hand opening.
Reader Service #211

Microtime Previews Low-Cost Digital Effects

Microtime will introduce a new low-cost, 3D digital video effects system at the SMPTE Exhibition in October. Rotation and perspective are among the wide range of effects and features the system will

offer. Microtime's system will have both composite and component inputs and outputs and will be available in NTSC, PAL-B and PAL-M television standards.
Reader Service #212

Midiizer Debuts From Tascam

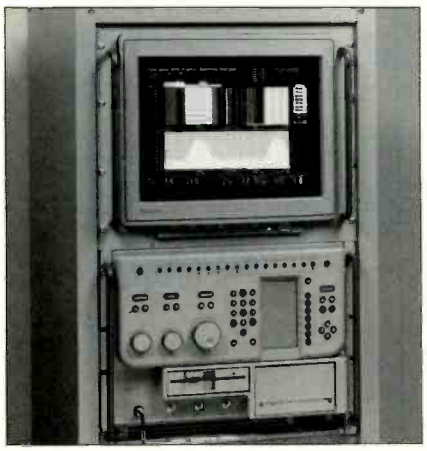
The Tascam MIDI/SMPTE/tape transport synchronizer is the first three-function synchronizer utilizing serial port connectors. It functions as an auto locater for transports, a MIDI synchronizer that syncs MIDI machines to transports, and a transport synchronizer which chases two transports. The Midiizer reads and generates all time codes for 24, 25 drop frame and non drop frame, chains songs without a pause, and has a serial/parallel converter to control transports that use parallel ports. Suggested retail price is under $2000.
Reader Service #213

Image Videos Latest Video Routing Switcher

The Model 9520 20 x 10 video routing switcher from Image Video, Ltd., utilizes adanced integrated circuit design to deliver a wide variety of control capabilites. Designed for mobile, editing suite, post-production and teleproduction applications, the 9520 features remote control (up to 20 remote panels) or control via standard RS-232/RS-422 serial interface.
Reader Service #214

Tektronics Speeds Up Spectrum Analyzer

The new 3052 digital spectrum analyzer is capable of real-time spectrum analysis that is 100 times faster than previous versions,



along with 800-element span resolutions to 1.25 Hz. For faster conversion times and better accuracy, it has 200-microsecond spectral output rates on signal bands to 10 MHz with continuous real-time spectral displays on bands to 2 MHz. The 3052's high-res color monitor with its variety of display format and summary selections, can be used with the Spectral Event Detect amd Block Capture Mode features for quicker, more refined analysis of spectral occurrences. Delivery time is 12 weeks and suggested price is $75,000.

Reader Service #215

Videotek Adds Line Select

The VDP-8000 frame store/synchronizer now features a line select. The modified frame synchronizer can be programmed to view a single line of a particular field of video. This line is repeated throughout the frame in order to display a bright line select on any waveform monitor or vectorscope. The unit also provides jitter-free lockup of noisy feeds, composite eight-bit signal processing at a sampling rate of 4 x fsc, and independent freeze field capability permitting the storage of two different fields or one field without interruption of live video synchronizing. Price is $5495.

Reader Service #216

Advanced Micro-Dynamics Unveils Transmitter Remote Control

The modular, 16-channel ARC-16 allows control of multiple transmitter sites from a single location, use of multiple control locations, or the addition of a redundant control/metering link. The transmitter unit includes a 32-character display for easy calibration and local operation. Values are displayed with

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user-selected labels. The user may add a dedicated studio control unit, a digital speech unit, or both. The speech unit allows transmitter control by telephone. Readings are announced by a digitally recorded human voice.

Reader Service #217

Rapid Systems Announces Digitizer

The R1288 IEEE-488 Waveform Digitizer features 1 MHz simultaneous sampling without multiplexing. This 12-bit recorder is fully controllable from the GP-1B without

added knobs, dials, or CRT. Features include two-channel input, one-channel trigger, variable gain from 10 mV p-p to 250 V p-p, and variable sample rate from 1 Hz to 1 MHz. Price is $2995.

Reader Service #218

Target Technology Intros 4 x 1 Switchers

Model AVS-403 is three separate 4 x 1 routing switchers, one video and two audio. The vertical interval video switcher has a 40 MHz bandwidth and the slew rate to accomodate the wideband signals found in computer graphics and HDTV applications. Click-free audio switching is obtained from the use of CMOS gates. The audio switchers handle maximum audio levels of +24 dBm with very low THD, noise, and crosstalk.

Reader Service #219

BUSINESS BRIEFS

R*Scan Corp. has formally announced the establishment of a National Lightning Detection Network (NLDN), the first such network to offer tracking of lightning-bearing storm systems. The first phase of the project, which will cover approximately the eastern two-thirds of the U.S., will be operational shortly, with service to the rest of the nation established by the end of 1989.

A related R*Scan service, the Lightning Data and Information System (LDIS), on-line with the NLDN, has already been incorporated into the **Zephyr** Weather Information Service.

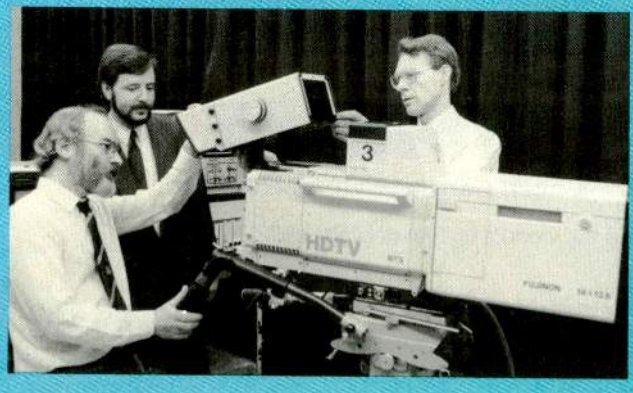
Calhoun Satellite Communications has been purchased by David S. Fruitman, making him sole owner and CEO of the Ku-band sat and transportable facility...Harris Corp. has announced an in-principle agreement with General Electric Co. to acquire **GE Solid State**...**Midwest Communications** has signed a distribution deal with ACE (formerly Abekas-Cox Electronics) detailing exclusive U.S. rights for Cox encoders, T8 production switchers, and other broadcast products.

According to a recent survey released by the National Society of Professional Engineers (**NSPE**), engineers in the Southeast earn more than their Southwestern peers. The *Professional Engineer Income and Salary Survey 1988* pegs median income for Southeastern engineers at $50,000; $49,900 for the Southwest. The survey is available through the society; (703) 684-2881. Ask for publication 0004. There is a $100 charge for nonmembers.

IDB Communications group reported a 90 percent increase in first-half earnings over fiscal 1987. Net income was set at over $1.1 million, or about $.24 per share...**Scientific-Atlanta, Inc.**, posted net earning for fiscal 1988 of $29.7 million, up 22 percent from 1987's $24.3 million. Sales figures broke down to $508.6 million for this year, compared to $495.3 for 1987...**Harris Corp.**'s net income for 1988 was up 19 percent from last year's $84.5 million to $100.5 million. Earnings per share rose 22 percent, from $2.05 to $2.50.

Early autumn appears to be a big time for movers and shakers, with many, many companies reporting staffing additions and alterations. Johan Safar has been named **Panasonic Broadcast Systems** new CE...Kudos to **Ron Ritchie**, new VP and division manager of **Ampex**'s Recording Systems Division...Michael J. Kelly has been named president of dbx after the buyout of the dbx/ADC and BSR (Japan), Ltd., divisions of BSR International by San Bruno, CA-based Carillon Technology...Michael Constanza is **Sony Magnetics Products**' new Accounts Manager...Acrodyne Industries has tapped **John F. Delissio** as its new VP of marketing...Richard Paterson is Ultimatte Corp.'s new director of marketing...Robert J. Anderman has joined Varian TVT as U.S. operations manager.

Harris Corp.'s Broadcast Division has named Dan Sessler radio sales manager for the Southeast...**Waveframe Corp.** announced the appointment of James S. Mays as president and CEO; Steve Krampf is the firm's new senior VP of sales and marketing...William Liento, Jr., is Lee Colortran's new senior VP of sales and marketing...New York production house (and *BME* Excellence in Engineering award winner) **Charlex** has named Mal MacDougall head of sales...Greg Smith is EEV, Inc.'s new sales manager, broadcast products...Audio Precision announced the appointment of Thomas E. Mintner to the newly created position of director of sales and marketing for that company. ■



BTS, the joint venture company of Bosch and Philips, has developed a high definition camera system and component recorder in conjunction with the European EUREKA high definition television research project. The equipment was shown as part of a complete, operational image chain compatible with 50Hz television standards at the recent IBC convention in Brighton, England.

EUREKA EU95 partners—including Thomson, Quantel, CCETT and Angenieux—have established a three-year schedule to develop European high definition television in Europe via satellite-delivery of the MAC-packet family of transmission standards.

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CLASSIFIED

Teleproduction Needs HDTV Standards

By Stan Kronquest

No matter where one sits around the video campfire these days, the number one subject is format proliferation. Also known as format wars, or Son of Built-in Obsolescence.

Now we are about to turn the burner up on the selection of a high definition television standard. Should HDTV be delivered simultaneously with present low-definition TV, to be received presumably by old *and* new sets? It can be effectively argued that after the kickoff of scheduled regular broadcasts, manufacturers will cease making low-def sets just as they effectively did black and white when NTSC broadcasts became regular. Will compatibility then be a concern? One might presume that large *and* portable small-screen HDTV receivers will be mass-produced. It is fair to assume that the 16x9 aspect ratio will be the main consumer motivator. The increased contrast ratio and resolution together with the wide screen are bound to increase rating points. Production techniques can also be redefined if the need to zoom in to show detail is minimized. One can only guess at the implications.

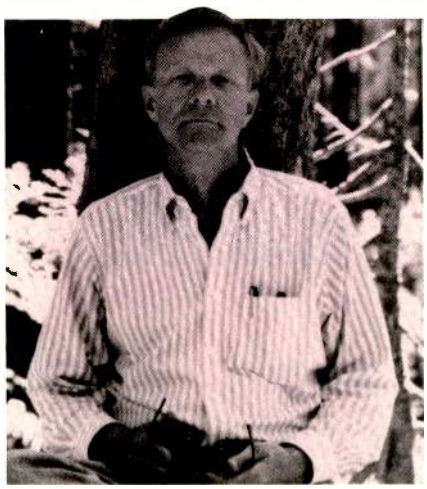
Well, for whatever purpose or reason, we are going to have HDTV, be it delivered in a compatible time-compressed widescreen version, 16x9 aspect ratio, interlaced, noninterlaced, 1125/60, 1152/50, or a digital ultra-mega plasma. Will HDTV be delivered by antenna, satellite, cable or recorded media? Perhaps all.

HDTV is exciting to look at. It is rich, vivid, and doesn't shake, weave or float like film. It should stir long dormant creativity. The potential for reward is high.

For the teleproduction industry, however, there is another dimension. What format are we going to use to record and manipulate HDTV? This is of vital concern to post-production people. We need a standard production format. But can we agree on one? Years ago, the players were few, so perhaps agreement on the dimension of 35 mm film was easy. Now we work throught the FCC, ANSI, SMPTE, ITS, manufacturers, lobbyists and PR firms, where the necessity becomes blurred.

This brings us back to the beginning: "format wars" and the high cost of built-in obsolescence. The International Teleproduction Society is forming a steering committee to promote the need for a standard HDTV production format. This format must, first of all, last long enough to amortize its probable high cost. It must be digital, interchangeable, and transcodable to whatever delivery system or systems are in use. It should be a long-term standard in that its quality, resolution capability and other features should be better than the HDTV standards as proposed.

We have the opportunity now to comment about the delivery format for HDTV by calling or writing Rep. Edward Markey (D-MA), who has made a call for help in preparing a blueprint for action in the next Congress under the new President. Meanwhile, I urge all teleproduction engineers to make their opinions known about a standard production format for HDTV. If you would like to make a comment about the standard production format, please contact me at the International Teleproduction Society, Suite 21E, New York, NY 10018. ■



Kronquest is chief engineer of Telemation Productions, Inc., Seattle, WA. He is a board member and chairman of the engineering committee of the ITS.

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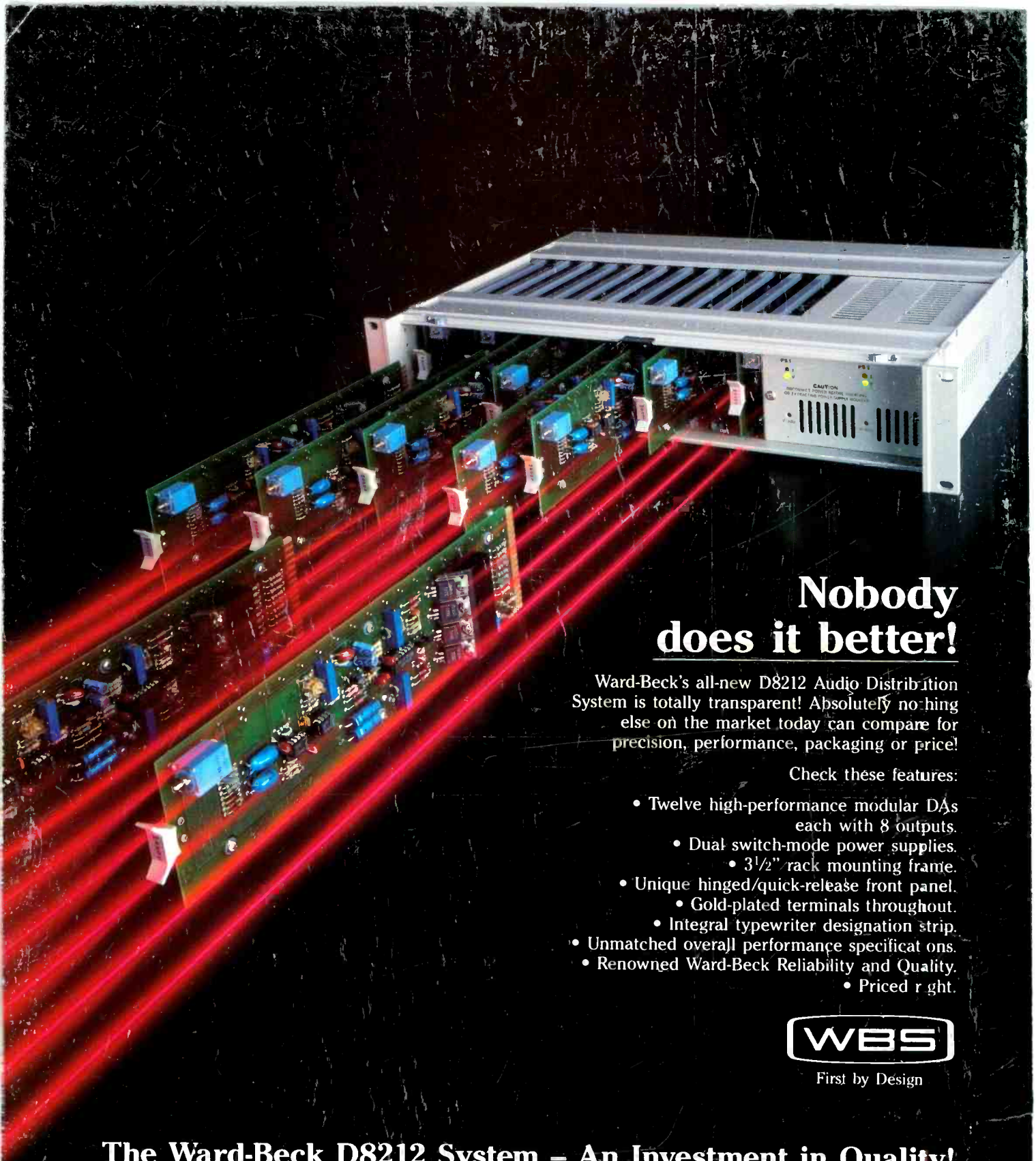

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