BME

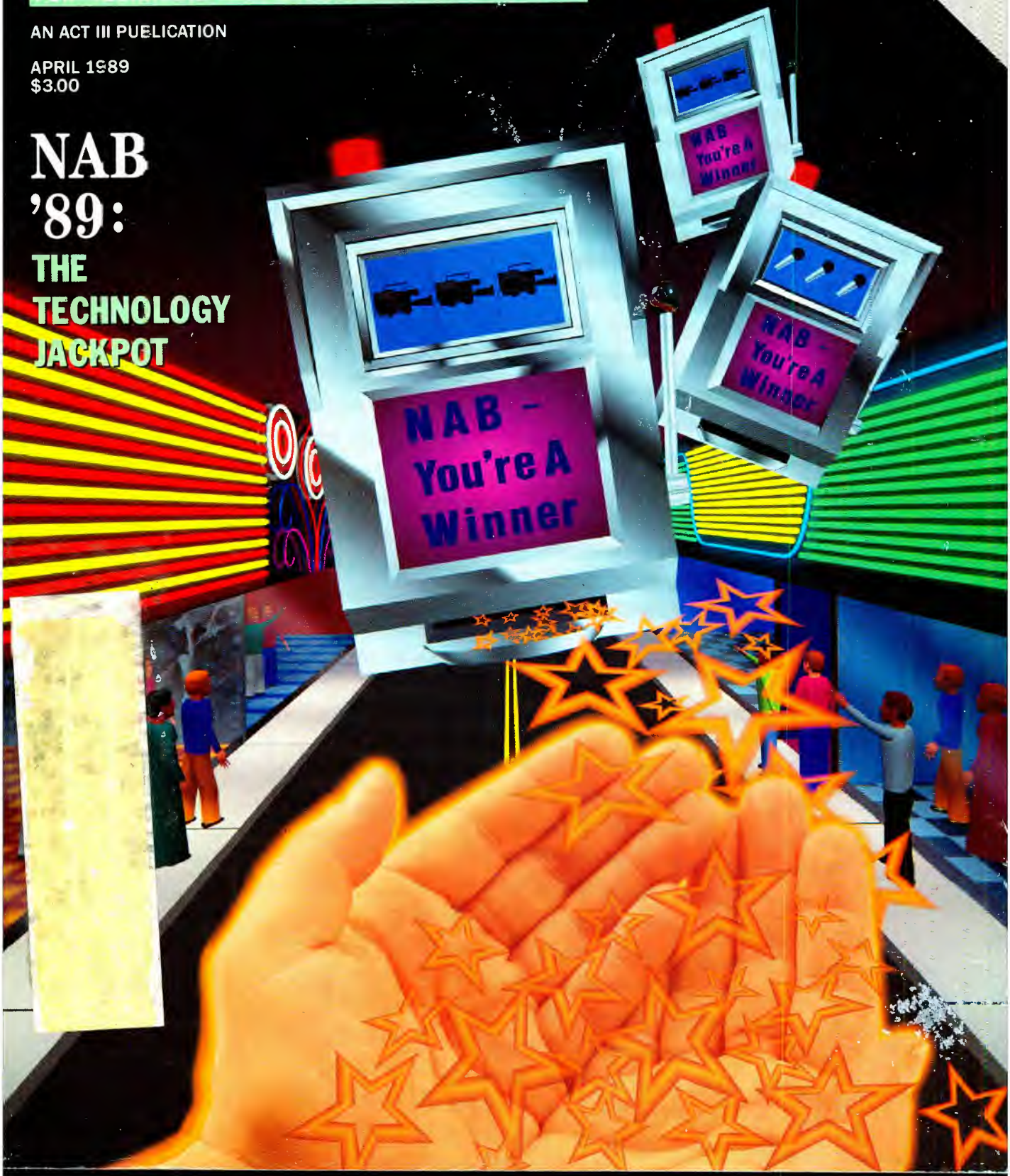
FOR TECHNICAL AND ENGINEERING MANAGEMENT

AN ACT III PUELICATION

APRIL 1989
$3.00

INSIDE:
ADVANCED TELEVISION

NAB '89: THE TECHNOLOGY JACKPOT



WHY DIDN'T SOMEONE THINK OF THIS BEFORE?

A FAST-PACED PRODUCTION CONSOLE

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.

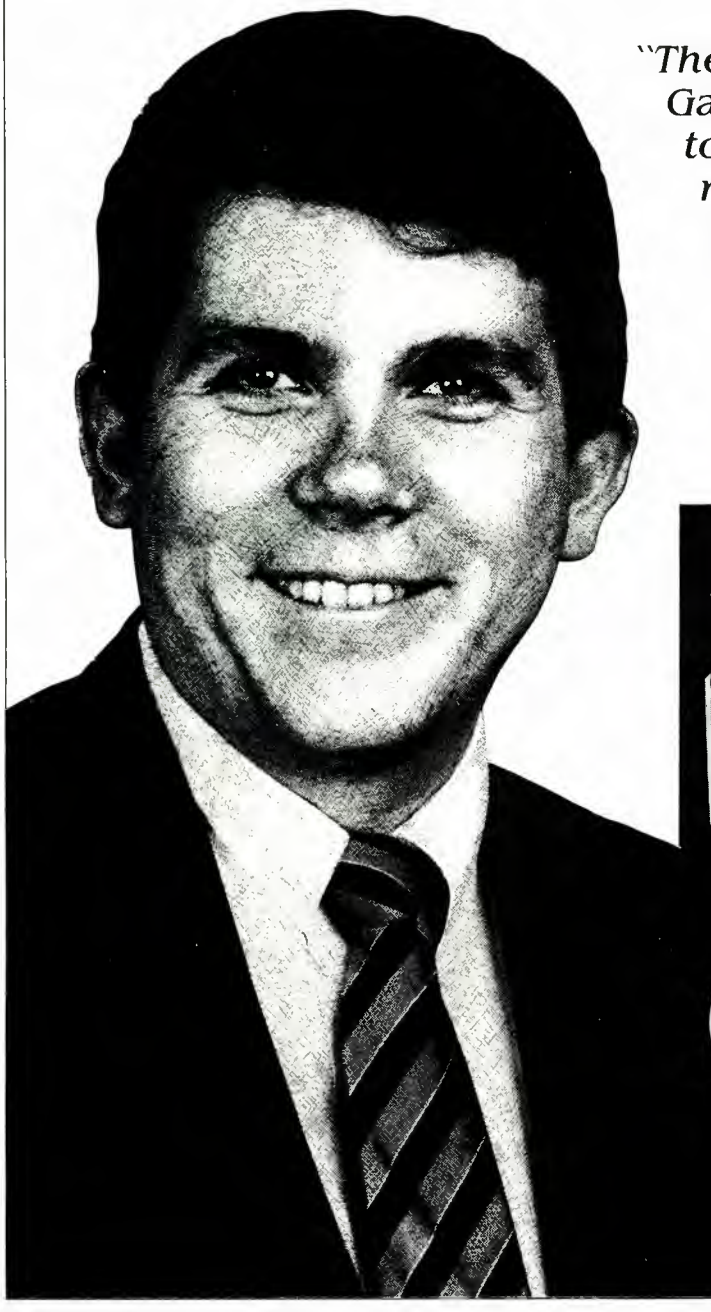
The SP-6 provides independent headphone, control room and studio monitor feeds, as well as stereo cue-solo. Control room and studio mute and tally functions are independently dipswitch selectable on individual input channels. Additional studio modules may be ordered to accommodate larger, multi-studio 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.

Wheatstone® Corporation

6720 V.I.P. Parkway, Syracuse, NY 13211
TEL 315 455-7740 FAX 315 454-8104

Circle 100 on Reader Service Card Page 107

GO WITH THE WINNERS. DYNAMAX CTR100 SERIES



"The Chiefs at 14 of 16 Gannett Stations switched to DYNAMAX cartridge machines. Each Chief wants the best in performance reliability, and versatility."

Paul Donahue
Vice President of Engineering
Gannett Radio

DYNAMAX™
BROADCAST PRODUCTS BY FIDELIPAC®

Fidelipac Corporation
☐ P.O. Box 808
☐ Moorestown, NJ 08057
☐ U.S.A.
☐ 609-235-3900
☐ TELEX: 710-897-0254
☐ FAX: 609-235-7779

Circle 101 on Reader Service Card Page 107

See us at NAB Booth #1117

When it comes to evaluating your picture, you need the whole truth and nothing but. Monitors that show you just what you're producing. With all its beauty and all its flaws — down to the tiniest bit of noise or artifact.

You need SONY broadcast monitors. The 19-inch BVM-1910, or a 13-inch monitor, the BVM-1310 or the BVM-1315. They bring you the best possible reproduction of the actual signal. The most faithful and detailed.

Because they offer the highest resolution in their category, even at high output levels. With the BVM-1910, for example, you get a full 900 TV lines.

Add to that the best convergence and geometry you can

and nothing but

find in a broadcast monitor. Plus excellent uniformity and rock-solid color stability.

All of which we achieve by manufacturing our own CRTs.

And these monitors offer the most advanced auto-setup option available. You can even analyze and set up other non-auto-setup monitors.

But don't take our oath for it. See the BVM-1910, BVM-1310 and BVM-1315 yourself. Contact your Sony Broadcast Sales Engineer. Or call (800) 635-SONY.

SONY®

BROADCAST PRODUCTS

Big FX.

Small Package.

A·C·E

If fitting all this capability into such a remarkably compact switcher is a piece of cake, everyone should be offering you one.

They aren't.

Not with true linear keying via dual linear keyers... standard. To assure compatability with anti-aliased graphic systems. These switchers would also offer over 80 wipe patterns. Including rotary and clock wipes. As well as dual pattern generators for wipe within wipe effects. a non-volatile fx memory with 64 set-up capability. and too much more to list in *this* ad.

See us at NAB Booth #4568 and Outdoor Booth #A110

And if that kind of compact capability is as hard to achieve as it seems to be, the T8 should cost a bundle.

It doesn't.

Which should mean the T8 is going to sell like the proverbial hot cakes.

It already has.

Maybe you should give your Midwest representative a little call.

To get the big picture on the T8.

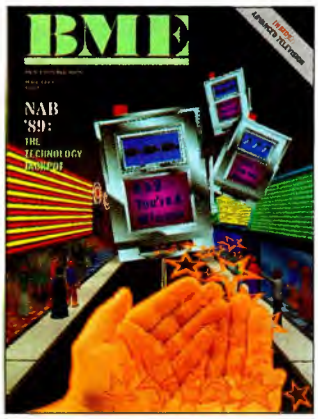
MIDWEST
Communications Corp.

One Sperti Drive
Edgewood, KY 41017
(606) 331-8990

Circle 102 on Reader Service Card Page 107

the SOURCE

BME
FOR TECHNICAL AND ENGINEERING MANAGEMENT
APRIL 1989
VOL. 25, NO. 4



On the cover:
Illustration by Alan Rosenfeld for Videosmith, Inc. Software: Wavefront Technologies; hardware: Silicon Graphics 3130 and 4D/60. Hand art photography by Gareth Hopson

Features

34 ATV: High Stakes, Tough Choices
The broadcast industry faces one of its toughest decisions ever—the choice of a standard for high definition television.

45 The Digital Audio Workstation Dilemma
A major purchasing and production decision may be in your future. Are you equipped to make it wisely?

51 NAB 1989

53 What's Hot: NAB 1989
BME's guide to NAB's hottest new products.

69 Exhibitor Listings
Who's who in the technology bonanza.

111 NAB Engineering Program
Off the floor, hot topics abound.

117 Radio Engineering

117 Radio News
BTP Says Bose FMX Report Flawed...Compu-Sonics Quits Manufacturing... NRSC FM Committee to Test at WAEB-AM/FM

118 What's New in Radio Transmitters?
Incremental improvements continue in AM and FM broadcast transmitter design.

ON THE AIR
Proud Tradition • Dynamic Future

51 *NAB 1989*

118 *Radio Transmitter Trends*

Don't Blame The Tape!

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.

Phase Trak 90 Cart Machines guarantee you superior production and playback quality . . . no matter what brand of tape you use.

A microprocessor-based Tape Analysis System "learns" and stores the optimal characteristics of 10 different tape formulations...Assuring you of the highest production quality.

Clean, crisp playback quality is assured with Phase Trak 90's exclusive Continuous, Non-encoded Electronic Phase Correction.*

PHASE TRAK 90™

Phase Trak 90, the most advanced cart machines on the market today, is raising the on-air standards of the industry.

Find out how **you** can improve **your** production and playback standards. Contact your Broadcast Electronics' Distributor today, or call Bob Arnold at

217-224-9600

*Patent applied for.

BE® BROADCAST ELECTRONICS INC

4100 N. 24th ST., P.O. BOX 3606, QUINCY, IL 62305–3606 U.S.A., PHONE (217) 224-9600, TELEX 250142, FAX (217) 224-9607

Circle 103 on Reader Service Card Page 107

BME
FOR TECHNICAL AND ENGINEERING MANAGEMENT

Group Publisher
KEVIN J. CONDON

Publisher
MICHAEL D. BAILENSON

Editor
EVA J. BLINDER

Senior Editor
BETH JACQUES

Technical Editor
JAMES A. ACKERLEY

Managing Editor
T. GWEN GRIFFITH

Copy Editor
PATRICK D. O'NEILL

Contributing Editor
SKIP PIZZI

Art Director
DONALD H. KROGMAN

Production Director
NICK TARTAGLIA

Assistant Production Manager
MARGOT SUYDAM

Associate Publisher
PATRICK J. MOLONEY

Northern District Sales Manager
WILLIAM P. DEY

Western District Sales Manager
DENICE NICHOLS

Controller
JOSEPH M. PANNULLO

Circulation Manager
JOSEPH SCHILLMOELLER

Executive Assistant
SHARON PORGES

Act III Publishing

President
PAUL DAVID SCHAEFFER

Chief Operating Officer
ROBERT C. GARDNER

Senior Vice President,
Technical Division
KEVIN J. CONDON

Senior Vice President,
Corporate Development & Planning
MARTHA LORINI

Senior Vice President, Corporate
Planning & International Development
GERARD A. BYRNE

Vice President,
Finance & Administration
SAM SCHECTER

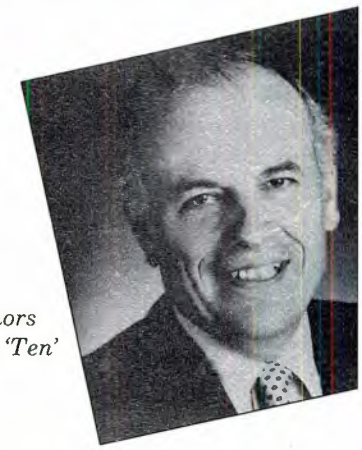
Act III Publishing, Technical Division
295 Madison Ave., New York, NY 10017
(212) 685-5320 Telex: 64-4001
Fax: (212) 679-0919
Also publishers of:
World Broadcast News
Corporate Video Decisions

ABP VBPA

BME (ISSN 0005-3201) is published monthly by NBB Acquisitions, Inc. BME is circulated without charge to those responsible for station operation and for specifying and authorizing the purchase of equipment used in broadcast facilities in the U.S. and Canada. These facilities include AM, FM and TV broadcast stations, CATV systems, ETV stations, networks and studios, audio and video recording studios, teleproduction facilities, consultants, etc. Subscription prices to others: $36.00 one year, $50.00 two years. Foreign: $50.00 one year, $75.00 two years. Air Mail rates on request.

Second class postage paid New York, NY, and additional mailing offices.
POSTMASTER: send address changes to BME, P.O. Box 6056, Duluth, MN 55806.

Columns & Departments



11 Viewpoint
HDTV: No Disinterested Parties

13 Feedback
Phasers on Stun?

17 Update
William Henry Leaves ATSC...IEEE Honors Nikola Tesla...ITS Survey Says HDTV a 'Ten'

25 Crosstalk: An Engineering Management Journal
HDTV in Space...Fairlight Fails in Emergent DAW Market

29 Tech Watch
CRT Alternatives Gain Ground

122 Compute
Calculate Approximate 'Flat Earth' Groundwave Field Strength

128 Spectrum: The Regulatory Environment
Engineers: Time to Renew

132 New Equipment
Hypertronics Unveils Power Supply Connector...U.S. Line Master Offers Ground Fault Alarm...Digital Offline Editors Introduced...RGB Has Scan Convertors...Altronic Premieres Dummy Loads

140 Business Briefs
Austin TV Station Installs Two-Channel Automation System

141 Advertisers Index

142 Currents: A Guest Editorial
A Vote for Dual HDTV Standards

29 *CRT Alternatives*

the SOURCE

The Vertex 2.6 DMK Ku Band Uplink Antenna — The Heart of the S-23 RF System

And one of the reasons there are over 30 Midwest S-23's in service today. In the U.S., Italy and Japan.

Over the past year, the Vertex 2.6m DMK outsold all comparable antennas in its class. The reason?

No prime focus antenna can perform as efficiently as the Vertex 2.6m DMK, due to its offset Gregorian feed system. The sub-reflector offers more complete illumination of the main reflector, and the offset configuration insures that the antenna meets the FCC 2° spacing curves, while providing a nominal transmit gain of 50.1 dB. Including 4 port diplexer. Cross polar isolation performance exceeds 35 dB.

Unlike most other mobile antennas, the Vertex 2.6 DMK is built to withstand many years of rugged service. A 25" diameter azimuth ring bearing insures stable mounting of the antenna while large DC drive motors provide all the power necessary to point the antenna even during high wind conditions.

If you're considering a mobile satellite system, compare the actual performance measurements of the Vertex 2.6 DMK to any other antenna in its class. Ask the space segment providers which antenna outperforms all others.

Then you'll know the reasons there are so many Midwest S-23's on the road today. ***Contact us for complete specifications and information.***

See us at NAB Booth #4568 and Outdoor Booth #A110

Partial List Of Midwest S-23's Currently In Service:

Cycle Satellite (2 units) Forest City, IA

J/C SAT Tokyo, Japan

KDD Tokyo, Japan

KGW-TV King Broadcasting Portland, OR

KOMO-TV Fisher Broadcasting Seattle, WA

WTVJ-TV NBC Miami, FL

KTTV-TV Fox Broadcasting Los Angeles, CA

KTVY-TV Oklahoma City, OK

KWCH-TV Witchita, KS

Northstar Microwave Redmond, WA

RAI (2 units) Rome, Italy

Rainbow Network Communications (2 units) Floral Park, NY

Telemundo Miami, FL

Telespazio (2 units) Rome, Italy

Trinity Broadcasting Santa Anna, CA

University of Florida Gainesville, FL

WBNS-TV Dispatch Printing Columbus, OH

WEWS-TV Scripps-Howard Broadcasting Cleveland, OH

WHAS-TV Louisville, KY

STS Hauppauge, NY

WKRC-TV Great American Television & Radio Cincinnati, OH

WSPA-TV Spartan Radiocasting Company Spartanburg, SC

WTKR-TV Knight-Ridder Broadcasting Norfolk, VA

Sugarman Productions New York, NY

WBRC-TV Great American Television & Radio Birmingham, AL

WBIR-TV Multimedia Broadcasting Knoxville, TN

MIDWEST
Communications Corp.

One Sperti Drive
Edgewood, KY 41017
(606) 331-8990

Circle 104 on Reader Service Card Page 107

VIEWPOINT

In the politically charged HDTV situation, there are no disinterested parties.

Who's making broadcast law these days? Our thoughts turned to this question after reading a recent report in *The Wall Street Journal*. According to the *Journal*, one proposed House of Representatives HDTV bill is being written, not by a representative or an employee of a representative, but by an employee of American Telephone and Telegraph. The author in question, Rhonda Levine, is working under the direction of Rep. Mel Levine, a California Democrat. Her salary comes not from Rep. Levine's budget, however, but from a science and technology fellowship provided by AT&T.

The situation is completely aboveboard, with no indication of any wrongdoing. Lobbying efforts by industry are a time-honored Washington tradition. Further, Dr. Levine, with a Ph.D. dissertation on the politics of television technology under her belt, seems highly qualified to grapple with the nuances of HDTV legislation.

What her current activity underscores, more than anything else, is the complexity and politically charged nature of the HDTV situation, where everybody has an axe to grind and there are no disinterested parties. The Levine legislation, cosponsored with Rep. Don Ritter (D-PA), seeks to increase U.S. government support of HDTV through tax incentives, grants, and antitrust exemptions. AT&T, which funds Dr. Levine's fellowship, has joined with Zenith Electronics (developer of the proposed Spectrum Compatible TV high-definition transmission system) to ask DARPA for $13 million in R&D funding. AT&T is also a member of the HDTV consortium recently formed by the American Electronics Association.

If anything, AT&T deserves admiration for its foresight in assisting someone likely to be sympathetic to its own agenda. Broadcast engineers, and the organizations that represent them, should take careful note. What group of people is better suited to explain to our legislators the technical and practical considerations of new transmission schemes? What group will be more closely affected by any changes we adopt? Amid the sea of political, legal and economic considerations that surround the HDTV issue, broadcast engineers must strive to make their voices heard effectively. The future of the industry demands it.

Eva J. Blinder
Editor

the SOURCE

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.

A Quasi-infinite window shuttling circuit gives you a stable picture during tape shuttle and horizontal and vertical Y/C delay controls compensate for the Y/C offset inherent in some S-VHS recorders.

The DPS-270 also offers many available and affordable interface options. Like automatic field correction, chrominance noise reduction and remote control.

So for those of you as concerned about value as you are about quality, remember ... one last word ... $2,995. As always backed by Midwest.

For more technical and sales information contact your nearest Midwest office.

See us at NAB Booth #4563 and Outdoor Booth #A110

DIGITAL
PROCESSING SYSTEMS INC.

From Midwest Communications –
Exclusive U.S. Distributor.

MIDWEST
Communications Corp.
One Sperti Drive
Edgewood, KY 41017
606-331-8990

Circle 105 on Reader Service Card Page 107

FEEDBACK

Phasers on Stun?

I would like to take this opportunity to present a clarification on several points regarding the Compute column in the January issue of *BME*. In the article and accompanying computer program, Mr. Balonis makes two assumptions upon which to base his calculations.

The first point is that the phase shift (phase delay in this case, although not depicted by a minus sign) is constant across the bandpass. This assumption does not hold true for a transmission line or simple model thereof. With a change in frequency, the wavelength will likewise change, hence a change in phase delay. When dealing with a network model, a simple three element lagging Tee for example, the component reactances will differ for each frequency as well.

The examples cited are based on the same phase shift for each frequency (see Figure 1). I have recalculated the impedances for the -78 degree case and present two working examples as a reference. The first is a lossless 52 Ohm (Zo) transmission line, the second a simple three element lagging Tee network. As you can see, the results differ from the examples shown in the article.

The second and most important point concerns symmetry. Of paramount importance is *where* the symmetrical load appears in the transmission system. Symmetry *must* occur at the signal generation point (i.e. plate of the final amplifier tube(s) or combiner output in a solid state transmitter). With the exception of some Nautel transmitters which have a 180 degree output network, a symmetrical load placed at the transmitter output terminals can be the worst condition possible. This is borne by the fact that the majority of transmitters, most of the older plate modulated jobs as well as the Harris SX series, have a -225 degree output network. As viewed on a Smith chart, this rotation to a symmetrical load spells almost certain disaster.

The load at the final amplifier will be far from symmetrical. As validation of this condition, I also present an example of a simple -78 degree Tee network feeding a 225 degree length of transmission line (a simplified model of a transmitter output network with a 1:1 transformation ratio...not a practical example, but sufficient for illustration). The asymmetry is obvious as is the imbalance in relative field strength which should be 5.0 for each sideband. For historical purposes I will cite the case of a 50 kW New York City radio station, operating a nondirectional (shared) antenna, who retained a "consultant" from the midwest to broadband the antenna. A symmetrical load was obtained at the transmitter output terminals by the use of an outboard line stretcher network. After the job was completed, the station sounded worse than before and the network was subsequently removed.

The purpose of this writing is by no means a criticism of Mr. Balonis or *BME*. Rather I feel that some clarification is necessary so that those wishing to improve their bandwidth thereby improving AM radio as a whole can do so with the precision that is required for satisfactory performance.

Thomas Gary Osenkowsky
Radio Engineering Consultant
Brookfield, CT

Example #1 Resonated Load Feeding 78 Degree Lossless Transmission Line

Freq.	R	X	Power%	Rel FS
970	50.16	+j8.06	25.26	5.03
980	52.00	+j0	100.0	10.00
990	50.72	-j5.95	25.28	5.03

Example #2 Resonated Load Feeding -78 Degree Simple Tee Network

970	51.34	+j7.63	24.77	4.98
980	52.00	+j0	100.0	10.00
990	49.88	-j5.23	25.78	5.08

Example #3 -78 Degree Tee Network Feeding 225 Degree Lossless Xmsn Line

970	60.26	+j0.83	21.57	4.64
980	52.00	+j0	100.0	10.00
990	46.94	+j2.1	27.64	5.26

Notes:

1. The transmission line has a Zo of 52 ohms and is lossless, having a velocity factor of 100 percent.

2. The Tee network is a simple Tee comprised of three components and zero loss.

3. The network is designed for an input impedance of 52 ohms.

4. The Rel FS is the square root of the sideband power.

Figure 1: Resonated load alternatives.

Do you have an questions, comments, or criticisms concerning what you read in BME*? Any bulletins or issues you want to open up to other engineering management readers? Our letter column, Feedback, is your forum. Write to: Feedback, BME Magazine, 295 Madison Avenue, 19th Floor, New York, NY 10017.*

A convincing argument for Type C from a company that invented D2.

We didn't spend five years pioneering the world's first D2 composite digital recorder just to win technology awards—selling D2 machines is one of our top priorities.

But another and even more important priority for us is to make sure that the video professionals we serve have appropriate equipment for their jobs. And that they continue to look to Ampex

"...business more than tripled this year using Type C..."

Bill Stokes,
Bill Stokes Associates

Ampex Zeus Advanced Video Processor

for the straight story about that equipment and its applications.

A case in point is the question we recently asked several of our customers who purchased Type C *after* we introduced D2.

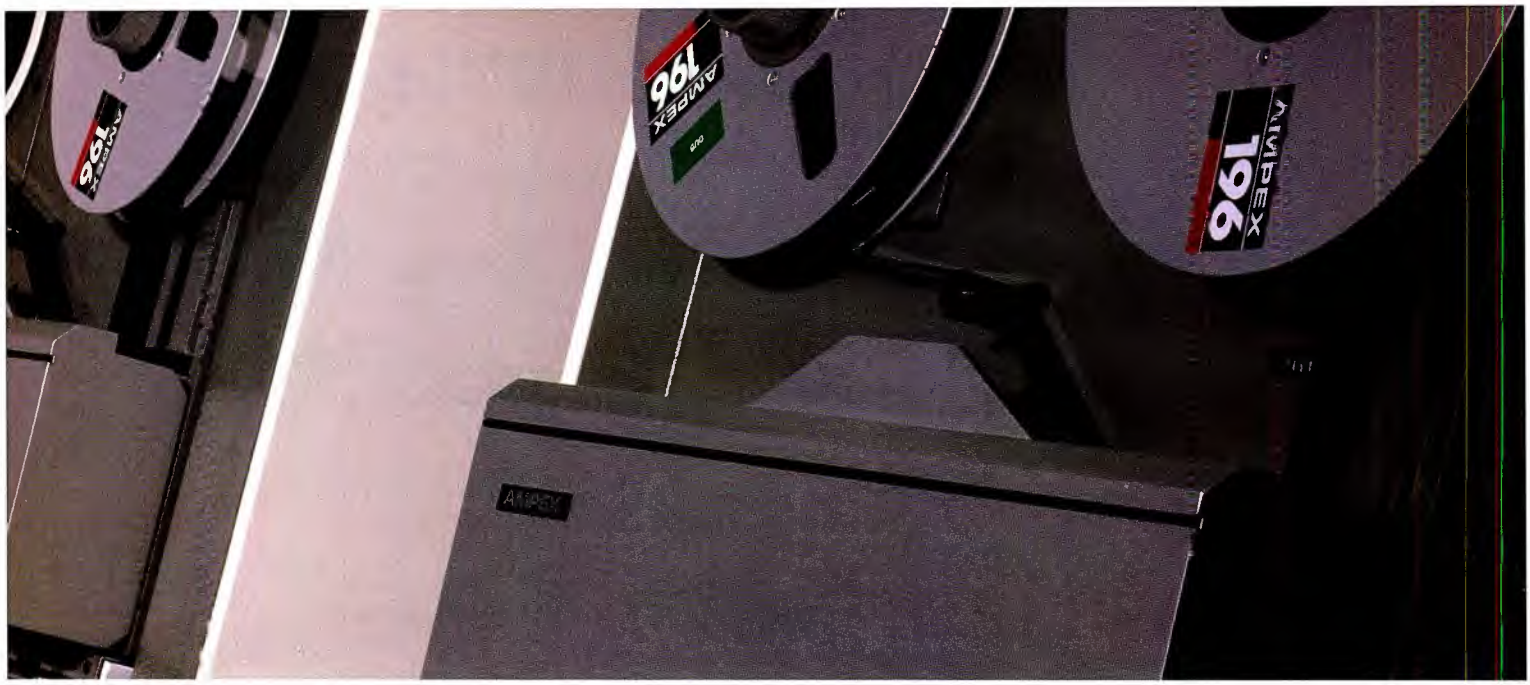
"With the introduction of D2, why did you purchase Type C?"

We think the answers we got may interest you if you're considering the purchase of *any* video machine.

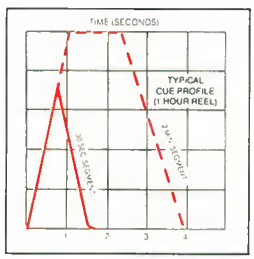
Bill Stokes (*Bill Stokes Associates* in Dallas), came right to the point. "My business has more than tripled this year, and I'm using Ampex Type C machines. Is there any better reason to buy more? With the new TBC-7 or the Zeus processor they make perfect pictures. Besides, I like the service I get from Ampex."

Jerry McKinzie with *Cycle-Sat Communications Network* in Forest City, Iowa, (a satellite courier,

The VPR-80's Automatic Scan Tracking head and its erase head are both easily removed and replaced with only a screwdriver.



production, and post-production business), thinks it's important to be able to update easily as his business changes. "The hardware and software upgrades Ampex makes in their equipment allow me to keep my facility current, and to always give my customers the newest look. I like that, and my customers demand it."



The VPR-3's incomparable acceleration allows a 30 second segment to be re-cued and synchronously played in 2 seconds, using one hour reels.

Darrell Anderson, whose company *Anderson Video* in Los Angeles, recently purchased several

"...Type C business is readily available..."

Darrell Anderson, *Anderson Video*

VPR-3s, pointed out that the Zeus port allows interface with D2. Darrell believes that, "Type C and D2 will co-exist successfully in a well-managed facility. Type C business is readily available." We were gratified to hear that he, "bought the best Type C machine he could find."

Consider your purchase decision carefully. When the excitement of a new equipment introduction passes, and you've put the pros and cons down on paper, Type C may be exactly the right machine for your application. After all, it's still the world's broadcast interchange and distribution standard.

"...hardware and software upgrades keep my facility current..."

Jerry McKinzie,
Cycle-Sat Communications Network

And it is obviously the perfect choice for facilities that are moving up from ¾-inch.

We'd like to be involved in your decision-making process, and we're as close as your telephone. Call Ampex at 1-800-25AMPEX for some real help with a difficult decision.

AMPEX

The Faroudja LINE DOUBLER

Ahead of its time

The LD-1 Line Doubler accepts 525 line, 2:1 interlaced, 59.94 Hz video signals and converts them to 525 line progressive scan or 1050 line interlaced signals.

The motion detection techniques used in the LD-1 are considered by experts in the field as being the most advanced. Along with proprietary bandwidth expansion techniques* and patented detail processing, Faroudja Laboratories LD-1 delivers images that rival HDTV.**

35 mm Film Quality

The absence of visible scanning line structure, edge blurring or motion artifacts at the LD-1 outputs makes it an ideal companion for large screen TV displays. Its crystal clear, artifact free image delivers a "cinema-like" feeling from standard 525 line video sources.

SuperNTSC™

The Faroudja LD-1 Line Doubler, CTE-2 Encoder and CFD-N Decoder comprise the basic building blocks of the fully compatible SuperNTSC™ ATV system.

*Patent Pending
**Patent Numbers 4,030,121 and 4,262,304

FAROUDJA LABORATORIES

Faroudja Laboratories Inc.
946 Benicia Avenue
Sunnyvale, California 94086
Telephone 408/245-1492
Telex 278559 MUHA UR
Fax 408/245-3363

Visit us at NAB Booth 5733

Circle 107 on Reader Service Card Page 107

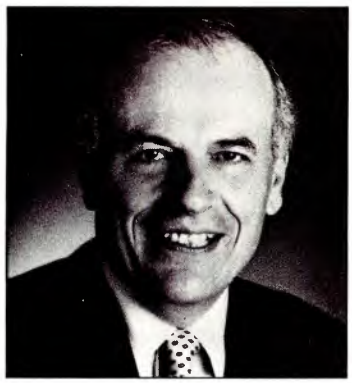
UPDATE

William Henry Leaves ATSC... IEEE Honors Nikola Tesla...ITS Survey Says HDTV a 'Ten'...Zenith and AT&T Form HDTV 'Consortium'

William Henry Leaves ATSC

The chairman of the Advanced Television Systems Committee (ATSC), E. William Henry, has resigned. Chairman of the broadbased private sector high definition television standards organization since April 1983, Mr. Henry will return to the law firm of Ginsburg, Feldman & Bress, where he is a partner.

"It's time for a new person," Henry told *BME*. "There are other ways for me to stay in the field." A search committee is seeking a replacement.



"Keep options open."—Henry.

Major ATSC accomplishments include work toward the adoption of the 1125/60 format as a standard for HDTV production, Henry said. He also cites the committee's work documenting a B-MAC format for HDTV satellite transmission.

Other achievements include establishing a technology group to coordinate and develop transmission standards for all communications media. "ATSC is the only standards organization which functions across the board," said Henry. "That's why it's the best organization to address terrestrial HDTV standards." Part of the ATSC mandate is supplying the FCC Advisory Committee with a private sector recommendation for a terrestrial broadcast standard.

Henry added that the best way to facilitate worldwide development of HDTV is to support a single production standard. He added that the European community supports a 50 Hz system rather than a 60 Hz or 59.94 Hz format because it fears an accelerated obsolescence for 50 Hz receivers. Henry personally feels the issue will be resolved at the CCIR conference in 1990, although the chance of a single standard is "less than 50-50."

"If there is to be a compromise, the issue is when you start negotiating," he said. "It's in the interest of 60 Hz countries to keep options open." ■

Zenith and AT&T Form 'HDTV Consortium'

Zenith Electronics Corp., in co-operation with AT&T, has filed a co-funding proposal to the U.S. Defense Advanced Research Projects Agency (DARPA). Submitted February 28, the proposal requests $13 million in co-funding to develop an HDTV processor/receiver, related circuitry and prototype hardware supporting Zenith's "Spectrum Compatible" HDTV transmission system.

At the same time, Zenith also submitted a separate plan to develop a large-screen version of its flat tension mask (FTM) high-resolution color picture tube. This proposal seeks $10 million to help develop a $21.5 million R&D study.

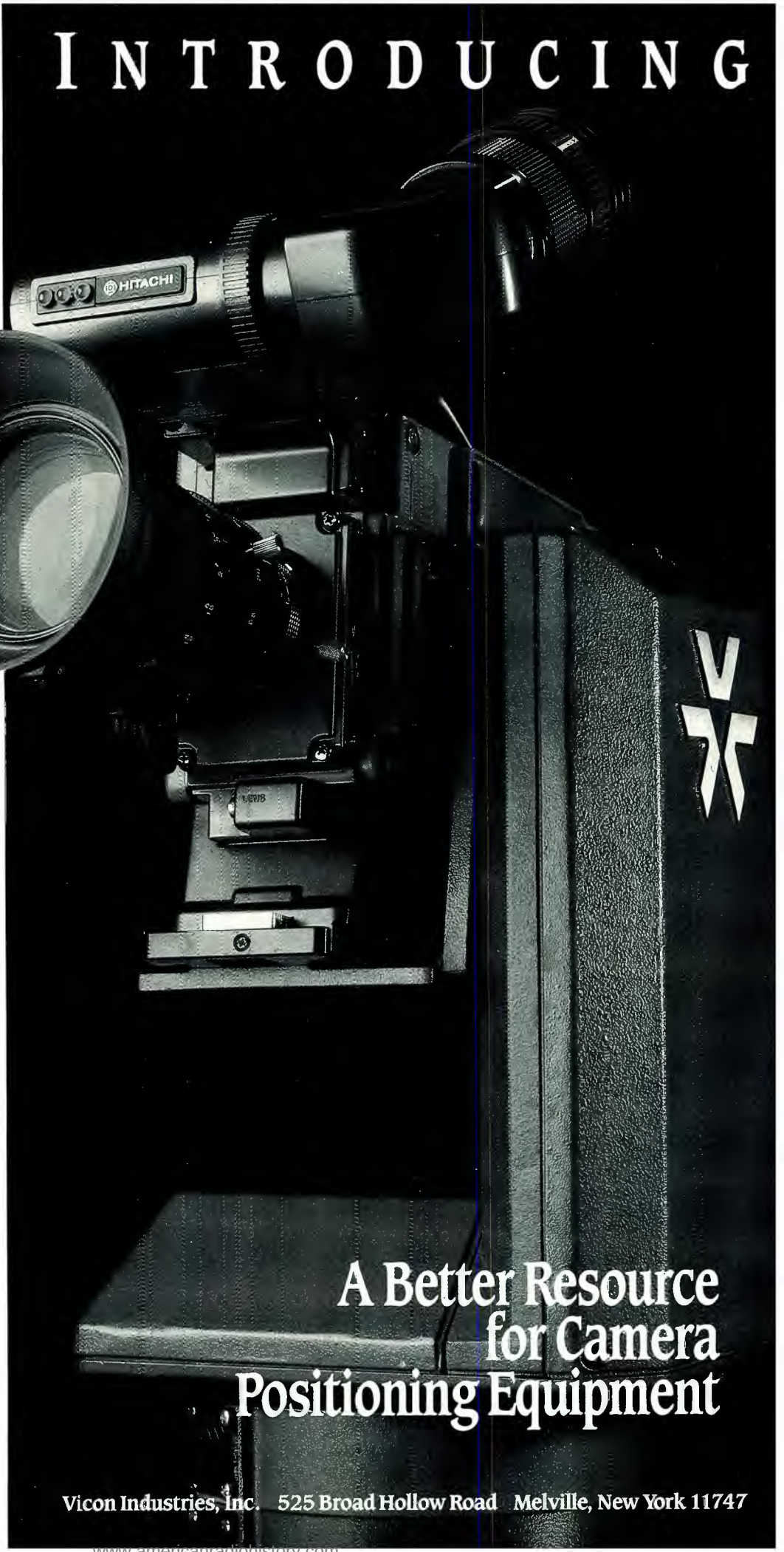
The HDTV receiver R&D program will be managed by Zenith. AT&T will develop HDTV integrated circuits in silicon through its AT&T Microelectronics operation. AT&T Bell Laboratories will supply other system-design technology including data compression.

It had been expected that Zenith would submit a joint proposal for HDTV receiver development, industry sources told *BME*. Factoring in AT&T—a member of the politically influential American Electronics Association HDTV working committee—and keying the program to Zenith's NTSC-compatible transmission system are seen as sophisticated moves to ensure that Congress and the FCC support the format, sources added. In recent months HDTV has become an increasingly volatile political issue which has come to symbolize the future of American technological growth and market development. The FCC has indicated that a U.S. HDTV system should be compatible with NTSC.

The Spectrum Compatible system is friendly to all media including cable, satellite and VCR, according to Zenith. Because it can utilize NTSC taboo channels without interference, it is uniquely applicable to over-the-air transmission, the company said. If the Zenith system were selected as the U.S. transmission standard, the 28-month joint project would enable the companies to deliver production model HDTV receivers by 1993.

"If the Spectrum Compatible system is not accepted, the work we're doing with AT&T will be

INTRODUCING



Vicon Industries, a leading source of video accessories and systems for more than 25 years, has formed a "Professional Products Division." That's good news for the broadcast as well as the non-broadcast video user.

Quite simply, you now have a better resource for camera positioning equipment...from a company that's committed to the highest quality standards and the best value available.

Take the new Vicon 6000 series. It delivers the most desirable features for all video applications:

High speed
Precise positioning
Silent operation
Compact & rugged

Vicon offers three models, attractively priced, with outstanding performance built on decades of engineering excellence.

For more information on our professional products line, call Mort Russin at 914-638-2805 or 1-800-645-9116. Dealers' inquiries are invited.

Come see us at the NAB Show.
Booth #2139

PROFESSIONAL PRODUCTS DIVISION
VICON

A Better Resource for Camera Positioning Equipment

Vicon Industries, Inc. 525 Broad Hollow Road Melville, New York 11747

Circle 108 on Reader Service Card Page 107

applicable to other HDTV broadcast technologies," Zenith executive John Taylor said. "The work will not be wasted." While AT&T is free to act independently, Zenith says it will continue developing an HDTV receiver in the event DARPA funding is not forthcoming, industry sources add.

The Zenith, Sarnoff-developed ACTV and N.V. Philips transmission format proposals are progressive scan systems and therefore incompatible with interlace systems such as ANSI/SMPTE 240M (1125/60). Currently it is technically not possible to transcode between these NTSC-compatible progressive scan systems and interlace systems without generating problems like motion artifacts. Coupled with international political considerations, this incompatibility may render agreement on any single standard for HDTV video production unlikely. The issue recently led members of the Hollywood film and video production industries—notably Paramount Pictures—to modify support for a single video production standard. In addition, Paramount said in comments filed before the NTIA in February that transfer from film to 1125/60 was also difficult.

Zenith, which supports the NBC 1050/59.94 Hz standard for production, said it is premature to consider who will manufacture broadcast equipment if its Spectrum Compatible format is successful. ■

American chips on the table. Zenith and AT&T ante up and ask DARPA to play. Left to right, Zenith's HDTV engineering team: Wayne Luplow, Richard Citta and Ronald Lee.

ITS Survey Says HDTV a 'Ten'

HDTV will have a major effect on the teleproduction industry, according to a recent survey conducted by the International Teleproduction Society's (ITS) engineering committee. A survey conducted in December 1988 shows the majority of those polled think HDTV will show an industry impact of 10 on a scale of one to 10.

"We wanted to find out how important the industry thought the issue was going to be," said engineering committee co-chairman Stan Kronquest (Telemation Productions, Seattle, WA.) Based on the response—termed "overwhelming and unprecedented"—the ITS is readying a position paper on a standard HDTV production format.

Respondents to the poll are concerned that none of the HDTV formats currently proposed meet industry requirements for a standard production format. Fifty-six percent of those responding felt an HDTV standard production format did not yet exist. Of the respondents who favor a current format (nearly half), 79 percent support 1125/60.

Engineering a position on HDTV: ITS committee co-chair Stan Kronquest

ITS respondents want a production system which provides high quality and high resolution in a standard worldwide format.

"We are concerned that the industry adopt a non-time-compressed standard production format that makes it possible for the easy exchange of video material in any format," Kronquest said.

Thirty-four U.S. members volunteered for the engineering committee's HDTV effort as a result of the survey. Two hundred seventy-seven facilities are members of ITS worldwide. ■

No dropouts in Russia.

Tape dropouts mean trouble for videotape professionals. No wonder so many of them choose to work with Sony Professional Videotape. Including the producers of two recent documentaries shot in Russia, who minimized dropouts by shooting with Sony Videocassettes.

Sony cassettes were never at a loss for picture, whether covering sub-zero, Northern Russia nights or getting impromptu interviews with people on the street in Moscow.

Not that this surprises those of us at Sony Professional Videotape. After all, we've designed all our products around one basic premise: durability. To be frank, the demanding shooting conditions of Russia aren't as tough on our tape as we are.

XBR U-matic® cassettes, for instance, feature a molded-in anti-static cassette shell and components to reduce transient dropout potential by neutralizing static charges. Combine this with base film that's been given Sony's exclusive Carbonmirror™ back coating and dropout potential is reduced even further.

No matter which Sony Professional Videotape you're working with, there's one thing you know for sure. Its greatest ability is durability. Whether it's U-matic, Betacam,® 1" or Digital tape. So take on the world. With Sony Videotape. On location in Moscow, Russia or in a studio in Moscow, Idaho, you need a tape that's tough as Sony. After all, there's no better way to lower the dropout rate.

SONY®
THE ONE AND ONLY.

Circle 109 on Reader Service Card Page 107

UPDATE

Obituaries

Joe Roizen, video recording pioneer and president of his own consulting company Telegen, died of a heart attack March 1 in Paris, France. He was attending a meeting of the International Electrotechnical Commission.

Roizen is perhaps best known for his participation in the development of videotape recording, video standardization and new electronic technologies such as DBS, digital videographics, videotext and Viewdata.

He began his career at the television division of Paramount Pictures in 1951, where he designed early NTSC studio equipment. During his 12 years at Ampex International, Roizen developed the first VTR edit system to use electronic "edit pulses" on the edge of a tape. Also at Ampex, his engineering team developed the first commercially successful color VTR. Roizen further underlined his place in broadcast history with the supervision of the Ampex color TV installation at the first U.S. Trade Fair in the Soviet Union.

Roizen, who was 65, is survived by his wife, Donna Foster-Roizen, two sons and a daughter.

William A. (Bill) Resch, president of his own Quincy, IL-based broadcasting engineering consulting firm, died in his home January 8, 1989. Until his death from cancer, Resch had been installing TV stereo-MTS systems and upgrading UHF-TV transmission systems for a number of American broadcast stations. He also consulted for Information Transmission Systems and Broadcast Electronics. Before starting his own firm, Resch was employed by Harris Corp.'s broadcast products division. Forty-nine years of age, Resch is survived by his wife Beverly and five children. Memorials may be made the Resch Children's Education Fund or to the charity of the donor's choice.

Keith Worsley, 51, one of the most highly regarded marketing specialists in professional audio, died of cancer in a hospital near his California home in early February. Most recently employed by Klark Teknik and DDA, he is credited with establishing markets for the DN 780 and DDA consoles and many Lexicon products, most notably the 224 digital reverb unit. He is survived by his wife Bonnie and his children. A special benefit project to help defray medical expenses is being organized by the publishers of *Mix Magazine*, *RE/P*, *Pro Sound News* and *Stage and Studio*. Contact Jack Kelly at Klark Teknik, Steve Woolley at Panasonic/RAMSA or any publisher above for further information. ■

IEEE Honors Nikola Tesla

The IEEE has unveiled a plaque commemorating Yugoslav-American electrical inventor and engineer Nikola Tesla. The plaque was installed in the lobby of IEEE headquarters in New York City February 3.

Tesla invented the ac induction motor and devices for generating high voltage and high frequency currents. He joined the American Institute of Electrical Engineers in 1888, its fourth year of organization. The AIEE was the IEEE's predecessor organization.

Hats off to Tesla, the father of high-frequency electrical engineering. Among those unveiling the IEEE plaque are William Terbo, Tesla's grand-nephew; Dr. Milan Bulajic, Yugoslav Tesla Fund; Dr. Emerson Pugh, IEEE president and Wallace Behnke, Jr., IEEE power engineering society president (left to right).

More and more people are lining up for the Panasonic SVHS Pro Series.

One look is all it takes. And you'll see why more and more people are lining up for the Panasonic® SVHS Pro Series. Because anyone in the market for a high-quality professional video production system, simply can't afford not to look at what the Pro Series can do for them.

Take Cost-Performance. The Panasonic SVHS Pro Series delivers both. By combining the efficiency and systems flexibility of half-inch technology with the exceptional performance of Y/C component signal processing.

The result. A comprehensive video production system that provides two hours of operation on a single cassette. With over 400 lines of horizontal resolution. And signal integrity through five generations.

By now it should be obvious. The closer you look and the more you compare the Pro Series to historical video formats, the sooner you'll line up for the Pro Series.

As a Panasonic SVHS Pro Series user, you'll have direct access to Panasonic's nationwide network of engineering, service and technical support specialists. And with over 300 professionally trained dealers, many of whom are self servicing, you'll always get the most out of your Pro Series equipment.

Finally, a professional video format more and more people are lining up for. The Panasonic SVHS Pro Series.

For more information and your local dealer,
call your nearest regional office.
Eastern Zone: (201) 348-7620 • Central Zone: (312) 981-4826
Southern Zone:
Dallas Region: (817) 685-1122 • Atlanta Region: (404) 925-6837
Western Zone:
Seattle Region: (206) 285-8883 • Los Angeles Region: (714) 373-7275

See us at NAB Booth 4142

To assure excellent quality, support, service and professionalism, the Panasonic Pro Series is available through authorized dealers.

Panasonic
Professional/Industrial Video

Circle 114 on Reader Service Card Page 107

How Good is Our 3rd Generation? 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 inventory.

- Signal Source: Luminance: Shibasoku TG-7/1 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.

The UTP-1 signal transcoder is more than ready to transcode virtually any component signal into any other component signal. Saving you an extra generation.

The IFP-44 editing interface controls Pro Series decks on both the source and edit side. To easily integrate into selected 3/4" systems.

Our CCD Cameras are equally spectacular. And with the Panasonic SVHS Pro Series you not only get outstanding performance, you also get the added economy of 2-hour operation in the field and in the studio.

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

For more information and your local dealer, call your nearest regional office.
Eastern Zone: (201) 348-7620
Central Zone: (312) 981-4826
Southern Zone:
Dallas Region: (817) 685-1122
Atlanta Region: (404) 925-6837
Western Zone:
Seattle Region: (206) 285-8883
Los Angeles Region: (714) 373-7275

SVHS

Panasonic
Professional/Industrial Video

See us at NAB Booth #4142

Circle 116 on Reader Service Card Page 107

CROSSTALK
AN ENGINEERING MANAGEMENT JOURNAL

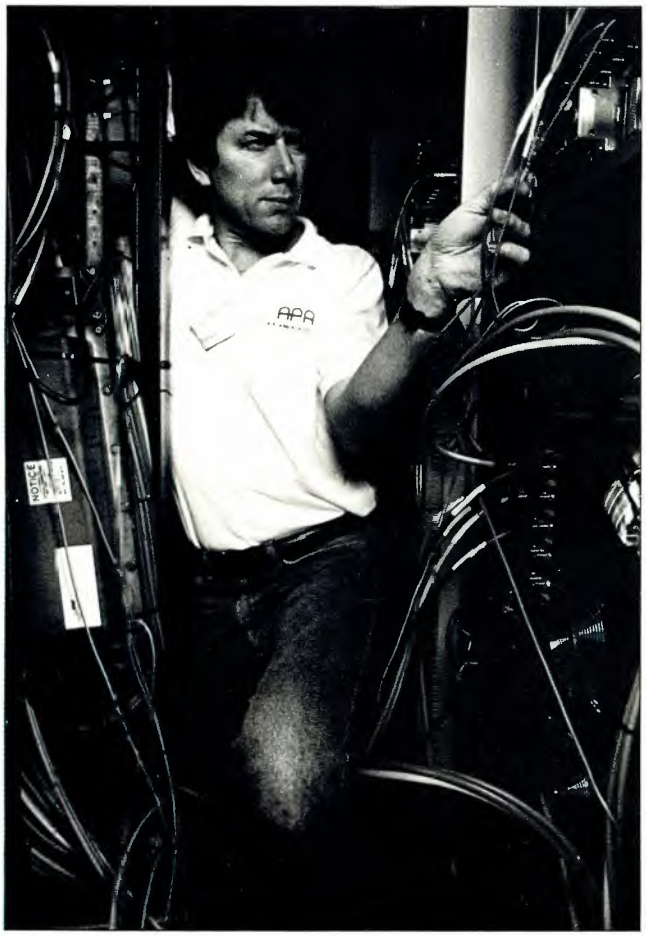
HDTV in Space...Fairlight Fails in Emergent DAW Market

HDTV in Space

It was the ultimate ENG assignment for New Jersey-based engineering consultants AF Associates: put together a state-of-the-art—but temporary—HDTV installation. The high definition photo opportunity? The launch of the space shuttle Discovery Monday, March 13.

The project began when NASA contracted with Bellcore (Bell Communications Research) to provide an HDTV closed-circuit feed via fiber optics. NASA is interested in HDTV to deliver pictures from space and as a means to monitor its launches. AF Associates, which has a long engineering relationship with Bellcore, was commissioned to design, build and engineer the temporary location unit. Technology and equipment were supplied by Sony, Grass Valley and Bellcore.

Working from a converted office trailer at the Kennedy Space Center, AF Associates technical director Jim McGrath and Bellcore's Dr. Indra Paul got what they term "pretty, exciting" pictures from four different camera angles. Barred at the last minute from siting a camera on top of the vehicle assembly building, the AF team scrambled to compensate.



Jim McGrath wends his way through the cables in AF Associates' temporary HDTV immobile.

The team got some terrific camera angles, McGrath said. The closest was at 1.7 miles from the launch site, where a camera was mounted on NASA's automatic tracking apparatus. McGrath also credits its lens selection for contributing to the good results. Lenses for the tracker sites were 150 to 600 mm zooms, which enabled the crew to frame and properly track the shuttle in a good full frame for as long as possible, he said. The team also used a 1600 mm lens on a third camera to track the shuttle through solid rocket stage separation.

Equipment for the shoot included four Sony HDV-1000 VTRs and a digital HD videotape recorder. "The most important thing we learned was about all the interaction between the equipment," said McGrath. "There's a change going on between the sync systems." The shoot interfaced older Sony bilevel sync HDTV equipment which does not conform to SMPTE 240M with a trilevel sync system used in a new Sony digital HD VTR.

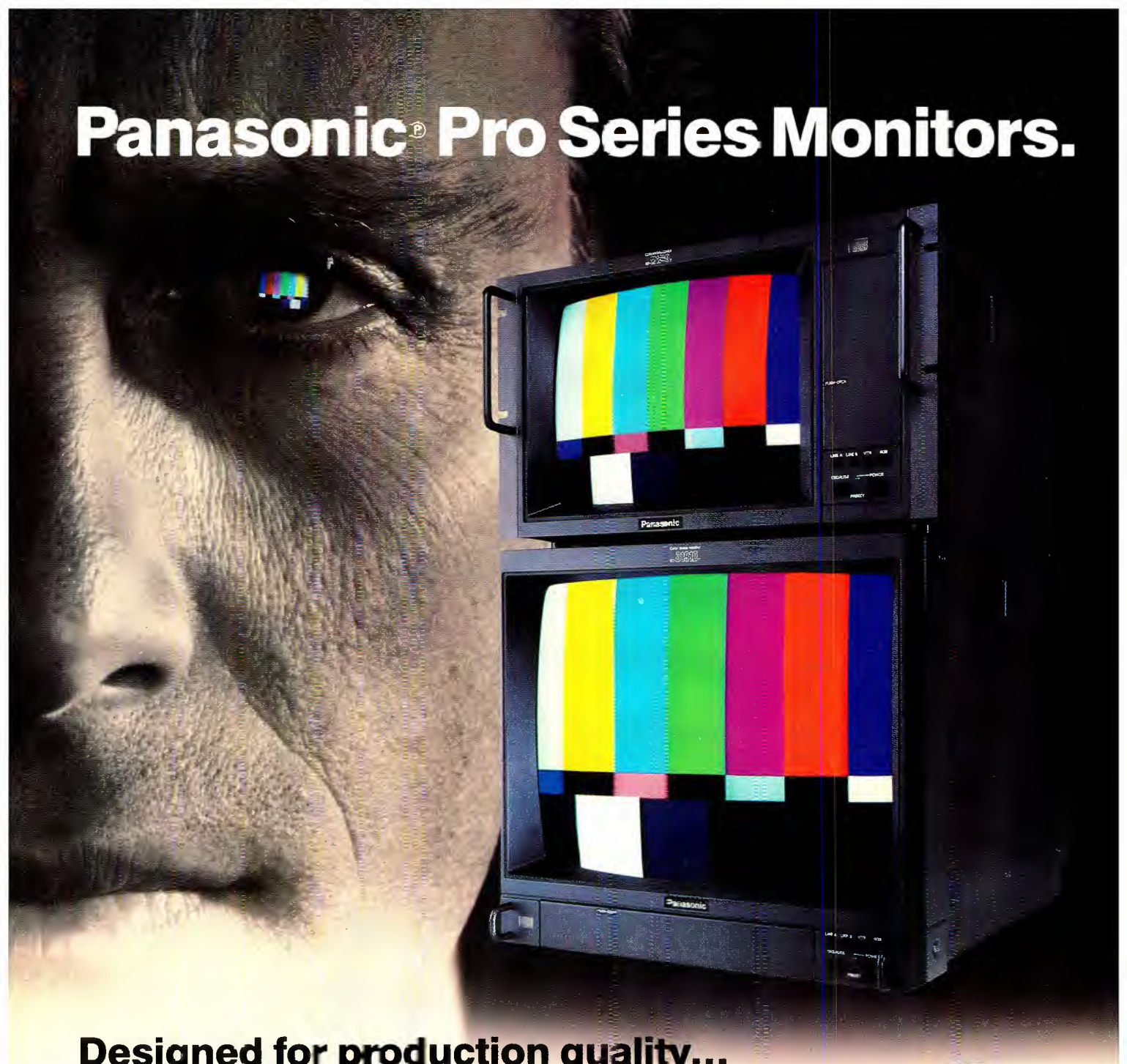
Other equipment included a Sony HD laser disc player, two HD framestores, five HD color monitors (models 1820 and 1828) and three HDC-100 cameras. A fourth camera was added and each was iso recorded. Grass Valley supplied a production switcher, a routing switcher, a 31 series editor and wideband distribution amps. Test equipment included a Tektronix 1480 HD precision scope, a ShibaSoku HD test generator and a Magni 2021 test generator.

The live action was relayed from the Kennedy Space Center to an HDTV viewing site at Research Park at the University of Florida, Orlando via an 88 km fiber optic cable link from Southern Bell. Southern Bell is trying to promote fiber optic technology to NASA; it used the shuttle launch as a "shop window" opportunity to demonstrate carrying HDTV video images over long distances.

"HDTV lends itself well to fiber optics and the phone companies are promoting fiber as a way of delivering it," said McGrath.

AF also provided downconverters

Panasonic® Pro Series Monitors.



Designed for production quality... With an eye on your budget.

S-VHS

Panasonic presents two very versatile, high-grade color monitors--the BT-D1910Y and the BT-M1310Y. Built for performance, these BT-Series monitors offer you the quality and reliability you've come to expect from Panasonic. Not to mention a wide array of features at an affordable price.

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 signal-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.

See us at NAB Booth #4142

Panasonic
Professional/Industrial Video

Circle 117 on Reader Service Card Page 107

through which NASA fed networks and cable companies. Bellcore is making a demonstration videotape of the launch. Look for it at NAB.

Fairlight Fails in Emergent DAW Market

In a sudden move, Sydney, Australia-based Fairlight Instruments Pty. Ltd., manufacturers of highly regarded digital audio music composition and recently launched audio post-production workstations, ceased operating in January. The company's assets were offered for sale as some 200 "orphan" American owners continue to confirm independent service arrangements through the former U.S. service manager.

STOP PRESS

At press time, Fairlight founders Kim Ryrie and Peter Vogel purchased all Fairlight Australian assets and intellectual property at an auction in Australia March 14. The sale does not affect the U.S. No U.S. distributorship is planned.

Effective worldwide, the move caught the industry by surprise. It was triggered by the failure of the venture capital group currently managing the company to provide further funding, according to Fairlight cofounder Kim Ryrie. Fairlight had developed a high debt level in its U.S. operation over the previous two years and the failure to obtain additional financing caused the company to cease operating, he said.

"We had expected additional funding from our investor group at the end of the year and there was no time to look for other sources," said Ryrie, adding Fairlight had record orders in November and December. The investor group was due to provide further funding at the close of 1988 but in December advised the partners futher financing was unavailable.

Ryrie and original Fairlight partner and co-founder Peter Vogel are attempting to form a consortium to buy Fairlight assets and intellectual property. It is not known whether Fairlight's core technology—sampling keyboard equipment for music production and audio post-production systems—will be handled separately from its newly launched range of video products.

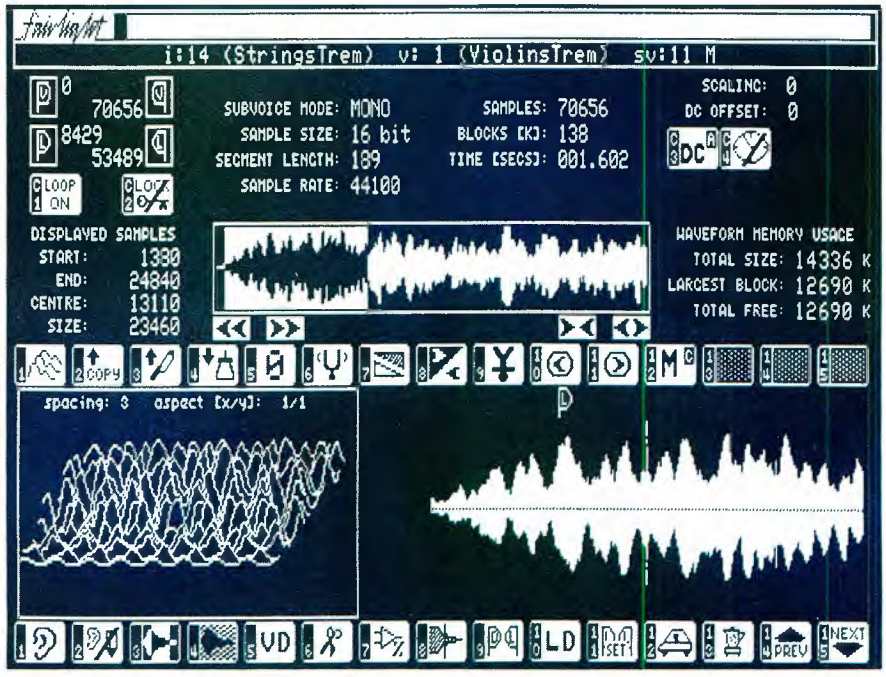
"Like many people in the industry, we made inquiries when we heard they were for sale, but that's as far as it has gone," said Ted Pine, marketing communications manager for New England Digital Corp. NED had been widely rumored as the leading contender for the company's U.S. assets.

"This underlines that potential buyers must make purchase decisions based on a company's stability and its commitment to service as well as an evaluation of technology," Pine said, adding the confusion over continuity of support for current Fairlight owners was "a problem" for the industry as a whole. Although Fairlight failed because of internal business problems, its demise underscores the emergent-market nature of the DAW marketplace, according to NED. "High-tech industries can attract a highly leveraged, go-go mentality," Pine said. "We always said 'Watch this space, there will be a shakeout.' "

"Competition leads to the development of new products and that's healthy," Rod Revilock, manager of marketing and product development for Lexicon Inc., told *BME*. "This is a small industry and we don't want to see anyone go out of business."

Fairlight's demise indicates neither a weakening in the DAW market nor the perils of diversification, according to Revilock. Fairlight sampling keyboard technology was originally developed for music composition and newly developed enhancements extended its capability into post-production. Music production continued to form a large part of Fairlight's primary market, however, whereas DAW applications range more widely, Revilock suggested. "Fairlight's failure doesn't mean DAW applications are limited. The term hasn't really been defined yet," he said.

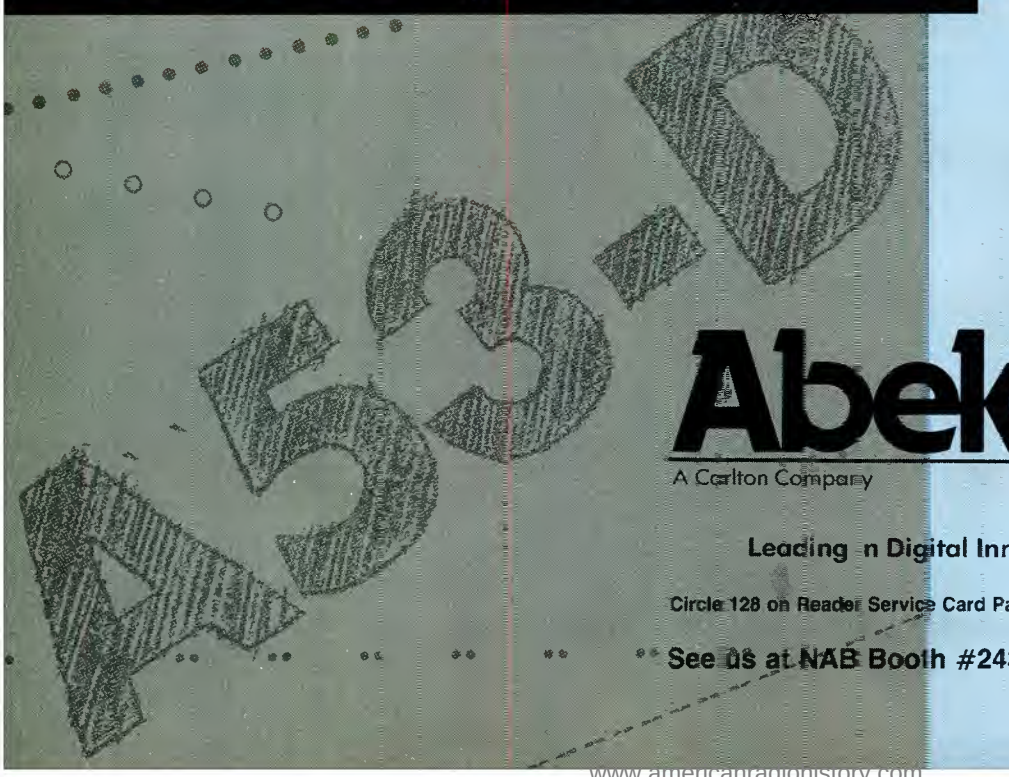
(Note: Andrew Brent is acting as interim service manager for Fairlight equipment. He can be reached at 213-859-6935.)



Say goodbye, HAL. Fairlight exits.

PUZZLE. WHY ARE ALL 1000 ABEKAS A53-D CUSTOMERS SO HAPPY?

Answer: They made the right choice in Digital Special Effects. All 1000 happy customers picked the Abekas A53-D from a field of worthy competitors. Many of them switched from other systems. And all 1000 took delivery in the last 2½ years. Remarkable when you consider the A53-D is just 2½ years old. But then, the A53-D offers a host of remarkable innovations. Page turning Warp excitement, for example. Drop shadow with one channel. Or variable transparency of foreground and drop shadow. Even serial control via all major editors. Nobody does this stuff better than owners of A53-Ds. Which brings us to another puzzle. Why did 1000 professionals who know what's hot and what's not go with the A53-D? Answer: We'd say digital innovation. Our customers call it happiness. Who can figure? Go buy an Abekas A53-D and be happy. For details: **(415) 369-5111**



Abekas

A Carlton Company

Leading in Digital Innovation

Circle 128 on Reader Service Card Page 107

See us at NAB Booth #2436

CRT Alternatives Gain Ground

By James A. Ackerley and Tim Wetmore

When the broadcast industry finally standardizes a method for HDTV transmission, how are viewers going to receive the widescreen images? The giant displays that will do HDTV most justice, if based on traditional CRT technology, could be large enough to evict viewers from their living rooms.

The blue-sky display of the future is not a bulky CRT, but a flat panel that could hang on a wall like a painting. A thin, flat display could be equally at home in the cramped quarters of a mobile teleproduction truck. Such displays are several years away at best.

Probably the most visible of these is the liquid crystal display (LCD), currently used for tiny hand-held TVs like the Sony Watchman and similar products from Hitachi, Toshiba and Sharp.

A typical active-matrix LCD consists of two flat glass plates with the liquid crystal filling the gap between. Because of its twisted molecular structure, the liquid crystal is normally opaque to polarized light, but when an electric field is applied, the structure untwists and polarized light passes through. One or two fluorescent tubes with diffusion plates supply light from the back plate. Filters then polarize the light, which the liquid crystal blocks at some points (pixels) and passes at others. Tiny red, green and blue filters on the inside of the front plate color the light at each pixel. The color and shape of the resulting picture depend on which pixels transmit light and the resolution depends on the number of pixels.

Each pixel consists of three or four subpixels. At each subpixel, an amorphous silicone thin film transistor (a-Si TFT) either supplies, or fails to supply, the electric field to make the liquid crystal transmit light. The inside of the back plate is covered by a grid of transparent thin film electric conductors and an array of a-Si TFTs. The conductors are formed by a thin film deposit with the excess etched away. Similarly, the transistors are formed by several thin film deposits with the excess etched away.

At each point of intersection, the horizontal conductor connects to the gates of two transistors and the vertical conductor connects to the drains of these transistors. A signal on both intersecting conductors causes both transistors to conduct, thereby creating electrical fields at their source terminals and allowing polarized light to pass through the liquid crystal at those subpixels. The operation is sequential, two subpixels at a time, and an interlaced scanning pattern is used to avoid flicker. In order to address each pair of subpixels in turn, the LCD requires a digital, rather than analog, video input.

Traditionally, the most serious drawback to LCDs has been their small size. The largest active-matrix color LCD in current production, for example, is a 6.3-inch unit from Hitachi. Judd Lynn, production manager for World Products, thinks inherent production difficulties could hold the upper limit on the size of LCDs to 10 or 11 inches.

Sharp, however, has demonstrated a 14-inch prototype, suggesting improvements in both size and quality could be on the horizon. The Sharp system boasts a 642 x 480 pixel array for a pixel count of 308,160 and a transistor count of 1,232,640. Sharp scientists claim color reproducibility equivalent to a CRT and good horizontal resolution of about 420 lines. IBM and Toshiba have also just announced a 14-inch prototype with a 720 x 550 pixel array and 1,584,000 transistors.

Although it is not yet possible, Sharp's LCD product marketing manager, Steve Sedaker, says the goal for LCDs is two- and three-foot-wide screens. While acknowledging that direct-address LCDs (without the TFTs) are easier to build than active-matrix LCDs, he adds that Sharp will be building 13- and 14-inch active-matrix LCDs in the near future. Sedaker further expects LCD resolution to catch up with CRT resolution. In his opinion, the best LCD color is already as good as CRT color and in some cases color saturation is better.

Of more concern to the broadcast engineer are the prospects for LCD color monitors. Sedaker reports work is in progress to allow LCDs to operate over a wider range of temperatures and this could result in LCD

The Sony Watchman displays NTSC video on a tiny LCD screen.

color monitors becoming a reality.

One troublesome aspect of LCDs is aliasing, or the tendency for lines to be jagged rather than smooth. Light from a CRT's phosphorescent coating tends to die out and soften the outlines of images, while light from liquid crystals tends to persist, leaving each pixel clearly defined. There is no known solution to the problem, but higher resolution should help. On the plus side for LCDs are reduced power requirements, but even here the backlighting in an LCD consumes at least 10 W.

Some manufacturers are apparently determined to stick with the CRT. According to Luke Rowles, marketing manager for display products from Sony's Professional Products division, "Sony is concentrating on CRTs because, for now, the CRT yields the highest quality picture with the best resolution and color characteristics of any display medium available."

Dave Sapper, assistant general manager at Hitachi America, one of the largest CRT manufacturers, says, "The CRT is still far better than anything else in terms of resolution and color. For some years to come, I can't see a threat from any other technology. The economics of the CRT are still very attractive and that's always a consideration in technological development."

One of the first companies to develop a large-size LCD screen for color display was Sayett Technology, a wholly owned subsidiary of Kodak. "We see future development in LCDs coming from several directions," says Don Ver Ploeg, director of corporate communications for Kodak. He believes computers may receive one of the prime LCD pushes. "We've been working heavily with software companies, such as Microsoft, to develop both control and display systems that will make LCD displays compatible with both the Apple Macintosh and the IBM PC."

But what about other flat-panel technologies? Plasma displays are also undergoing rapid development

Developments in flat panel display technology are starting to give the CRT a run for its money.

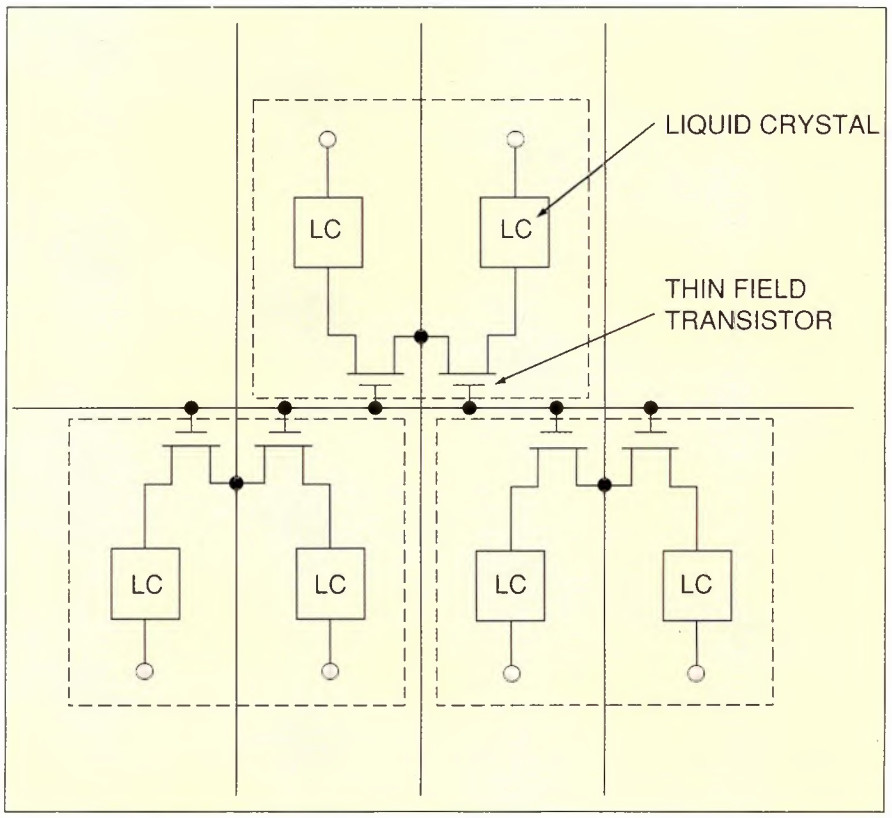
but, by admission of plasma proponents themselves, it's a technology likely to remain too expensive for all but highly specialized video uses. Another limitation: All plasma systems are monochrome except for a handful of prototypes not slated for wide release in the near future.

That leaves the technology known as flat tension mask (FTM). Although basically a CRT itself, its developer, Zenith, contends that it represents a true departure from preconceptions about display technology. "It uses a perfectly flat shadow mask and a perfectly flat screen," relates Chuck Prazak, director of the FTM program at Zenith. "The mask is stretched across the screen and will absorb very high beam power."

In effect, this flat tension mask allows designers to use an anti-reflective surface to eliminate glare, one of the big problems with most flat-panel displays. It also enables the system to have greater brightness and achieve better contrast levels, resulting in a sharp, bright picture even in a brightly lit room. The mask's high resolution is shown in a pixel count of 640 x 480.

The conventional CRT won't go away, at least not in the foreseeable future, but flat-panel technology is clearly the wave of the future. Look for flat panels to appear next in computer monitors, workstations and applications where CRTs can't be used, such as individual video monitors aboard airplanes. ■

Wetmore is a New Jersey-based writer specializing in technology. Ackerley is BME's technical editor.



Typical thin-film transistor and liquid crystal interconnection.

Introducing the smallest, lightest broadcast Betacam® camcorder in the world.

The BVW-200 weighs only 15 pounds, including lens, cassette, viewfinder, and lightweight battery. So you can hold any shot better and longer. Plus, it records for an entire hour on a single NP-1A battery.

But state-of-the-art features are what make the BVW-200 extraordinary by any standard. Betacam SP® format. Advanced CCD technology for higher sensitivity, resolution of 550 lines, and a superior S/N ratio. There's even viewfinder playback.

RAISES TV JOURNALISM TO NEW HEIGHTS.

And all of this fits into a 15-inch length. And a low profile for unobstructed peripheral view. The BVW-200. More compact and maneuverable than any other camcorder before it.

Suddenly, the impossible shot is yours. To find out how the BVW-200 can help your work reach new heights, see your Sony Broadcast Sales Engineer. Or call: (800) 635-SONY.

SONY®

BROADCAST PRODUCTS

ATV

HIGH STAKES, TOUGH CHOICES

The broadcast industry faces one of its toughest decisions ever—the choice of a standard for high definition television. Here's what some of the leading decision-makers have to say.

The decisions that will shape the broadcasting industry of tomorrow are being made today, by a diverse assortment of groups within and without the broadcast industry. Each is struggling to have its say amid the rising pressure from various directions—technological, political and economic.

With new developments occurring almost daily, it is virtually impossible to present a complete view of the HDTV picture in all its complexity. BME's editors asked half a dozen leading figures in the evolving HDTV arena to update us on the progress their organizations are making toward implementation of high definition television. They responded by sharing their unique perspectives on this nascent technology.

ATV Test Pilots

The long road toward ATV transmission standardization is about to begin at the Advanced Television Test Center (ATTC), a nonprofit organization voluntarily formed by broadcasters for independent evaluation of the many proposed systems.

"This is the first time broadcasters have come together collectively to undertake something of this sort," says Peter M. Fannon, executive director of the ATTC. The former president of the National Association of Public Television Stations and director of planning for PBS is ready for the difficult task ahead.

ATTC is charged with conducting objective and subjective evaluations of all ATV transmission systems proposed for broadcast, satellite, cable, fiberoptic and microwave use. Its findings will be reported to the industry and public, but most importantly to the Committee on Advanced Television Service of the FCC, who will make recommendations on standards to the full Commission, based primarily upon the ATTC's test results.

Right now, Fannon says, ATTC is developing hardware and procedures for testing, and hopes to begin actual evaluation of proposed systems in October 1989. But the testing may prove difficult. "Most of these systems aren't yet built, and very little is known about how to test them," he observes. "Our challenge is not to undertest."

Digital videotapes will be made of all proponents under test, providing a convenient means for later psychophysical and comparative evaluation with a wide range of subjects, and leaving permanent records of results.

"It would be the first time that policymakers could see as well as hear the real differences," notes Fannon. He categorizes the proponents into three camps: enhanced NTSC-based signals, "simulcast" NTSC/HDTV sys-

PETER M. FANNON

tems, and NTSC-incompatible formats.

"Anyone who presumes to bypass everyone with a TV set today would do so at his own peril," he cautions, although he acknowledges that "every system is a combination of tradeoffs, compatible or incompatible. We hope our analysis will show the real cost benefits of the tradeoffs." Fannon notes, however, that most systems still employ 6 MHz-wide channels.

He adds, "The best system may not be the province of any one group's thinking," implying that proponents might be encouraged to "think about mutual ventures that would result in a sum greater than the equal of the parts."

Responding to concerns that demand for ATV hardware may provide domestic manufacturers with an opportunity to get back into the television manufacturing business, Fannon states that ATTC will not treat systems differently based on their country of origin, but adds, "Where the dollars flow may depend more on the [proceeds from] licensing than the actual manufacturing."

ATTC's Second Interim Report, due at the end of this month, will detail the procedures to be used in all its tests, but Fannon expects the ATTC's work to take at least another two years to complete. He foresees no problem with continued funding.

"The broadcasters who support ATTC have agreed to contribute whatever it takes to get this job done," he says confidently. But he recognizes that this cannot be an open-ended process. Fannon feels that broadcasters have focused the FCC on this issue, and the Commission has responded; now the ball is in his court, and he wants to get solid information out to the public and the policymakers quickly, "so that the issue of ATV can be addressed on its merits sooner rather than later, to the benefit of all concerned."—*S.P.*

Flaherty Foresees Gradual Changeover

"Several of the proponent transmission systems to be tested should demonstrate their ability to transmit a high-quality HDTV signal," predicts Joseph Flaherty, CBS vice president and general manager of engineering and development and chairman of the Planning Subcommittee of the FCC's Advisory Committee on Advanced Television Service (ACATS).

In the competition to offer superior HDTV, both cable and direct broadcast satellite (DBS) have an advantage to the extent that broadcast bandwidth may be a limitation, but Flaherty expects this advantage to be at least partially nullified when efforts to use two broadcast channels are successful.

Flaherty discounts the possibility that NTSC and HDTV will exist side-by-side, competing for separate markets like AM and FM radio. "It won't happen," he states. He foresees, rather, a gradual changeover from NTSC to HDTV similar to the changeover from black-and-white to color, with free, over-the-air television re-

Fannon: "Most of these systems aren't yet built, and very little is known about how to test them. Our challenge is not to undertest."

ATV

taining its popularity in an essentially unified market.

Three phases of the work of the committee as a whole are propagation testing, objective testing and subjective assessment. Propagation testing is presently being conducted by the Systems Subcommittee of the ACATS at the Advanced Television Test Center (ATTC) temporarily housed in the PBS facility in Arlington, VA. This testing is necessary to determine if it is practically possible to transmit an HDTV signal using two noncontiguous channels.

The next phase of testing, also to be performed at the ATTC, will be the objective testing of the hardware. This will start when the hardware is delivered late in 1989 and is expected to continue through all of 1990.

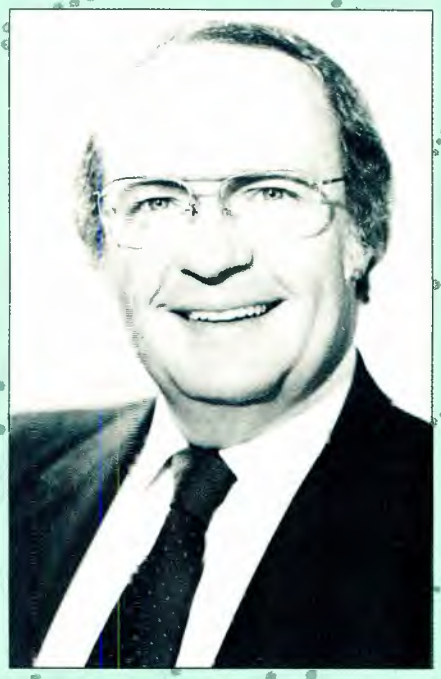
A working party of the Planning Subcommittee has completed an all-inclusive list of attributes to be evaluated during objective testing. Among the more important attributes, for example, are resolution received and motion portrayal.

There will be no limits or "passing grade" for each attribute. The purpose will be simply to determine the best system, rather than to establish any arbitrary standard of excellence. Another working party is writing specifications for the test equipment and test setups that will be needed to do the testing.

Panels of average viewers having no special expertise or training will perform a subjective assessment of each proponent system. This will be done at various sites after the objective testing is complete. Viewers will evaluate each system from prerecorded inputs rather than from actual transmission.

The evaluation and testing program is funded by contributions from the major networks, the NAB, other broadcasting organizations, group broadcasters and all members of the FCC's Advisory Committee on Advanced Television Service. The cost of the many meetings of working parties and advisory groups is generally supported entirely by the organizations represented.

In any given market, a cable operator has several channels while a broadcaster has only one. This gives cable the option of making a rapid switchover to HDTV on one or more of its channels while the switchover by any broadcast station must be more gradual. According to Flaherty, we may look for broadcast HDTV to evolve more slowly than cable HDTV, but we shouldn't expect HDTV to materially alter the competition between broadcasters and cable operators. In his view, both broadcast viewers and cable subscribers will continue to have essentially the same reasons to choose one or the other.—*J.A.*



JOSEPH FLAHERTY

Green Predicts NTSC-HDTV Coexistence

NTSC and HDTV services will coexist in a manner similar to AM and FM radio, predicts Richard Green, president and CEO of Cable Television Laboratories, Inc.

In Green's view, the subtle differences between the NTSC and HDTV markets will mirror the difference in the AM and FM markets. As he sees it, the purist will be an early convert to HDTV whatever the cost, but many others—especially if enhanced NTSC comes into existence—will hold back and become a well-entrenched market for NTSC.

Green hopes cable operators can gain an edge in the competition for the HDTV market by offering a better picture than the broadcasters. His big

Flaherty discounts the possibility that NTSC and HDTV will exist side-by-side, competing for separate markets like AM and FM radio.

DSC CMX AURORA

NAB Booth #4538

Meet the Group

Individually, we're Chyron — CMX — DSC — and AURORA (with their newest INTELLIGENT LIGHT).

Together, we're THE CHYRON GROUP. We're Character and Graphics Generation . . . Video, Film and Audio Editing . . . Special Effects . . Digital Disc Recording . . . Videographics Paint, 3D and Animation.

Together, we provide systems for every application and every marketplace — with four of the most respected product lines in the industry.

Together, we offer a broad range of products for every budget — with the best financing programs available.

And together, we've extended sensible protection against product obsolescence — with our new GTUI Plan (Guaranteed Trade-Up Insurance).

Meet The Chyron Group. Industry-standard products. Innovative financing. Guaranteed future system upgradability. Solutions.

Chyron
516-845-2020
516-845-2022

DSC
904-377-8013

CMX
In CA:
1-800-982-3400
Outside CA:
1-800-932-3400

Aurora
415-369-9400

THE CHYRON GROUP

The company the whole world watches.

Chyron • DSC • CMX • Aurora

Circle 115 on Reader Service Card Page 107

ATV

concern is that the FCC standard, when approved, will fall short of the quality cable is capable of delivering. Some 15 proponent systems will be tested by the FCC's Advisory Committee, but in Green's mind, the best of these might easily fail to provide the quality the cable industry is looking for.

Green points out that many of the proposed systems are untested. While computer-simulated demonstrations may be impressive, he adds, only full-scale use of actual hardware can predict the inevitable, real-life problems that may occur.

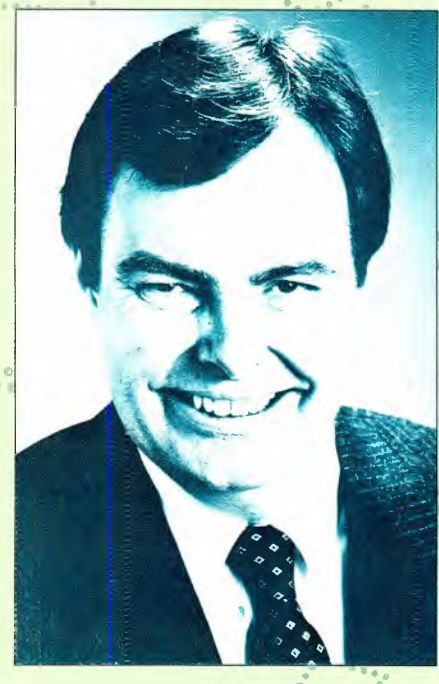
What will happen if the FCC adopts an HDTV terrestrial broadcast emission standard compatible with NTSC and capable of interfacing with cable, but the cable industry doesn't like the picture? One possible answer, according to Green, could be the creation of a separate cable-industry standard for transmitting noncompatible HDTV on cable.

Cable should have an advantage even without a separate signal, Green continues. In many cases, the "purist" who is most likely to go for HDTV is already a cable subscriber, he notes. He adds that cable can devote whole channels to sports or opera, where the benefits of HDTV will be most apparent. Broadcasters offer no comparable service.

Despite his doubts about the suitability of the proponent systems for the cable industry, Green is making no predictions concerning the future. He regards the idea of a second signal as merely an option, rather than a plan of action. As for the present, he says, "The cable industry wants to work with the broadcast industry to develop a standard that will serve the needs of both."

One area of full cooperation is an HDTV broadcast-cable interface proposal being prepared by the Planning Committee of the ACATS. The interface will enable cable to carry HDTV broadcast programming the way cable now carries NTSC.

Cable Labs represents, on a subscriber basis, about 80 percent of the cable industry and derives its $9 million funding from the assessment of its members. It is currently negotiating a move from Cambridge, MA to a new main office to be located in the Boulder-Denver area of Colorado, where it hopes to establish a working relationship with the University of Colorado's very strong optical electronics program. It was also attracted to this area by the near presence of the National Telecommunications Information Administration (NTIA) Laboratory, one of best propagation laboratories in the world. Cable Labs concentrates on R&D in the areas of fiber optics and HDTV. In the area of fiber optics, Green is not intimidated by the telcos.



RICHARD GREEN

"Ten years of experience in using fiber optics in actual operating systems gives the cable industry an edge in the fiberoptic delivery of video," he asserts.—*J.A.*

Peace through Prosperity: The AEA

"Economic competitiveness has become *the* national security issue," states a working report issued by the American Electronics Association (AEA) ATV Task Force Economic Impact Team. "While a few view ATV's incredibly detailed images as simply a boon to couch potatoes,'...most recognize the long-term competitive implications: the 'ripple effect' on other electronic industry segments."

In Green's view, the subtle differences between the NTSC and HDTV markets will mirror the difference in the AM and FM markets.

"There are two voices in the country which are not so much at odds as 'crossmessaging,' " said Pat Hill Hubbard, vice president of science and technology for the AEA. One group—loosely, the broadcast industry—is primarily concerned with sending high-resolution television pictures to the home. The second group sees HDTV technologies "converging" into advanced imaging applications. The primary issue for the latter group, which the AEA represents, is how to re-enter a market we vacated, Hubbard said.

Although Rebo High Definition Studio has recently joined the association, most AEA members come from the computer and semiconductor industries.

"You can make a link between the U.S. leaving the consumer field in products like TVs and VCRs in the early 1970s and the current shortage of DRAMs, which is affecting computer systems manufacturers," the AEA's John Hatch also told *BME*. "You can make the same case for display technology."

The AEA wants to see a three-pronged initiative to develop HDTV, according to Hubbard. One prong is an industry-led initiative, another will focus on consumer products, and the third was begun by the Department of Defense, which recently began a program to fund research into HDTV display and communications technology. "The DARPA initiative put the technology agenda on companies' plates, and hopefully it will have a life of its own beyond that," she said. "We hope we don't have to walk away from HDTV and say 'DARPA was it.' "

The next step for the AEA is development of HDTV business plans for presentation to Washington no later than May 15. "It's crucial we do this now," Hubbard said. "If we miss May, we lose a year." Some 30 AEA members have agreed to fund business plans. "It's clear that a single company will not try to re-enter this business alone," Hubbard said. "The financial risk of squeezing back into a market where there's no plant, shelf space or distribution is very high."

The AEA is also exploring the creation of industry-led development and manufacturing consortia. One model is a joint industry-government R&D effort focused heavily on commercial development of research technology. Technology licensing agreements and government tax credits are other issues under consideration.

Although the AEA does not rule out partnership arrangements with foreign companies, U.S. HDTV manufacture is the association's primary goal. "We hope this becomes a real partnership between U.S. government and U.S. industry," Hubbard. "I have no doubts we have the capability here to meet whatever technological challenges arise."

"The broadcast industry is definitely part of our vision," said Hubbard, addressing concern that the television business could be overlooked by proponents of the "convergence" theory of imaging. "We're trying to get the nonconsumer electronics industry together, but there's certainly room to ensure their needs are addressed, too."

Although the AEA says the wisest

PAT HILL HUBBARD

Hubbard: "The broadcast industry is definitely part of our vision. There's certainly room to ensure their needs are addressed."

ATV

DR. JAMES J. TIETJEN

course in establishing HDTV standards is not to make definitive statements, the association is a member of an FCC advisory group. "Some people charge we're behind the FCC downward-compatible spectrum issue, and we aren't," Hubbard says. "But we did make the FCC aware that whatever standards they adopt, the issue is bigger than TV and there will be an effect on the U.S. competitive trade position. That was our contribution."
—*B.J.*

Tietjen Urges Rapid Standardization

Dr. James J. Tietjen, president and CEO of the David Sarnoff Research Center and chairman of the Implementation Subcommittee of the FCC's Advisory Committee on Advanced Television Service (ACATS), believes any delay in making HDTV available to U.S. television viewers could be a competitive nightmare.

"Not only might a time lag fail to help American companies," Tietjen argues, "it might compel the Japanese to introduce HDTV VCRs and other components which could slow progress for all concerned. Establishing standards is a separate issue apart from considerations of competitive advantage and the rapid introduction of standards should be good for broadcasters especially and also for others."

Tietjen believes the Japanese are no longer pressing for world acceptance of the 1125-line, 60 Hz MUSE transmission standard and are willing to wait for the rest of the world to establish its own transmission standards. If they have to wait too long, he cautions, they could attempt to force a market for HDTV products by introducing HDTV VCRs. This would create a problem for both the broadcasters and the cable companies. According to Tietjen, "The sooner standards are adopted the better for all, especially the consumer."

The subcommittee Tietjen heads consists of two work parties. One concerns itself with possible legal restraints to the introduction of HDTV and the other, in close conjunction with the ACATS Systems Subcommittee, works on the actual transition from NTSC to HDTV. The Subcommittee solicited implementation details from each of the 19 HDTV system proponents. Information from the 14 respondents was tabulated into a spreadsheet for easier analysis.

Maintaining an open procedure at every stage, the Subcommittee has mailed the spreadsheets back to the proponents for comments. When hardware for the proponent systems becomes available late this year, objective testing will begin at a test center located in the PBS facility in Alexandria, VA. The Subcommittee should end its work in late 1989 or early 1990 and the full Committee, assuming an FCC extension, should finish sometime in the last quarter of 1990.

Many Subcommittee members work for companies in the broadcasting industry and some of these companies have a direct interest in the outcome of Subcommittee proceedings. Does this mean there's a conflict of interest problem? "Absolutely not." says Tietjen, "We keep the whole process open so that everyone knows what everyone else is doing and we don't reject anyone's ideas. The proponents are given many opportunities to modify their proposals and the final report does not pick a winner, but merely gives the FCC the facts in a

Tietjen: "We keep the whole process open so that everyone knows what everyone else is doing and we don't reject anyone's ideas."

Gold Standard.

In finance, the gold standard means unquestioned security and reliability. In broadcast-quality satellite receivers, it means the Agile Omni Professional. From Standard Communications.

Based on intelligent microprocessors, the Omni Pro does most of the thinking for you. You choose the desired satellite signal, and the Omni Pro automatically sets the correct format of C or Ku band antenna inputs, full or half-transponder operation, center frequency, channel spacing, audio subcarrier frequencies and more. In essence, two knobs let you select audio/video performance without confusing conversion or reference tables, without complicated switches and controls, without hassle. But that's just the beginning.

Order the optional RS-232 computer remote control and you can change everything from the transponder bandwidth to the subcarrier frequency, for a whole network or any individual unit, either by phone modem or Earth station uplink.

For broadcast applications, Standard offers the Omni Pro with the Broadcast Performance Package, which includes proof of performance, EPROMs pre-programmed for all domestic satellite formats and channels, multiple IF bandwidths, additional audio subcarrier demodulators, and more.

To get the full story, call or write Standard's SATCOM Division.

And find out how little gold it takes to get on the Gold Standard.

Standard Communications
SATCOM Division

P.O. Box 92151
Los Angeles, CA 90009-2151
Telephone: (800) 243-1357
In California (800) 824-7766
(213) 532-5300 Telex: 67-7173

Circle 110 on Reader Service Card Page 107

format on which all concerned parties have agreed."—*J.A.*

Rebo Learns by Doing

Barry Minnerly and Abby Levine, president and vice president, respectively, of New York City-based Rebo Research, know a lot about pioneering. Rebo was the first company in the U.S. to use HDTV equipment for video and film production and consequently found itself a de facto industry technical authority.

"Not only do we have to figure out how to use the equipment and retrofit it, but we have to develop the market for it," said Minnerly. Rebo's high definition work is based on Sony HD analog equipment. Rebo also identified the obvious gaps in the high definition equipment arena and recently developed some products itself to fill them.

"The big thing that's missing is a digital video effects device," said Levine. "One optical effects processor exists in Japan, although it costs $1.2 million." HD production is "limited," but not necessarily "primitive," compared to what can be done in NTSC, he continued. "In a year or two a lot of the NTSC post tools will also be available in HD post. That's a matter of money. The limiting factor is really a lack of tools. If you need to do a special effects shot, like Super Slo-Mo, you can't do that in NTSC either. Some things are done best in specific media—HD is excellent for mattes and film is excellent for high speed photography."

Both men think HDTV is headed toward digital production and distribution. "It's not necessary to be digital, but it's going there," they say, adding that film effects people are stimulating demand. "Digital is not a panacea. Despite the number of generations, there are limits to its effectiveness. It's well-suited to certain processes like image manipulation and processing, but it's not necessary for everything. It presents great difficulties for the front end, especially cameras," says Minnerly. "Digital, however, is a product that will not be stopped. In 150 years they'll rediscover analog."

"There are definite technical advantages to HDTV," Minnerly continued. "It offers instantaneous development, so it's easier to see what you get, why you get it and the effects of change. You can see a special effect immediately in real time, rather than going through an NTSC transfer and optical printer test if you are shooting on film." Special effects clients originally thought HD work would save them a great deal of money, Minnerly says, but now they want the advantages of immediate live view and the flexibility of originating in a high-quality transparent medium. Many also like HD's "look" when it is downconverted and transferred directly to NTSC.

BARRY MINNERLY

Rebo's position about high definition formats is that production should use the best-quality system available at any given time. "Some people say that in three years, better formats will be available—but if we all waited, no one would buy a VCR," said Minnerly. "This is a working system which is relatively reliable, considering what we put it through. The cameras and the tubes themselves are the limiting factors in terms of resolution." Minnerly and Levine say there is plenty of room for improvement in the current 1125-line system, citing an expected boost in HD VTR recording capacity from 20 MHz per channel to 30 MHz per channel, the SMPTE

Minnerly: "Not only do we have to figure out how to use the equipment and retrofit it, but we have to develop the market for it."

specification.—*B.J.*

Promoting 1125/60

The aim of the Washington, DC-based 1125/60 Group is pretty straightforward: the establishment of the 1125-line, 60 Hz high definition television format as a production standard for the world. "We seek a single worldwide standard for studio origination and international program exchange," the Group's charter states.

That seems pretty simple, and in pure science the simple solution is usually the correct one. In the HDTV arena, however, international political, personal and economic interests are working to intertwine HDTV production with the establishment of domestic transmission standards. As recent events such as Cap Cities/ABC's attempt to roll back ANSI 240M as an American HDTV production standard clearly show, these factors practically guarantee HDTV will be broadcast—and probably originated—from the Tower of Babel.

"It would be a real shame to go into the twenty-first century with HDTV versions of NTSC, PAL and SECAM," William Connolly, president of Sony Corp.'s advanced systems division and technical spokesman for the 1125/60 Group, told *BME*. "With any change, there's always anxiety. It's not caused by true problems, just by change itself. You ask yourself, 'Wouldn't it be better if we wait?' The answer to waiting is that the world will pass us by."

Connolly argues that the only way to move HDTV forward is to separate the issues of transmission and production. "Linking transmission and production automatically obscures the logical conclusions," he says, pointing out that audiences watch programming, not standards. A single standard makes program production simpler, more straightforward and more cost-effective, he argues. In addition, a single standard makes international co-production easier and ensures cost-efficient broad distribution for the independent program producers who "feed" most of the international broadcast community.

WILLIAM CONNOLLY

"It's a pretty parochial view for people to say they want a production standard that is 'more friendly' to local transmission standards," says Connolly. "I'd say they're not well-informed."

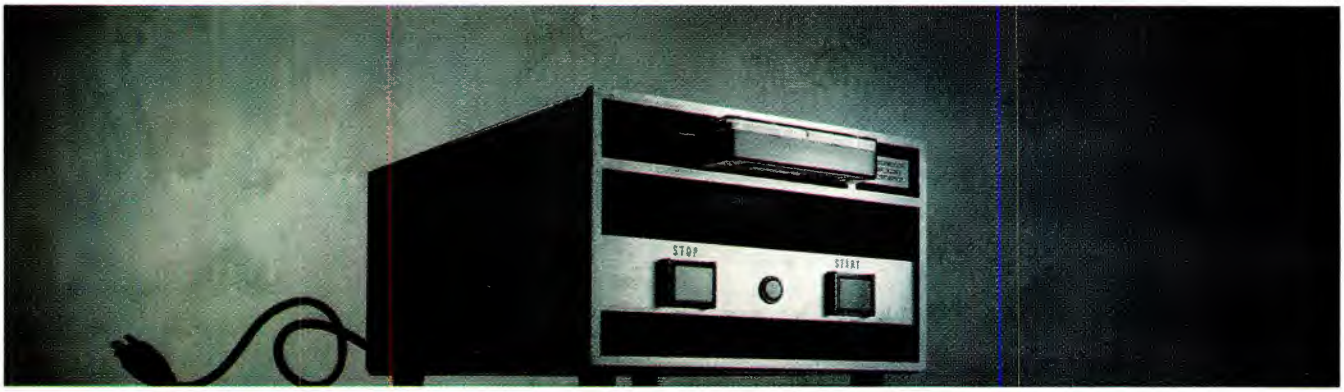
In support, Connolly cites the 1988 Algiers CCIR standards meeting where the committee was charged with developing a single worldwide production standard on a universal vote. "It was a unanimous vote," said Connolly, who attended. "You would think that was a clear mandate."

The 1125/60 format is a voluntary production standard in the U.S.; it can be transcoded to any current transmission standard and is transferrable to and from 35mm film. It is not transparent to the European-developed Eureka system or vice versa. "Eureka was designed to be different," Connolly says.—*B.J.*

Interviews in this special report were conducted by BME technical editor James Ackerley, senior editor Beth Jacques and contributing editor Skip Pizzi.

Connolly: "It would be a real shame to go into the twenty-first century with HDTV versions of NTSC, PAL and SECAM."

It's withstood nineteen years of raps, bops, swings and hits.



Reliability. It's what ITC audio cartridge machines are all about. Even after years of playing and pounding. In fact, you'll find many of our original models still in use today. Like this one from KOMA-AM in Oklahoma City.

ITC cart machines have always been engineered to withstand heavy-duty use. That includes our latest models. It's reliability that's made ITC the undisputed world leader in cart machines.

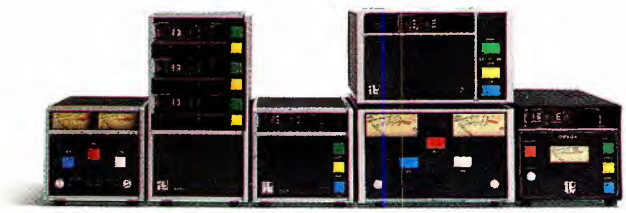
But our reputation doesn't end there. Engineers say ITC offers the best support in the business. With toll-free technical advice. Fast turn-around on repairs and parts. And a two-year warranty on factory labor and all parts including motors, heads and solenoids.

No wonder stations buy ITC machines more often than any other brand. And keep coming back for more.

There's an ITC cart machine for every need. The 99B Master Recorder with the patented ELSA cartridge preparation system. The DELTA series, the most popular cart machine for the last five years. And the economical OMEGA series, offering affordable performance.

To find out more, call International Tapetronics, 3M Broadcast and Related Products Department at 1-800-447-0414. (In Illinois and Alaska, call collect: 309-828-1381.) Or see one for yourself at these dealers: Allied Broadcast Equipment; Broadcast Services Co.; Broadcast Supply West.

Tell them you heard about it from a reliable source.

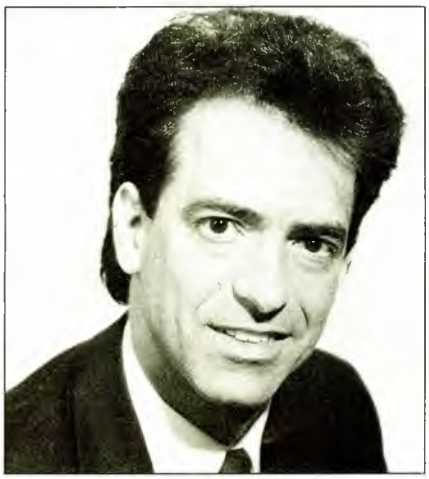


3M

Circle 111 on Reader Service Card Page 107

THE DIGITAL AUDIO WORKSTATION DILEMMA

A major purchasing and production decision may be in your future. Are you equipped to make it wisely?



BY SKIP PIZZI

The digital audio workstations on display at NAB 1989 will present engineers with a difficult assessment. Few of us have the perspective required for a valid appraisal of this new equipment category. It's hard to evaluate something when the industry hasn't even defined the unit of measurement. Add to this the infancy of the industry, with its first-generation bugs and "gold rush" atmosphere, and you have an intimidating environment for the prospective purchaser.

The sad fact is, it's probably not going to get much better, although the number of vendors may shrink as "natural selection" takes its toll. The process has already begun, in fact, with the corporate demise of Fairlight Instruments Ltd. in late January.

This is a good time to get an early grip on the situation. To aid in this, we offer some thoughts on the decision-making processes that confront us in the workstation world.

First of all, is the price justified? Prices will inevitably come down, and further system integration will bring cheaper, more task-specific units. Any realistic price comparison must consider that most workstations replace a multitrack tape recorder and a mastering recorder, and some replace most or all of a mixing console.

Unfortunately, most of us don't replace all of these items at once, unless we're starting from scratch. So this big a ticket may be hard to swallow as an incremental improvement. This is especially true for the many broadcast facilities that have never had much of an investment in multitrack recorders in the past, but who might still benefit from a workstation.

And the comparison is not quite that direct, either. Most workstations can outperform a multitrack deck in terms of editing individual tracks after "layup," and in their ability to slide tracks around in time relative to each other. Editing in general can be previewed before commitment, much like video editing. And the compact size of the workstations makes them much more space-efficient than the hardware they replace. Their "soft" configuration eliminates the need to decide how many tracks are enough, and what track format to use, a source of great concern when purchasing a multitrack ATR.

Even the highest-priced systems may prove cost-efficient. A number of recording studios, for whom billable hours are of supreme importance, have successfully implemented workstations. According to these users, this hardware doesn't sound any better or do any more in the end for the client, but it does it all *faster*. The time saved can be booked by other clients. One major studio claims its workstations have paid for themselves faster than anything else they have ever bought.

This is not just a newer, better version of last year's product—it's a whole new product. So new, it may redefine the very nature of audio production.

Can this timesaving capability translate to the same economic advantage for broadcasters? That will depend on the specifics of your situation. Is your cash flow limited by production speed? If your production studio were more productive, would that show up on your bottom line? It is important to note that audio downloading to, and uploading from, a workstation cannot currently be accomplished at anything greater than the real-time speed. For the facility not already using multitrack regularly, these added steps can actually make production take longer. The picture will change radically if faster-than-real-time digital I/O becomes available.

Radio and television/film users of these devices will have different needs and priorities. The relative ease of synchronization and of conforming audio to last-minute picture changes that many workstations offer is a clear advantage to teleproduction. For radio, the justification is more difficult, since much of the daily production load is fairly quick and simple, thus minimizing the potential time savings. But for a very busy audio-only facility that commonly works on complex productions, today's workstation may prove cost-effective.

Current offerings range in price from around $20,000 to over $150,000. All workstations are not created equal, and the price differential reflects that. They break down into three major categories:

1) Editor only. Audio is downloaded into the workstation, assigned to various "tracks," edited and output. No audio processing, no mixing onboard. Examples are the AMS Audiofile and DAR Soundstation II.

2) Editor with "virtual" mixer. Audio is downloaded in, assigned to tracks, and edited. Mixing and some audio processing can be accomplished using a mixing-console-like display on CRT, emulating typical control surfaces, and operated by mouse or QWERTY keyboard manipulation. Examples are the Waveframe Audioframe, NED PostPro, and Dyaxis System. Some workstations of this variety are also based around musical keyboard controllers, such as the NED Synclavier.

3) Editor with digital mixer. Here a small mixer is attached, to be used for A/D conversion, grouping, mixing and assignment of audio inputs to the workstation, as well as digital mixdown and processing of edited tracks. Workstations of this category (such as the Lexicon Opus, AMS Logic 1 and SSL 01) are true standalone control rooms, requiring only an outboard mastering deck to which to download the final mix, and an audio monitoring system.

Even some of the higher priced models are still fairly limited in what they can actually accomplish. For example, one of the fully dedicated workstations has an eight-input, onboard digital mixer. But the CPU can only handle three "disk events" simultaneously, meaning that only three tracks can be mixed at a time to an outboard mastering deck, or only *two* tracks if staying totally inboard with the mix file—the preferred method in most cases.

Size variations are also notable. Storage capacity is the primary variable here, but access time and general design philosophy are also involved. Sizes range from desktop to several full racks. How versatile and modular the control software is should be considered as well. Each workstation has a personality that belies the origin of its creators, whether they be digital sampler/synthesizer manufacturers, audio processing firms, console designers, tape recorder builders, or pure computer types. Knowing this going in can help scope out the design approach, and thereby help you get quickly to the heart of any potential strengths or shortcomings for your applications.

And of course, don't forget user-friendliness. How long it takes your staff to come up to speed on the device is far from a trivial concern. Various levels of training and other support are offered by the manufacturers. Determine these clearly, and factor them into any purchasing decisions.

Remember, too, that this is anything but a static market. Economic volatility and "soft" configurations both make for lots of changes in a hurry. Many buyers have changed their minds more than once between purchase approval and delivery. We're dealing with rapidly moving targets here, faster than we're used to, since much the momentum driving this development comes from the high-volume computer industry.

The workstation's advantages come hand in hand with the danger of making a massive mistake, if a choice is considered imprudently. Fluency in this arena takes more than a quick trade-show demo. An entire brave new world must be carefully confronted, a world where computers meet audio and broadcasting. Even if a long-term demo in your studios is available, it takes valuable amounts of your time to study, learn and finally evaluate. Is that worthwhile? The answer is probably yes, since you are investing in your own and your company's future, and expanding your knowledge base. Somewhere, sometime, this is inevitable technology. ■

Pizzi is ***BME****'s contributing editor.*

The Future of Broadcast Audio Has Arrived...

Neve's 66 Series

The 66 Series offers the possibilities of tommorrow for today's sonically demanding broadcast facilities. Neve has combined its unmatched analog circuitry with the latest techniques in digital control to create the 66 Series — a completely new range of audio consoles for broadcast applications.

Take a look at just a few of the features of the 66 Series:

- Microprocessor - controlled reset system for switch status and input gain
- Optional system to restore rotary controls and faders to previous settings
- Dual input mono and stereo mic/line channels
- Multiple clean feed system (mix-minus)
- Four-band equalizer
- Silent matrix switching
- Four or eight stereo groups
- Up to 12 mono and two stereo auxes
- 24 or 32-track recording and post- production options

Neve welcomes you to the future –

the 66 series

Neve
A Siemens Company

BERKSHIRE INDUSTRIAL PARK, BETHEL, CONNECTICUT 06801, U.S.A. • TELEPHONE: (203) 744-6230.
260 WEST 52ND STREET, NEW YORK, NY 10019, U.S.A. • TELEPHONE: (212) 956-6464.
6353 WEST SUNSET BLVD., SUITE 402, HOLLYWOOD, CALIFORNIA 90028, U.S.A. • TELEPHONE: (213) 461-6383.
1221 16TH AVENUE SOUTH, NASHVILLE, TENNESSEE 37212, U.S.A. • TELEPHONE: (615) 329-9584.
MELBOURN, ROYSTON, HERTS SG8 6AU, ENGLAND • TELEPHONE: ROYSTON (0763) 60776.
POSTFACH 326 A-1031, VIENNA, AUSTRIA • TELEPHONE: 43-222-72930.

Watching the horizon for more of Type IX?

That's Sony's value line of U-Matic SP™ 3/4-inch video equipment.

Well, the goods are here. And they're not just good. They're great.

There are three new pieces: the VO-9850 Editing Recorder, VO-9800 Recorder/Player, and the VO-8800 Portable Recorder. They will dazzle you with advanced capabilities. And affordable prices.

One innovation is software control. A menu on the screen lets you preset an optional time code and access other machine functions, such as diagnostics, by means of front panel software switches.

The RS-422 serial interface for remote control is bi-directional, so that the edit controller is continually updated on machine status.

Plus longitudinal SMPTE time code, for ±0 frame accuracy. Not to mention the Dolby® C audio noise reduction, with balanced audio XLR connectors.

But see these wonderful new arrivals for yourself. Just call Sony at 1-800-523-SONY.

SONY®

PROFESSIONAL VIDEO

inside
YOU GET THE RIGHT STUFF

Today's multi-format editing demands more from a TBC. So the Nova 900S delivers more: Professional TBC performance with true 4:2:2 component processing. Plus synchronized input switching and digital effects that will "supercharge" your video system's creative potential.

outside
YOU GET THE RIGHT NAME

The Nova logo means proven performance, dependability and reliability: Our exacting test and burn-in procedures make sure of that. And we back every Nova TBC with a guaranteed 24-hour service turnaround, because you can't afford days of downtime or missed deadlines.

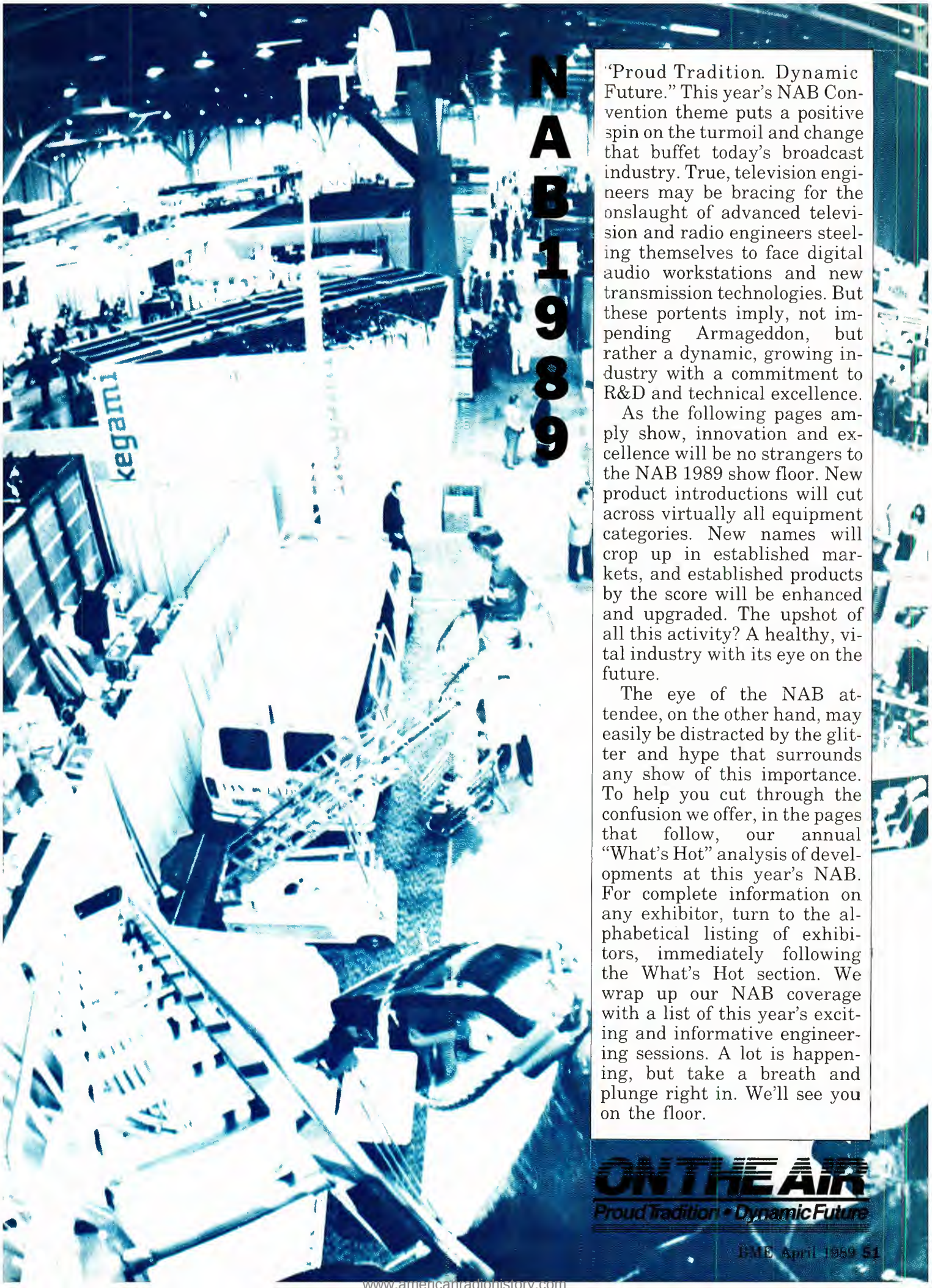
nova 900S SUPER TBC™

Now get all the flexibility of S-VHS and composite inputs and outputs. All the creativity of digital effects. All the professional quality and reliability of a Nova TBC. All in one cost-effective Super TBC — the Nova 900S.

NOVA SYSTEMS, INC.
50 Albany Turnpike, Canton, CT 06019
Tel (203) 693-0238 • Fax (203) 693-1497

nova SYSTEMS, INC.

THE CLEAR CHOICE IN VIDEO TECHNOLOGY



"Proud Tradition. Dynamic Future." This year's NAB Convention theme puts a positive spin on the turmoil and change that buffet today's broadcast industry. True, television engineers may be bracing for the onslaught of advanced television and radio engineers steeling themselves to face digital audio workstations and new transmission technologies. But these portents imply, not impending Armageddon, but rather a dynamic, growing industry with a commitment to R&D and technical excellence.

As the following pages amply show, innovation and excellence will be no strangers to the NAB 1989 show floor. New product introductions will cut across virtually all equipment categories. New names will crop up in established markets, and established products by the score will be enhanced and upgraded. The upshot of all this activity? A healthy, vital industry with its eye on the future.

The eye of the NAB attendee, on the other hand, may easily be distracted by the glitter and hype that surrounds any show of this importance. To help you cut through the confusion we offer, in the pages that follow, our annual "What's Hot" analysis of developments at this year's NAB. For complete information on any exhibitor, turn to the alphabetical listing of exhibitors, immediately following the What's Hot section. We wrap up our NAB coverage with a list of this year's exciting and informative engineering sessions. A lot is happening, but take a breath and plunge right in. We'll see you on the floor.

ON THE AIR
Proud Tradition • Dynamic Future

AVOID THE GENERATION GAP.

GOOD ENOUGH FOR THE NEXT GENERATION OF CCD CAMERAS.

The new generation of FUJINON lenses are the first—and only—lenses built to deliver all the performance capabilities of today's most advanced CCD cameras. And, by anticipating the next generation of CCD cameras, FUJINON has eliminated the generation gap. Every FUJINON ⅔" and ½" format lens is compatible with the highest registration specifications and offers total interchangeability.

The new A15 x 8 ESM and A18 x 8 ESM studio lenses exhibit the industry's lowest longitudinal chromatic aberration. Which means unprecedented color and focus-tracking accuracy with any CCD camera. The same is true for the new A55 x 9.5 ESM—the field lens with the world's highest zoom ratio.

For studio use, the new A15 x 8 ESM zooms from 8mm out to 114mm, while the *F1.5 maximum aperture remains absolutely flat!* At 120mm, it's F1.7. That means no changes in your present studio lighting. And you can fill the screen with an 11' x 8' subject from only 10' away.

Weight and size are reduced, reliability and serviceability are increased. Major components are modular and interchangeable. Controls and adjustments are accessible *with the shroud in position.* These include back focus adjustment and lock, servo/manual switch for the built-in 2X extender, and pattern projector color levels and chart positioning. Focal length and aperture are reported through LEDs on the side of the lenses. And options include the full array of FUJINON accessories including remote demands and shot boxes.

To learn more about FUJINON's new generation of ⅔" studio/field lenses, you'll get more information or a demonstration by calling the FUJINON location nearest you.

See us at NAB Booth #3555

FUJINON INC. 10 High Point Drive, Wayne, New Jersey 07470 (201) 633-5600
Southern 2101 Midway, Suite 350, Carrollton, Texas 75006 (214) 385-8902
Midwestern 3 N. 125 Springvale, West Chicago, Illinois 60185 (312) 231-7888
Western 129 E. Savanora Way, Carson, California 90746 (213) 532-2861

FUJINON

A subsidiary of Fuji Photo Optical Co. Ltd.

Circle 122 on Reader Service Card Page 107

WHAT'S HOT

TV/VIDEO

Judging by the number of new product introductions scheduled for NAB 1989, video equipment manufacturers are going out of their way to demonstrate the health and vitality of the broadcast industry. If you're attending the show, be prepared for some surprises and plenty of excitement.

The staid production switcher market, for example, will heat up considerably as Sony enters the field with a splash. Don't expect other switcher manufacturers to take this move lying down; this year should see dramatic development in production switchers generally. Digital effects, too, will move beyond the established cast of characters with new entries and lots of new and upgraded equipment.

Video recording, last year's hottest area, will cool to a steady simmer this year as both Ampex and Sony continue to ship their D-2 recorders. But Panasonic/Matsushita will attempt to keep the temperature high with its new half-inch digital recording technology.

With the industry about to begin HDTV testing, advanced television is sure to dominate many conversations at this year's show. In addition to NAB's own ATV Hall, at the Convention Center, the 1125/60 Group will host a large display at the Tropicana Hotel.

Here's a sampling of NAB's hottest products for video:

Switchers and Post-Production

• The hottest news in this area will be Sony's (4101) entry into the production switcher market with not one but six exciting products. Entry-level switcher is a three-input unit that includes a field of memory to lock together two VTRs, eliminating the need for TBCs and allowing simulated A/B edits with only one VTR. It features full 3D digital effects and a surprisingly low price tag. Second in the line is a 10-input, 1 M/E switcher with full key bus and four external key inputs. Options will include a chroma keyer, E-File and a downstream keyer. The switcher also features an editor interface and digital effects link. The next step up is a 10-input, 1 M/E switcher with two key buses and a downstream keyer, genlock and editor interface as standard equipment. This unit is capable of nonlinear transitions, has 34 wipes and a digital effects link, and will be available in a component version that can intermix Betacam and RGB signals.

Sony switcher four has 17 inputs, one M/E, and a program/preset bus with effects. Standard configuration includes auto phasing of inputs, E-File and a chroma keyer that can use a component background signal. The digital effects link runs on the same fader as the switcher.

An unusual item will be a seven-input, 1.5 M/E switcher that is completely battery operated. The size of an attache case, it will feature three linear keyers and 34 built-in wipes. The top of the line will be the "ultimate" Sony switcher, a D-2 composite digital unit that will be demoed as a product concept only.

CEL family of video effects devices.

• Another advance in high-end switching is expected to be on view at the Abekas booth (2346), where the A84 digital component switcher will make its debut. Announced (but not exhibited) at SMPTE, the A84 is a high-end switcher for the D-1 digital domain.

• Ross Video (4977) will unveil the Downstream Multi-Keyer, an option for the company's RVS416 production switcher. The device can put eight different keys from six sources on the screen at one time, bringing the total of key levels on the 416 to 12. It also features non-additive keys, allowing key source and program video to be combined.

• Thomson (5141) will show several new production switchers: the TTV 5645, an analog component switcher with 4:2:2 digital processing; the TTV 5650, a serial component digital mixer; and the TTV 5655, a parallel component version of the 5650.

• New from Crosspoint Latch (3977) will be a pair of production switchers, the 6129 BHK and the 6199 YC.

• Utah Scientific (4526) will introduce a new automation

system, the TAS-1.

• In video editing systems, CMX (4538) will premier the latest version of its midrange editor, the 3100B. The B has all the features of the 3100A, which it replaces, plus the operational features of the higher-priced 3400A. Users of the 3100B will enjoy advanced capabilities such as Dynamic Motion Memory, Gismo II software, expanded GPI, alphanumeric reel names, and switcher M/E bank assignable from the editor's keyboard. In addition, CMX has upgraded its 3600 Edit System with a bootable 20 Mbyte hard disk, which offers increased speed and more file space. This option, which is retrofittable to existing 3600s, costs $3500.

• The new A34 Solo integrated post-production system from Abekas (2346), shown in a hospitality suite at SMPTE, will make its official U.S. debut. This product combines editing with time base correction, A/V switching and programmable digital effects.

• United Media (5544) will introduce its Multi-Tasking Series of multisource video editors.

• Cinedco (7027), known for its Ediflex, will introduce the Cineflex random-access video editor and the Audiflex digital audio workstation.

• Also noteworthy: Comlux (3085) plans to unveil a multichannel, all-digital telecine system. Convergence (1773) will unveil the Slo-Motion edit controller.

Digital Effects

• Industry leader Ampex Corp. (4501) will up the effects ante with the introduction of a moderately priced addition to its ADO line, to be unveiled a day before the show opens.

• Sony (4101) will unveil an "incredibly powerful" digital effects device. This high-end, high-priced unit will be positioned to compete directly with the Ampex ADO 3000 and Quantel Mirage and will link with Sony's new switchers.

• Pinnacle Systems (801) will premier the Prizm Video Workstation, built on a modular, VLSI-based platform. Options for the system include the Prizm Digital Optics system, featuring true 3D perspective, warp and curvilinear effects, along with 1/32 sub-pixel motion resolution, smooth movement and 15-point antialias filtering. Other modules include an eight-bit linear key channel and Prizm FreezeFile image storage. The system meets CCIR 601 specs and features D-1 I/O.

• CEL Ltd. (at the James Grunder booth, 4177) has upgraded its seven-bit efx/framestore/TBC system in a big way. The new model, the P164 series, features an eight-bit, 4:2:2 format, along with new software, proprietary ASICs, and DSP digital signal processors. The device has four composite inputs with internal switching and input selection for component, Y/C, YUV, and digital. Added memory capacity has allowed a raft of new effects, such as skew, ripple, cropping and zoom, perspective, H and V flips and mirrors and many more. It is built around an infinite window TBC and five-field framestore.

• ALTA Group's (4526) latest intro in this field is the Cygnus 5.5, a wideband TBC/synchronizer that supplies 5.5 MHz bandwidth in both composite and Y/C modes. It also provides 3 dB chrominance NR and has a new one-line chroma-luma delay for multiple generation color integrity. The Cygnus 5.5 meets RS-170A specs and includes a wide variety of production effects.

Video Graphics

• Look for Sony (4101) to enter the still store market with an innovative product using removable optical WORM disks for true CCIR 601 digital component storage. Sony's "decentralized hardware-distributed software" approach relies on linking a series of completely independent mainframes, each of which supports up to eight disk drives. A control computer off each mainframe drives the system. Several computers may be tied together using the network port on the computer. A "jukebox" holding 50 disks can replace any single disk drive.

• Ampex's (4501) entry into the hot character generator market, Alex, will make its NAB debut. This midpriced unit ($15,000 to $50,000) is positioned to compete with such high-end CGs as the Aston 4 and Chyron Scribe. It features 256 levels of both transparency and antialiasing, plus virtually unlimited manipulation and animation, variable motion speed, an internal palette of 16 million colors and effects such as metallics and glows. A unique feature is the ability to map characters to follow a curve.

• Dubner (4130) will introduce a number of enhancements to its product line, including the new 30K character generator and the GF-50, an upgraded version of the GF-30 Graphics Factory.

• Harris Corp. (1305) will show the latest enhancements for its Vws still store/video workstation, including character generation, 2D graphics, and 3D animation.

• Aston (7720), famous for its high-end character generators, will show a new still store product.

• Look also for new product introductions from: Aurora (4956); BTS (4119); Chyron (4538); Digital F/X (7211); Intelligent Light (7105); Cubicomp (703); Wavefront (7217) and Symbolics (7017).

Processing and Standards Conversion

• Merlin Snell & Wilcox (5330) will introduce several exciting products: the ME 2001 high-definition downconverter for all HDTV standards; the ME 9900 multistandard four-field standards converter, now in full production; and the ME 8800 compact universal standards converter.

• The line of Stage *1 enhanced NTSC encoders and decoders from CDL (3944) will make its NAB debut with new additions and enhancements.

• Thomson (5141) will introduce a new 4:2:2 digital component color corrector, the Colorado, which operates on individual and master gains, blacks, gammas, saturation RGB, with time code and memory.

• The CVS-940A standards converter will premier at the Yamashita Engineering booth (3712).

• Intelvideo (4478) will premier a dynamically enhanced NTSC coding technology.

• Look for a new line of component video encoders and decoders from Conrac (1741).

Automation

• Switching automation will take a step forward when Media Touch (2105) unveils its ARC-2000 software, which operates in conjunction with any audio switcher or mixer. Days of switching any input to any output plus start, stop, rewind, and recue instructions for analog machines can be set up weeks in advance.

• A new control room touchscreen console will add the crowning touch to Dynatech NewStar's (4526) popular newsroom automation system. A full news set and hourly newscasts will demonstrate NewStar's ability to automate newscast production while controlling a fully electronic teleprompter, Betacart, character generator, still store and robotic camera system.

Video Acquisition and Recording

• Two new CCD cameras will be on view at the NEC booth (3444). The SP-30, at approximately $25,000, is the ENG

Thomson's Sportcam CCD field camera.

version of the EP-3. It uses a high-density interline frame transfer CCD chip that boosts its resistance to smear. Other features include over 700 lines of resolution, sensitivity of f/6.2 at 2000 lux and 60 dB S/N. The NC-120 is a $13,000 CCD camera intended for the high-end pro or low-end broadcast market; it is a three-chip model with specs almost as good as the SP-30.

• Sony (4101), never a slacker when it comes to new products, will add a new Betacam SP camcorder to its camera line, which already includes the one-piece BVW-200 and the BVP-7 CCD model.

• Panasonic Broadcast (4142) will demonstrate its half-inch composite digital recorder, shown as an engineering prototype at SMPTE. It's expected that the deck's electronics, initially rack-mounted, will have shrunk down to VLSIs for a compact and possibly portable unit. Also new from Panasonic will be the AK-450 camcorder.

• Thomson Video Equipment (5141) will introduce several new cameras. Among them: the Sportcam CCD studio/field camera; TTV-1647 CCD ENG/EFP camera; and the TTV-1532, a high-end studio camera. The 1647 uses a new 768 pixels/line CCD sensor and operates over triax or multicore.

• Sony's (4101) RAM Recorder, previously seen in prototype, will be introduced as a product at NAB. The device is

built on a mainframe incorporating 60 seconds of video memory; memory is upgradable in 20-second modules to a maximum of three minutes.

- NEC (3444) will have further enhancements for its VSR-10 solid state recorder, which now features a sports panel controller.
- A new digital disk recorder will be introed by special efx specialist DSC (4538).
- Also hot: BTS (4119) will also unveil a new CCD studio camera; JVC (4168) will premier a new CCD camera and new S-VHS VCRs.

Advanced Television

While Congress debates the politics of ATV and the electronics industry focuses on economics, the broadcast industry is developing ATV technology at an unprecedented pace. Two venues will showcase the latest: the NAB's own Advanced Television exhibit, at the Convention Center, and the HDTV Pavilion sponsored by the 1125/60 Group at the Tropicana Hotel. A few highlights:

- Rank Cintel (710) will show an updated version of the MkIII HD 1125/60 flying spot scanner. It will be exhibited with an advanced Amigo preprogrammer for color correction in the Tropicana. Rank has announced that it will support all HDTV standards including 1050 lines, and has already shown a 1250/50 version.
- Rebo Research, also at the Tropicana, will have a line of new equipment for HDTV production, including a fiberoptic transmission system, a downconverter, and a framestore. The framestore is based on the Macintosh II and includes graphics.
- BTS's (4119) TAS/TVS 2001 HDTV video/audio routing switcher system, with full 30 MHz bandwidth, will be shown.
- Thomson Video Equipment (5141) will unveil a progressive-scan EDTV studio camera dubbed "Proscan."
- Test equipment for HDTV is beginning to appear. Magni Systems (3173) will pull the wraps from a programmable HDTV generator, while Tektronix (3700) will unveil a new HDTV generator family.
- Sierra Video Systems (7904) will have a new keyer for HDTV, the CIK-1. Toko America's (7100) HDTV framestore is also worthy of note.
- Don't forget to check out the established ATV/HDTV players for the latest developments, including Sony (4101), Ikegami (5305), Hitachi (4519) and Faroudja (5733).

RADIO/AUDIO

The word in audio is "digital" once more, but digital with a small "d." This is an NAB of consolidation as companies work to integrate digital technology into equipment that has some practical use today. With the exception of outfitting new facilities or ground-up rebuilds, manufacturers know establishing digital audio as the medium of choice will take several years of pounding the pavement.

"Cost effective" is another popular theme, and many companies are extending ranges or enhancing products as a way to make new sales at price points that won't cause buyers heart failure.

So the digital enthusiasts must wait for what they really want: effective, cheap, compatible mass storage. While a technology like the erasable optical disk may finally kick the reluctant DAW market into takeoff, manufacturers in the meantime attempt to define and diversify their market through areas like audio-for-video and film scoring.

While some interesting products from Valley foretell the future for digital signal processing, new entries from companies like Ampex, Eventide, Lexicon and Dolby continue to prove there's life and high quality in analog yet. Another hot category for stations is telephone interfaces for call-in talk shows. See Gentner for starters.

Despite political problems which continue to inhibit commercial consumer development in the U.S., DAT may be coming into its own. Look also for new or improved entries for AM stereo, NRSC and FMX.

Mics and Intercoms

- Clear-Com (5346-49) adds the Matrix Plus fully digitized matrix system to its line of standard analog intercom systems; also see the Model 1020/M self-contained stereo amplified monitor speaker system. McCurdy (1755) will feature its new CS9500 digital intercom system, 50 x 50 in and 3RU.
- There'll be a host of new mics from which to choose. Shure (1517) adds its new Beta Series dynamic mics to its SM series professional line. The Beta 58 is for music vocals; the Beta 57 for musical instruments. Vega (3846/47), meanwhile, announces the T-88 Pro Plus and Beyer Dynamic (3738/39) bows the MCE 86 shotgun and the SI86 and TS 190 wireless mic systems. Micron Audio (5772) has new wireless mics.
- Watch for more products geared toward ENG and small-

ONE TOUCH... AND YOU'LL SHIFT TO LEITCH

Once you get your hands on a STILL FILE by Leitch, you won't want to let go. The reason is simple ... the STILL FILE is the best designed still store on the market ... fully integrated and with a host of features that are as easy as the touch of a button.

Call Leitch today for a hands-on demonstration, and we'll even leave a STILL FILE at your studio for a while.

We're confident we won't have to pick it up again.

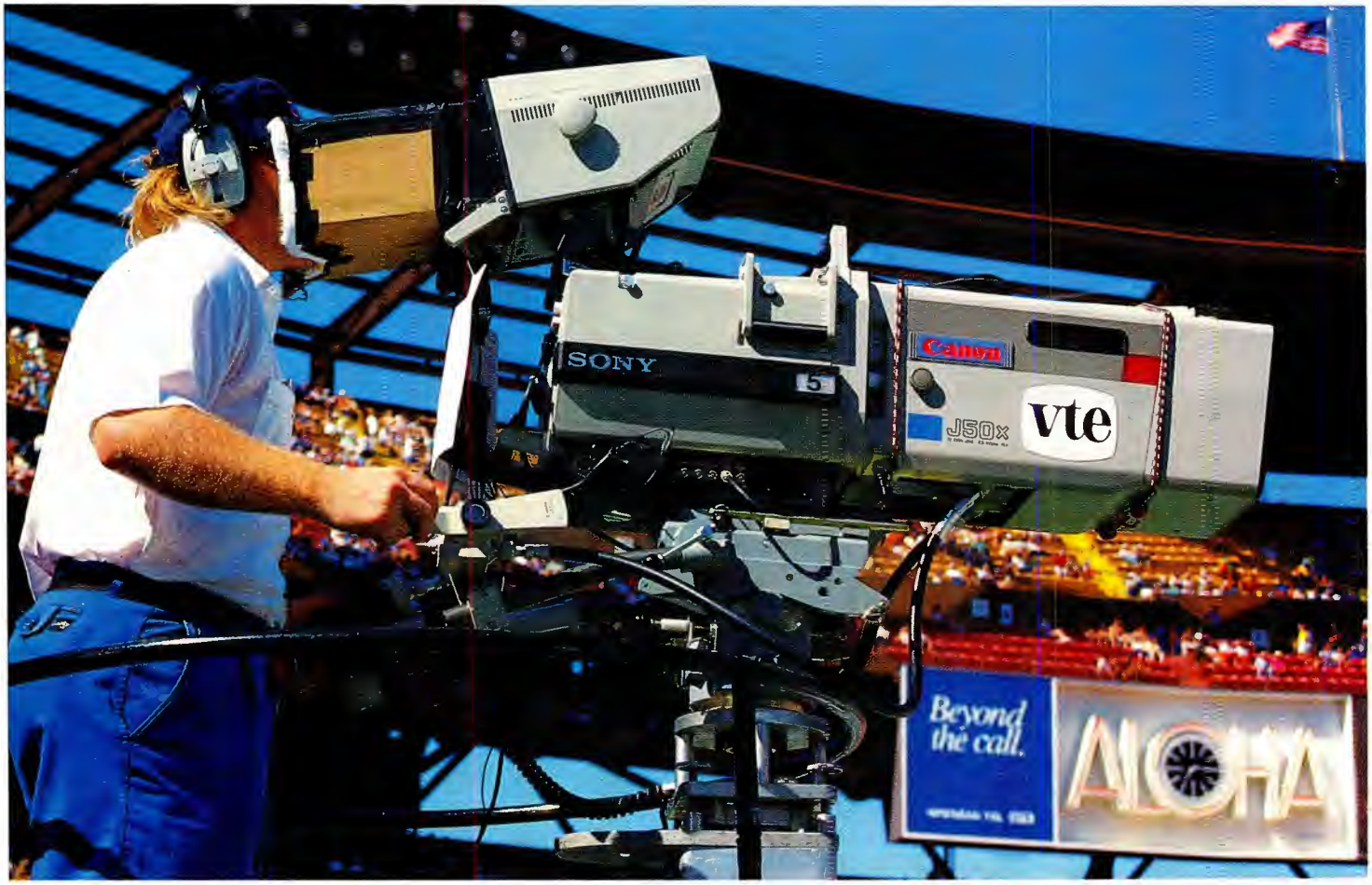
Don't just reach for the nearest brand name ... reach for the best. STILL FILE by Leitch.

LEITCH

Leitch Video of America, Inc., 825K Greenbrier Circle, Chesapeake, VA 23320 – Tel: (804) 424-7920 or (800) 231-9673 Fax: (804) 424-0639
Leitch Video International Inc., 10 Dyas Rd., Don Mills, Ont., Canada M3B 1V5 – Tel: (800) 387-0233 Fax: (416) 445-0595 Telex: 06-986241

See us at NAB Booth #3568

Circle 123 on Reader Service Card Page 107



SEE US AT NAB BOOTH #3955

Canon Answers the Needs of the Broadcast Industry Once Again.

Introducing the Canon J50X9.5BIE.

Canon answers the demanding requirements of electronic field production with the sensational new J50X9.5BIE. The perfect lens for outdoor events like the Super Bowl and the Calgary Olympics where the J50X was put into action. Featuring a 50X zoom ratio, f1.4 maximum aperture, and an effective focal length of 9.5 to 950mm, thanks to its built-in 1.5X and 2X extenders. Any way you look at it, the J50X9.5 gives you incredible reach. Yet, it's great indoors too, with a minimum object distance of 7.2 feet and macrofocusing to 20 inches. Plus the usual high M.T.F., minimized distortion and chromatic aberration you've come to expect from Canon broadcast lenses.

An optional rotary shutter provides a choice of 1/1,000th, 1/500th and 1/250th sec. high shutter speeds and will interface with most major manufacturer's cameras.

The J50X9.5BIE is designed for outstanding performance on both 2/3" tube and CCD cameras. And with a weight of just 36 lbs., these credentials are even more impressive. Simply stated, the J50X represents the most advanced design in optical technology available to the broadcast industry today. There is no better lens to meet the tough professional standards of electronic field production. So the next time you need a broadcast lens with the reach of a 50X zoom and unsurpassed optical quality, choose Canon. Because no other lens measures up.

Canon

Canon USA, Inc., New York Office: One Jericho Plaza, Jericho, NY 11753 (516) 933-6300. Dallas Office: 3200 Regent Blvd., Irving, TX 75063 (214) 830-9600
Chicago Office 100 Park Blvd., Itasca, IL 60143 (312) 250-6200 West Coast Office: 123 Paularino Avenue East, Costa Mesa, CA 92626 (714) 979-6000
Canon Canada, Inc., 6390 Dixie Road, Mississauga, Ontario L5T1P7, Canada (416) 678-2730

Circle 124 on Reader Service Card Page 107

THE INTERCOM SOLUTION FROM McCurdy

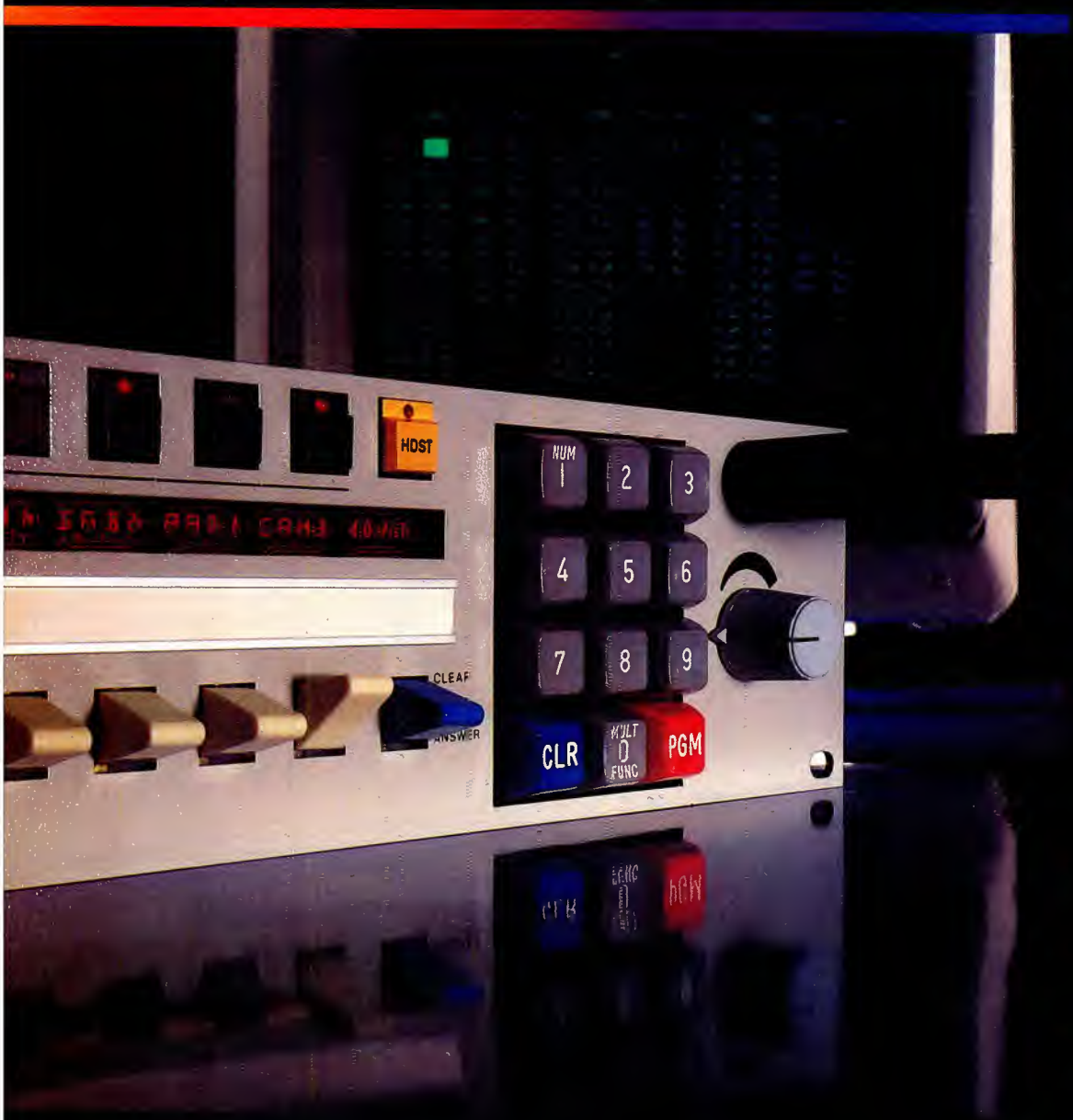
Looking for an integrated communications system? Look to McCurdy for the affordable solution. McCurdy's advanced Digital Intercom Systems have set a new standard for programmability, flexibility, expandability and reliability. We offer you cost-effective solutions to your intercom needs, large or small.

Our affordable, high performance intercoms are integrated communication systems with the following superior capabilities:

- Point-to-Point communications
- Programmable Party Lines
- Programmable IFB's (Program Interrupt)
- Programmable selective Group Calls
- 2-wire beltpack interface
- 2-way radio interface
- Telephone interface with auto answer
- Camera interface
- Camera ISO capability
- Relays for auxiliary equipment control.

Other features include:

- Ultra-reliable
- Instantaneous Cross-point Access Time
- Fastest system reconfiguration time
- Disk based storage system or EEPROM
- Completely modular and field expandable
- 3-pair telco wire between matrix and control panels
- Wide choice of control panels
- Bright, easy to read 4 character alpha-numeric displays
- Easy to program
- All keys universally programmable locally or at central terminal
- System configuration can be changed by user at any time
- Very compact: CS9500 50×50 matrix is only 3 RU (5¼") high



40 YEARS OF EXCELLENCE

McCurdy's intercom systems are in use around the world; they range in size from 10×10 to 400×400 systems.

As the premier intercom supplier for the 1988 Calgary and Seoul Olympic Games, McCurdy intercoms succeeded with flying colors!

Make it an easy choice. Select McCurdy's Digital Intercom System ... the Integrated Intercom Solution.

McCurdy

McCurdy Radio Industries
108 Carnforth Road, Toronto, Ontario
Canada M4A 2L4 Tel: (416) 751-6262
Telex: 06-963533 Telefax: (416) 751-6455

1051 Clinton Street, Buffalo, New York
14206 Tel: (212) 772-0719

Circle 125 on Reader Service Card Page 107

WHAT'S HOT

scale applications. Anchor Audio (3451/2) introduces the series 400, a hardwired party-line intercom system which accommodates up to 40 belt-pack stations. Also new: telephone interfaces, voltage-controlled amplifers and remote control additions to the ARMS 7000 virtual routing audio routing switcher. Samson (2310-08) will launch new portable wireless transmitters and receivers for ENG, including the Infinity with dbx noise reduction.

Radio Technologies: Test Equipment and Enhancements

- Inovonics (1473) launches a digitally synthesized FM stereo generator which includes a plug-in option for FMX.
- Circuit Research Laboratories (CRL) (1009) supports NRSC and AM stereo with the PMC 450 tri-band peak modulation controller and the SMP 950 tri-band matrix processor. Both feature precise implementation of the NRSC standard.
- Delta Electronics (1159) launches a production version of its noise generator for test signal applications.
- TFT (2115) adds frequency-agile high-level inputs and built-in absence of carrier and modulation alarms to the 844A FM aural modulation monitor. It also launches the Model 8888 RPU.

Cart Decks and Automation

- Fidelipac (1117) bows an enhanced version of the CTR3OR three-deck cartridge recorder.
- Digital studio automation innovators Concept Productions (1453-1455) will launch the CAPS II computer assisted programming system based on DAT decks. The system has 120 hours of full random access storage for automated, live or satellite programming operation. Innovative Automation (1603) extends its line of cost-effective analog automation systems, adding the Di-Trol Jr.

Consoles and Production

- A slew of on-air and production consoles will make air freight shipping a nightmare. Wheatstone (1034/40) launches the A-500as on-air radio console which sequentially controls cart machine banks. Also new: the SP6a stereo production console with full external machine control and internal console logic, and the 822 stereo selector audio routing switcher. Ward Beck (5319) bows new on-air consoles, audio test equipment, intercoms and the show's hot product category, telco interface equipment. Broadcast Audio's (1053) Series VI is completely modular up to 24 mixers with standard audio follow video control, while Harrison (1116) enters the AP-100 and Neotek bows the Esprit for post-production. Orion (3068), something of an innovator in digital on-air consoles for radio/TV, adds the AFV/8+8 editing system first seen at SMPTE to its SoundStar post-production lineup.
- Across-the-board entries come from Neve and Amek/Tak. Amek/Tak (2008/18) offers the Tac Bullet, the Amek BCII and the Amek Classic—a field portable mixer, an on-air console and a production console. Neve (2407) will launch the 66 series on-air console and make the new VR production console first seen at the Hamburg AES last month available for hands-on demonstration. VR enhancements include the option of resetting controls to stored configurations; an upgrade program has been developed for V series users.
- Also note: International Music (7440) will show the new Akai digital samplers (models S1000, S1000HD, S1000PB, S950) for people who want to make their own noises without moving into digital audio workstations.

Digital Audio Workstations

- WaveFrame (7817) brings to market its long-awaited universal digital interface module for the AudioFrame digital audio workstation.
- Symetrix (2304/6) enters the digital recording arena with the DPR-100, an adaptive hybrid disk-based processing recorder. Also new: the SX205 precision level indicator.
- AKG Acoustics (2043) will launch its DSE 7000 digital sound editor. A RAM-based work station, it combines an eight-track recorder, editor and mixing system.
- AMS/Calrec (1134) upgrades the AudioFile with ADR software and combines it with the new Logic 1 digital audio mixer to form a workstation.
- Lexicon (2327) is now shipping the Opus 1 for production, post-production, commercial and mastering applications. It now offers 12 channels of integrated digital EQ. New signal processing products: software upgrades for the 2400 stereo audio time compressor/expander and the 480L digital effects system. 2400 Version 3.0 provides new machine interfaces; 480L Version 3.0 provides digital stereo two-band and mono four-band parametric EQ programs.

NAB1989NAB19

WHAT'S HOT

• Filling the gap while the DAT industry attempts to standardize itself, Fostex (5280) presents its four-head D20 DAT digital master recorder, first seen at AES. The unit has SMPTE time code, sync to video, off-tape monitoring and immediate punch in/out. Also new: the R8 eight-track recorder with detachable remote control front panel. Compatible with most synchronizers; MIDI option.

Recording Equipment

• Revox (1261) shows the PR99 MKIII Compact two-channel recorder, while Studer bows the A827-24 multichannel recorder, the A764 professional FM monitor tuner and—sure to be a show-stopper—the A729 CD system controller. Tascam (5577) will also show CD control first seen at last fall's AES.

• Look for DAT everywhere. Leaders of the pack start at Harris (1305) for the XD-001UH broadcast quality unit.

• Note: Many distributors—Allied and Schafer World Communication among them—will be showing DTRs, either as standalones or part of packages.

Post-Production

• Two important companies are entering this volatile category for the first time. The first is Sony (4101), drawing on its professional audio expertise to offer a 24-channel digital audio-for-video mixer. The second is Cinedco (7027), which is entering with a digital audio-for-video editor. Cinedco's Audiflex will first be used in film and video post production but the design is expandable to full DAW functions including music editing and SFX production. Cinedco is also launching the Cineflex random access video editor.

• On the console automation front, Harrison (1116) launches a Macintosh II-based hard disk automation system for its Series Ten automated console and teams with George Massenberg to create an inline multitrack recording, production and post-production recording system. Designated "MR-20", the system combines Harrison electronics and the GML moving fader automation.

• Adams-Smith (2505/11) adds automatic track selection, VTR motion control and C:SOUND still-frame and slow motion sound editing to the company's 2600 A/V Audio-for-Video Editor. Among the new features for the Zeta-Three Audio-video-MIDI synchronizer are multiple tempo map banks, MIDI metronome and Adams-Smith serial protocol via MIDI port.

• SSL (2005) features ScreenSound, a multitrack hard disk-based digital audio editing, mixing and recording system. It interfaces with VTR/VCRs, film reproducers with full machine control and Quantel digital production systems via HARRY for off-line video and film post production and audio-for-video editing.

Signal Processing

• Valley International (2030/32), a pioneer in digital equipment with radio applications, launches its long-anticipated DCE digital compressor/expander. It joins the DDP digital dynamic processor formerly seen in prototype.

• Analog audio processing equipment new here includes Gentner's (2127) Phoenix Audio Prism, Orban's (1630) Optimod-HF 91051 audio processing system for international shortwave and 764B programmable parametric equalizer/notch filter with optional RS-422, RS-232 and MIDI interfaces, and the "cost-effective" hands-on BD940 delay unit from Eventide (2535). New software versions of the Eventide H3000 Ultra-Harmonizer tailor it for on-air production or post (Studio Ultra-Harmonizer) and for broadcast (H3000B), with cart and varispeed tape control. Dolby Labs (1457) will launch a new noise reduction unit, the Model 363/SDV4, while the Aphex (1058/62) Model 250 Type III aural exciter first seen at SMPTE makes its bow at Vegas. HoweTech (1465) will bring the ATC-35 PhaseChaser audio time base corrector, also seen first at SMPTE, to Las Vegas, where it will expand its HoweTech 10K console/mixer series.

Audio Test Equipment

• Digital testing by itself is not new, but digitally based analysis and synthesis of audio frequency signals in both the analog and digital domains is very new. The System One Dual Domain from Audio Precision (2044) can generate either analog or digital at one end and analyze either analog or digital at the other. The system also features enhanced analog measurement capability.

• The trend in audio test equipment is toward increasing sophistication and performance at decreasing prices. The 3200B programmable audio signal generator, at $4380, and the 3100B autoranging audio analyzer, at $5660, both from Sound Technology (4577), are two cases in point. These portable units offer three modes of operation—man-

NAB1989NAB198

ual, automatic, and computer-driven using an external PC with menu-driven software. The generator can store 99 test panels in battery-backed RAM and send them all to the analyzer at the touch of a button.

- A unique method of testing the phase relation of two stereo channels is provided by the 1200 stereo signal test set from Dorrough Electronics (1035). The instrument, a modern version of the classic "Gain Set," allows measurement down to -75 dB and is the only test set available with the capability of measuring the stereo program signal in both the sum and difference formats, according to the manufacturer.
- Amber Electro Design (2209) will show an enhanced version of its AudioCheck software, which is designed to control the Amber 5500 series of audio test equipment and has the built-in ability to control audio test equipment from any manufacturer by using the industry standard IEEE 488 bus. New features include an expanded graphical capability, faster operation, enhanced ease of use and greatly enlarged sample and example files.
- Something new in audio monitoring is the series 190 audio line monitor/bridging switcher from Anchor Audio (3451). The 190 series features eight monaural or 16 stereo inputs and can function as a routing switcher. The operator selects one of the inputs to become the output, listens to the quality of the selected signal, and adjusts the audio level based on a meter reading in volume units.

RF/AUTOMATION

In radio transmitters, solid state AM is well entrenched and multiplying, but the trend in FM above 4 kW is to a hybrid design consisting of solid state with a one- or two-tube output stage. The rage in TV transmitters for klystrode in UHF and solid-state in VHF continues hot and heavy, but the big news is the air-cooled klystrode which offers reduced size and cost and should be with us for some time.

Radio Transmitters

Solid state rules the roost in AM transmitters, but not FM, and the reason is purely economic. FM frequency in solid state at more than 2 kW comes dear and while some manufacturers are testing the upper limit, no one is ready to price himself out of the market.

- Doubling the maximum power rating of the Harris (1305) line of digitally modulated solid-state AM transmitters is the new 50 kW DX-50. The 86 percent efficiency of this remarkable transmitter is achieved by digital modulation which is accomplished by digitally turning amplifiers on and off while the sum of their outputs is totaled in a master RF combiner. The FlexPatch feature ensures continued safe operation even if a power amplifier should fail.
- In the two years since FMX was introduced at the 1987 NAB convention, some 100 stations have begun FMX transmissions. The system uses an additional stereo subcarrier to provide stereo coverage equivalent to monaural coverage at the same power. The new Inovonics (1473) Model 706 FM/FMX digital stereo generator will improve on the original model 705 by adding the ability to accommodate radio data service subcarriers, providing front panel instrumentation of internal functions and allowing remote control of some functions. Broadcast Technology Partners (2249) will also show the 706.
- Nautel (1065), the perennial leader in solid-state AM transmitters, is extending its Ampfet line in the direction of lower power by adding a 5 kW transmitter, the ND-5. This is essentially a smaller version of the Ampfet ND-10 introduced at last year's NAB and has the same specifications, including 125 percent positive peak capability to 5.6 kW, a flat frequency response from dc to 10 kHz, virtually no square wave tilt, IM distortion of less than 1 percent, and IQM better than 36 dB.
- Television Technology (3500) will unveil the highest powered domestic FM solid state transmitter yet produced when they show the 4.0 kW FMS-4000. This will be the first of a line which will include units rated at 1 kW, 2 kW and 8 kW. FETs will be employed throughout for improved performance and efficiency. The unit will occupy about ¾ of a rack, be cooled by air and incorporate the proven solid state model X exciter.
- Energy-Onix (1730-1732) will introduce five solid state FM transmitters ranging in power from 100 W to 2 kW. In addition, they will show for the first time five single-tetrode FM transmitters ranging in power from 1.5 kW to 12 kW and six two-tetrode FM transmitters ranging in power from 15 kW to 50 kW. In all cases, the intermediate power amplifiers and driver sections will be solid state. Zero-biased tetrodes will be used because they don't require the complex circuitry associated with pentodes.
- Delta Electronics (1159) has a new AM stereo exciter, the ASE-1, along with a new radio transmitter remote

monitoring/remote control system, the RCS-1V. Delta will also unveil the AMP-1 audio processor with NRSC.

• Bext (7913) will exhibit new FM amplifiers rated at 800 W, 1.5 kW and 2 kW. The very compact amps measure 25 inches deep, 14 inches high and 19 inches wide for easy rack mounting.

Television Transmitters

• Comark (5141), which first offered the klystrode two years ago, will enter the market for air-cooled klystrodes by introducing a line of transmitters having power ratings up to 120 kW based on a 30 kW, UHF amplifier, the CTT-UA-30. The CTT-U-35SKC, a 35 kW UHF klystrode transmitter from Comark, will feature high efficiency, excellent linearity, low drive requirements and reasonable price. The CTT-U-1SS is a solid-state, 1 kW UHF transmitter intended for the low-power TV market. Also new is an 80 kw UHF klystrode, the CTT-U-80SKM.

• Television Technology (3500) will offer the UHF-60MA, a 60 kW air-cooled klystrode transmitter. The unit will feature high efficiency and a redundant design, accomplished by using two 30 kW klystrodes. Also on display will be the XL-1200, a 1 kW, part-73 UHF transmitter with a built-in remote interface.

• Varian (5300) will show its latest transmitter developments using the MDSC klystron.

• Larcan (3562) will unveil the TTS-30M, an all-solid-state, 30 kW VHF model that employs FET semiconductors for excellent linearity and reliability. The self-contained unit, seven feet wide and 3.5 feet deep, is available in power levels from 250 W to 60 kW. Also new from Larcan will be a pair of CCIR-standard transmitters, the 5 kW TTS-5MH and 10 kW TTS-10MH. Both employ all-solid-state FET technology and are designed for CCIR standards in band 3.

• With most of the TV transmitter industry going to solid state for VHF, NEC (3444) continues to offer a choice between solid-state and tube. NEC's 30 kW highband, one-tube-with-solid-state-aurals VHF transmitter will go on display as the PCN1430AH/1. Four solid-state drives will provide the aural output while two solid-state drives and the final tetrode will provide the visual output. Also, for the first time from NEC, an all-solid-state, 30 kW, highband VHF transmitter, the PCN1430SSH, will be shown. A 60 kW, klystron UHF transmitter, the PCU960HC, will round out NEC's offerings.

• Harris (1305) will enter the all-solid-state VHF TV transmitter market with the 30 kW HT30HS. Since the middle of February, this transmitter, which is also available in power ratings up to 60 kW, has been in continuous operation at KYW-TV in Philadelphia. Modular design allows the on-line replacement of 1 kW power amplifiers without service interruption and an optional redundant exciter and exciter switching further reduce the chance of catastrophic failure.

• Another fully solid-state VHF transmitter is the 20 kW dual-drive model EVHF 20000 DD from Thomson-LGT (Comark booth, 5141). Features include broadband amplification, TV stereo and a built-in regulated power supply. Thomson-LGT will also show three smaller UHF transmitters. The 2 kW dual-drive solid-state EUHF 2000 DD will feature full broadband operation and built-in regulated power supply, while the 200 W RUHF 200 S translator will claim extreme linearity and a low noise figure. The last of these, the 10 W low-power translator, RUHF 10 S, is designed to operate from a solar energy supply.

• Telettra (3086) will debut its DTV-45 video codec for 45 Mbit/s digital transmission systems. DTV-45 employs the discrete cosine transform algorithm and is a TV codec for transmission of a television program plus associated signals into a DS3 channel at 44.736 Mbit/sec. Conversion between composite and component formats is accomplished by swapping I/O cards.

Weather Radar and Graphics

• Ground clutter suppression, preservation of important weather information, and the first national and regional radar images composited from data gathered simultaneously from multiple radar sites are the shining features of WSI's new NOWrad service (3774). NOWrad offers weathercasters the first national composite radar image using radar data that is only minutes old and up to 48 archived images for tracing developments over time.

• The new Advanced Weather Graphics System from ESD (5461) will feature improved art and animation capabilities together with a more detailed and better defined picture combining both satellite and ground observations for greater accuracy.

• The new DWSR-88CTV Doppler weather radar system from Enterprise Electronics (3870) "sees" wind and features a radius range of 300 miles and 70 to 98 percent ground clutter cancellation. ■

Our Network Ratings Are In.

Our clients have certainly appreciated the cost savings, and everyone has enjoyed the extra time satellite has provided us. Cycle-Sat has proven that satellite is a very viable method to distribute commercials.

—Dana Geiken, DMB & B

Our association with Cycle-Sat has been an exciting time for us. Cycle-Sat has made it easier for us to execute spot T.V. buys in multiple markets.

—Merle Welch, Foote, Cone and Belding

We have become accustomed to the ease and reliability of receiving commercial spots via satellite. We are also impressed with the flexibility of the system in regard to getting refeeds and special feeds. We look forward to a long working relationship.

—Karl Hagnauer, KPLR

Our experience at WGN-TV with Cycle-Sat has been quite positive. The system has been very reliable and the convenience of receiving the commercials in non-primetime has been helpful in scheduling our tape machines. Our equipment has been freed for production use during the prime hours.

—Robert Strutzel, WGN-TV

The quality and reliability of the hardware and software is outstanding. It's error free in its operation, and the speed with which we receive commercial feeds saves us make-goods and lost time.

—Jim Martin, WOAY-TV

If you still haven't joined the Cycle Sat network, check out the reception we're getting from people who have. Visit us at N.A.B. Booth 3184 and we'll tell you more. Or just give us a call at 1-800-622-1865.

Cycle-Sat
A Communications Network.

WE'VE SEEN THE FUTURE AND IT FITS.

Just when broadcasters and professional users are shifting from one-inch and 3/4-inch video tape systems to 1/2-inch analog component video, along comes the specter of 19mm D2. First they made it smaller; now they want to make it bigger again.

When Panasonic set out to design Composite Digital recording systems, we had a big responsibility —to keep it small. Our customers have a right to expect their investment in 1/2-inch to be preserved. We know that a change in technology means more than a change in equipment; walls, racks, layouts, suites, vans and tape storage are all long-term investments that shouldn't have to be re-done every time there's a new chip on the block.

Panasonic's new Composite Digital system not only delivers superior multi-generation capability, long-term signal stability and unprecedented operating ease. It is designed to fit right where it should—into your existing facilities.

Panasonic's design philosophy is always to create products for the future with today clearly in mind. Our editing recorders and systems work with all of today's existing standards for video, audio and control. When you're ready to convert your editing suite to Composite Digital video, Panasonic will fit in.

Panasonic cameras, from our new, all solid-state AK-450 to the new all-digital DPC-1, are designed to slip transparently into the operators' experienced hands.

Today's mobile teleproduction requirements include everything from commercial production to fast-breaking news. That's why our system design is built around interchangeable components and true portability—and will remain so from today to digital to HDTV.

Here's the bottom line. Television in the 1990's demands technical advances and innovations—digital video and HDTV. But *your* demands are for systems that permit smarter, leaner operations. And that is why Panasonic's broadcast equipment, both for today and tomorrow, is designed to fit into your plant, your vision and your budget.

Panasonic
Broadcast Systems

Panasonic Broadcast Systems Company, One Panasonic Way, Secaucus, NJ 07094 (201) 348-7671

Circle 127 on Reader Service Card Page 107

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.

See us at NAB, Booth 4526

ALTA GROUP, INC

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

Circle 112 on Reader Service Card Page 107

ABEKAS VIDEO SYSTEMS 2436
New: Solo A34 integrated production system; A84 digital post-production switcher. Electronic still stores; character generators; digital effects; digital disk recorders.
See ad on p. 28

ACCOM 917
Digital image enhancer.

ACCU-WEATHER 7416, 7418
Weather radar/graphics; weather graphics/special efx service.

ACCURATE SOUND CORP. 5760
New: high speed audio tape duplicating equip.

A.C.E. 7935
New: Pierrot digital matte generator.
See ad on p. 70

ACOUSTIC SYSTEMS 5486
BB voice-over booths.
See ad on p. 70

ACRODYNE INDUSTRIES 3982
TV transmitters.

ADAMS-SMITH 2505
Model 2600 A/V audio-for-video editor: time code equip.

ADC TELE COMMUNICATIONS 3755
Fiberoptic systems; connectors, jackfields.

ADELPHON (OUTSIDE)
Antennas, towers.

ADM TECHNOLOGY 4951
VTR editor/controllers; on-air consoles, mixers; post-production consoles; studio automation equip.; audio routing switchers.

ADRIENNE ELECTRONICS 7901
New: AEC-2 10x2 video/audio routing switcher; AEC-1 S-VHS 10x1 routing switcher; PC-VITC VITC reader for IBM PC. AEC-1 30 MHz 10x1 router; PC-207M/VTR board for IBM PC; AEC-1 audio & video routers; PC-LTC LTC reader/generators.

ADVANCED DESIGNS 5334
New: 2D graphics systems; weather radar/graphics.

ADVANCED MICRO-DYNAMICS 1563, 1662
Transmitter remote control; SCA equip.

ADVENT COMMUNICATIONS 7300
SNG systems; satellite earth stations.

AEG BAYLY 1624
Scene transition recognition; studio ATRs; turntables; radio transmitters.

A.F. ASSOCIATES 3719
New: Standards convertors (ISIS); robotic camera systems (ARC). Video test equip.; studio design & construction; production/post-production facility; financial services.
See ad on p. 116

AGFA-GEVAERT 5206
Videotape; audio tape, carts.

THE AIRCRAFT MUSIC LIBRARY 5444-5445
Music/sound efx libraries.

AKG ACOUSTICS 2043
New: DSE 7000 digital audio workstation. Audio processors; mics, accessories.

NAB '89 will be a new product bonanza.

ALAMAR USA 4779
MC switchers; switching automation; routing switchers, DAs.

ALDEN ELECTRONICS 5460
Weather radar/graphics; satellite earth stations.

ALEXANDER BATTERIES 3914
Battery analyzers, chargers, tri-analyzers, smart chargers.
See ad on p. 77

ALLEN & HEATH BRENELL USA LTD. 7434-7436
Field portable mixers; on-air consoles, mixers; post-production consoles.

EXHIBITOR LISTING

ALLEN AVIONICS 5222
Video delay lines, filters, hum eliminators.

ALLIED BROADCAST EQUIP. 2027
New: Autogram Pacemaker console; compact disc equip.

ALLIED TOWER CO. 1565
Antennas, towers.

ALLSOP 5356
Tape erasers, degaussers.

ALPHA AUDIO 3455-3458
The BOSS/2 automated audio editor; Sonex acoustical products.

ALPHA VIDEO & ELECTRONICS 5183
3/4-, 1/2-inch VTRs; mobile vehicle construction.
See ad on p. 30

ALPHA WIRE CORP. 7206

ALPS 7141

ALTA GROUP 4526
New: TBCs; frame synchronizers; color correctors.
See ad on p. 68

ALTRONIC RESEARCH 2529-2531
Omegaline dummy loads.

AMBER ELECTRO DESIGN 2209-2211
New: AudioCheck 2 control software for 5500 series test equip. Audio test equip.

AMCO ENGINEERING 3747-3749
New: Electronic still stores.

AMEK/TAC US OPERATIONS 2008-2018
New: Field portable mixers; on-air consoles, mixers; post-production consoles.

AMERICAN BROADCAST SYSTEMS 3846

AMERICAN STUDIO EQUIPMENT 2038-2042
Lighting equip.; camera support equip.

AMPEREX ELECTRONICS 5213
Pickup tubes.

AMPEX 4501
New: Studio cameras; ENG/EFP cameras; camcorders; video processing equip. Digital VTRs; 3/4-, 1/2-inch VTRs; cart automation/MERPS; TBCs; electronic still stores; Alex antialiased character generator; 2D graphics systems; digital video effects; VTR editor/controllers; production switchers; videotape.
See ad on p. 14-15

AMS INDUSTRIES 1134
New: ADR software for Audiofile; Logic 1 digital audio mixer. Audio processors (Timeflex/A-V Sync); field portable mixers; mics, accessories; Audiofile digital audio workstation; reverb, special efx.

AMTEL SYSTEMS 5433-5436
Character generators; tape synchronizers; routing switchers, DAs; time code equip.; ATR synchronizers.

AMX 7230, 7232
New: Remote control systems; TBCs; production switchers.

ANDREW CORP. 1721
Antennas, towers; intercity microwave; satellite earth stations.
See ad on p. 81,83,85

ANGENIEUX 4138
New: Lenses.

ANIXTER BROS. 2421
Test equip.

ANRITSU AMERICA 7521
Video & audio test equip.; fiberoptic systems; RF test equip.

ANTENNA TECHNOLOGY CORP. 2036
New: Satellite earth stations. Video test equip.; antennas, towers; MDS, SMATV systems; equipment distributor.

ANTON/BAUER 5219-5221
New: Lighting equip.; power supplies, batteries.

ANVIL CASES 5426
Transportation cases.

APHEX SYSTEMS 1058-1062
New: Model 800 studio clock; Model 250 Type II aural exciter. Audio processors.

APOLLO AUDIO VISUAL 7535-7537
Lenses (Raynox); lamps; Raynox video slide transfer system; studio furniture.

ARBEN DESIGN 5763
Studio design & construction.

ARBITRON RATINGS 4377

TOBY ARNOLD & ASSOC. 1570
Music/sound efx libraries.

ARRAKIS SYSTEMS 2215
Field portable mixers; on-air consoles, mixers; audio routing switchers; studio furniture; tape storage systems.

ARRIFLEX CORP. 4165
Lenses.

ARTEL COMMUNICATIONS CORP. 4579
Fiberoptic systems; technical/engineering consultant.

ARTI 7634
Desktop video production system.

ASACA/SHIBASOKU CORP. 5533
New: HDTV production equip. Cart automation/MERPS; NTSC encoders/decoders; video monitors; video test equip.; electronic still stores; 3D modeling, animation; digital video effects; digital disk recorders; random access editors; MTS equip.

ASSOCIATED COMPUTER SERVICES 7121
Graphics, weather graphics & production software for the Amiga; Amiga genlock devices.

ASSOCIATED PRODUCTION MUSIC 1641
Music/sound efx libraries.
See ad on p. 138

ASTON ELECTRONICS 7720-7722
New: Electronic still stores. Character generators.

AT&T COMMUNICATIONS 3962
3D modeling, animation; satellite earth stations; business automation.

ATI-AUDIO TECHNOLOGIES 2101, 2200
New: Utility amps. Audio processors; field portable mixers; on-air consoles, mixers; mics, accessories; audio test equip.; compact disc equip.; noise reduction systems; special efx; routing switchers.

AUDI-CORD 1113
Cart decks.

AUDICO 1740
Cassette loaders, reloaders, rewinders.

AUDIO ACCESSORIES 1529
Connectors, jackfields.

THE AUDIO BROADCAST GROUP 2427
New: Studio cabinetry. Post-production consoles; studio monitors; studio ATRs; cart decks; turntables; equip. distributor; studio design & construction; mobile vehicle construction.

AUDIO DEVELOPMENTS 3465
Field portable mixers; on-air consoles, mixers; post-production consoles.

AUDIO KINETICS 2414
ATR synchronizers; audio console automation.

EXHIBITOR LISTING

AUDIO PRECISION 2044-2046
New: System One dual domain audio test equip.; DSP audio test set.

AUDIO-TECHNICA U.S. 1631
Mics, accessories.

AUDIOPAK 1653
Audio tape.

AUDITRONICS 1363
Post-production consoles; mix-minus system.

AURORA SYSTEMS 4956
New: 2D graphics systems. 3D modeling, animation.

AUTOGRAM 1026
New: On-air consoles, mixers; post-production consoles.

AUTOMATED BUSINESS CONCEPTS 2539-2541
Radio business automation.

AVCOM OF VIRGINIA 5114
Audio test equip.; SCPC downconverters & demodulators; satellite earth stations; spectrum analyzers, sweep generators.
See ad on p. 79

B&B SYSTEMS 3873-3874
Audio phase monitors; studio design & construction; technical/engineering consultant.

B.C., INC. 7834

BAF COMMUNICATIONS CORP. 7835
SNG systems.

BAL COMPONENTS 7740

BARCO 5463
NTSC encoders/decoders; video monitors.

BARRETT ASSOC. 1041

BASYS 5568
New: Basys machine control system. Cart automation/MERPS; electronic still stores; character generators; production switchers; robotic camera systems; teleprompters; newsroom computers.

BCS—THE BROADCAST STORE 7235, 7237
Broadcast equip. distributor.

Circle 131 on Reader Service Card Page 107

SEE US AT THE N.A.B.!

Built by Shook Electronic Enterprises, Inc., San Antonio

Perfection is Priority.

For eight years John Crowe Productions has set the standards in remote television production. We never forget that our clients deserve the best in performance from the JCP equipment, and now JCP presents a producers dream. A 48-foot production trailer featuring a 3-tiered production area that will comfortably accommodate the most complex production. Completely compatible with JCP's other mobile units, #4 features;

- 6 BTS (Philips) LDK-6A cameras
- 2 Ikegami HL 79E-E cameras
- 6 Canon 40X1 lens (Philips)
- 2 Canon 18X1 lens (Ikegami)
- 4 Sony BVH 3100 1" VTR's
- Grass Valley 24 input, 3 M/E, w/Master E-MEM production switcher
- 32 input full stereo audio mixer
- 2 Chyron 4100 EXB w/CCM, MCM, hard disk
- 1 Abekas A53D DVE with warp
- 1 Abekas A 42 Still Store
- RTS 12 channel PL/IFB w/6 802 stations
- 45 monitors in production area

JCP now offers three "Look-Alike" mobile units with 16 BTS (Philips) LDK-6A cameras, 8 Ikegami HL 79 cameras, 13 Sony 1" VTR's and 6 Chyrons, all available anywhere in the nation, plus permanent facilities in the Summit in Houston, Texas.

SUPERB PICTURE QUALITY

"Based on our experience with the BTS (Philips) cameras, I saw no reason to change", John Crowe said, "and when you consider that 10 of our existing LDK6 cameras are being upgraded to the LDK-6A's it's a real bonus for JCP. Where else in the country could you get 16 look alike cameras."

The LDK-6A is a future proof camera with frequent improvements offering the program producer consistently superb picture quality over the short and long term. Rugged, reliable, rainproof, and able to work over a wide range of temperatures. the LDK-6A performs to perfection when perfection is priority.

JCP

John Crowe Productions

Houston
10 Greenway Plaza Houston, Texas 77046 (713) 627-9270

3 Dallas Communications Complex
6311 N. O'Connor Rd. Suite 102 Irving, Texas 75039 (214) 556-1816

Circle 132 on Reader Service Card Page 107

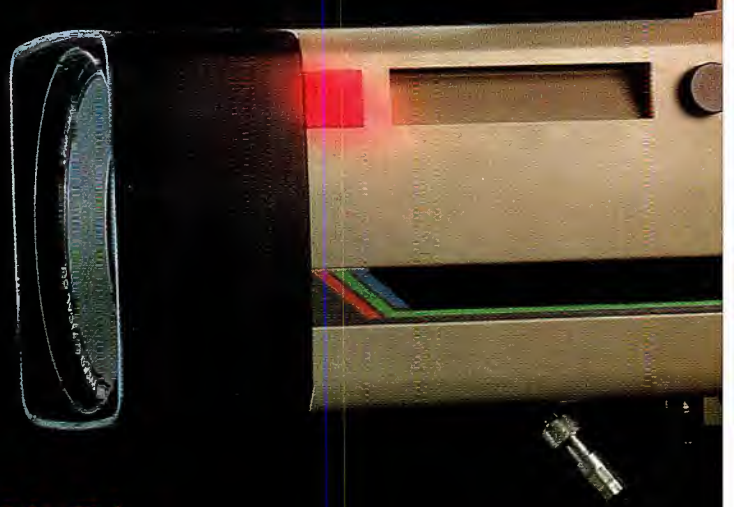
In business, as in life, you get what you pay for. True, there are values to be had, but when selecting a studio camera one word speaks louder than any other: technology.

Consider Ikegami's HK-323 field/studio camera. Performance and technology-wise, no other studio camera comes close. Which is why some of our competitors are attempting to convince you that their inferior, and often old technology, is worth buying at a reduced price. Fact is when it comes to quality versus price, the HK-323 is the best value in the industry!

It's small, lightweight design, combined with the most sophisticated engineering available, eliminates what was once the need for separate studio and field cameras, and goes one better by offering a hand held version, the HK-323P, which operates from the same base station.

The HK-323P hand-held companion camera.

Other unique and state-of-the-art features include: a Master Control Panel (MCP) that can control up to 40 cameras with triax, multicore, or fiber-optic cable (a triax repeater option triples cable length from one to three miles), fully automatic setup including green registration (all automatic or manual adjustments are stored



THE HK-323 FIELD/STUDIO CAMERA:

CONSIDER ANY OTHER STUDIO CAMERA, YOU'LL PAY THE PRICE!

Ikegami

:n memory, powered by a lithium battery, whose 5-year life is backed up by a permanent, redundant E^2-PROM), 1" or ⅔" Diode Gun Plumbicons® (upon request), high performance prism optics, a broad contrast range knee circuit that handles 1600% normal level, built-in color correction, comet tail suppression, scene file memory with up to four presets, and the sharpest picture quality regardless of scene color content or special color lighting.

Ikegami's commitment to quality goes right down to our all fiberglass board construction, component selection, and body construction.

Some day our competitors would like to manufacture a camera this good. Until then, don't be taken in by what seems like a great deal. You'll pay the price.

For more information, contact your Ikegami Office.

Ikegami Electronics (USA), Inc. 37 Brook Avenue, Maywood, NJ 07607
East Coast: (201) 368-9171 West Coast: (213) 534-0050 Southeast: (305) 735-2203
Southwest: (214) 869-2363 Midwest: (312) 834-9774 Hawaii: (808) 946-5955
Circle 133 on Reader Service Card Page 107

The Essentials Defined.

Two-channels of SR and A-type noise reduction.

Three cards available: Cat. No. 300—SR and A-type module: Cat. No. 350—SR module only, and the Cat. No. 450—A-type module only.

Relay-controlled "hard" bypass of all circuitry.

Provides SR users with accurate verification of decode calibration levels and playback frequency response.

Multi-turn level controls on each channel for setting all levels.

Balanced transformerless input and output circuits.

Generates Dolby tone for A-type or Dolby noise for SR; also activates Auto Compare mode for SR alignment.

Allows checking of the non-decoded signal from tape during recording or playback.

Four element LED calibration displays.

Front panel control of record/play switching. Can also be switched under tape recorder remote control via connector on rear panel.

Toggle switches allow selection of A-type, no processing, or SR.

Model 363

100 Potrero Avenue, San Francisco, CA 94103-4813, Phone 415-558-0200, Telex 34409, Facsimile 415-863-1373. 346 Clapham Road, London SW9 9AP, Phone 01-720-1111, Telex 919109, Facsimile 01-720-4118.

Dolby®

Circle 134 on Reader Service Card Page 107

BEAVERONICS 1726-1728
New: Favag LED50 digital clock; ESE ES-CG89 character generator. Favag & ESE master clock systems; ESE timers; downstream keyers; custom video switching systems; video hum stop coils.

BELAR ELECTRONICS LABORATORY 1352
Demodulators, modulation monitors, frequency monitors & controllers.
See ad on p. 137

BELDEN ELECTRONIC WIRE & CABLE 2431
Wire, cable; connectors, jackfields.

BENCHER 4584
Video copy stands.

BENCHMARK MEDIA SYSTEMS 3780
Mic preamps; audio test equip.; System 1000 audio DAs; IFA systems; wire, cable; connectors, jackfields.

BEXT, INC. 7913
New: FM amps.

BEYER DYNAMIC 3738-3739
New: Shotgun mic, wireless mic system; headphones. Equip. distributor.

BHP 7517-7519
VTR editor/controllers; multisource video editors; random access editors.

BIRCH/SCARBOROUGH RESEARCH 5770
Ratings service.

BIRD ELECTRONIC CORP. 1552
Audio test equip.; remote monitoring systems; RF power measurement & termination.

BOGEN PHOTO CORP. 5744
Lighting equip.

BOGNER BROADCAST EQUIP. 5174
Antennas, towers.

BOONTON ELECTRONICS CORP. 2525
Modulation monitors; RF test equip.

NAB
LAS VEGAS
1 9 8 9

BOWEN BROADCAST SERVICE 3429-3430
VTR heads, electronics; Technical/engineering consultant.

BRADLEY BROADCAST SALES 2301
Equip. distributor.

BRETFORD MFG. 5782
Cart automation/MERPS.

WALTER S. BREWER CORP. 4777
Studio & remote lighting equip.; power supplies, batteries; wire, cable; connectors, jackfields; tools; lighting system design & consultation.

BROADCAST AUDIO CORP. 1053
New: Series VI on-air audio consoles. Studio monitors; audio DAs.

BROADCAST AUTOMATION 7226
New: Studio automation equip. Compact disc equip.

BROADCAST ELEC. SVCES. 1205
On-air consoles, mixers; cart decks; turntables; studio automation equip.
See ad on p. 8

BROADCAST ELEC.SVCES. 923

BROADCAST MICROWAVE SERVICES 1718
New: STLs, TSLs; ENG microwave; intercity microwave; power supplies, batteries.

BROADCAST PRODUCTS 2426

BROADCAST TECH. PARTNERS 2249
FMX broadcasting system.

BROADCAST VIDEO SYSTEMS 3426
New: NTSC encoders/decoders; Masterkey II linear keyer; safe area generator, time/date/indent generator. Video test equip.

BROADCASTERS GENERAL STORE 7327
Equip. distributor.

BRUEL & KJAER 7431
Mics, accessories.

BRYSTON LTD. 2148
Other audio (audio amps & preamps).

BSM BROADCAST SYSTEMS 2237
New: MC switchers. Routing switchers, DAs; audio routing switchers.

BSW/BROADCAST SUPPLY WEST 2015
Equip. distributor.

BTS/BROADCAST TELEVISION SYSTEMS 4119
New: Character generators; 3D modeling, animation; routing switchers, DAs; control system); 2D graphics systems. Studio cameras; ENG/EFP cameras; camcorders; HDTV production equip.; color correctors; telecines; MC switchers; switching automation.
See ad on p. 126-127

BURLE INDUSTRIES 4048
Transmitter, power tubes.

BYTE BY BYTE 7900

CABLEWAVE SYSTEMS 5100
Antennas, towers; connectors, jackfields.

CAL SWITCH 4882

CALZONE CASE CO. 3416
Transportation cases.

CAM-LOK 3481-3482

CAMERA MART 5551
Lenses; ENG/EFP cameras; camcorders; video monitors; video test equip.; character generators; 2D graphics systems; 3D modeling, animation; digital video effects; VTR editor/controllers; multisource video editors; camera support equip.
See ad on p. 88-89

CANARE CABLE 5755-5756
New: Component cable, 75 ohm video jack coax. Wire, cable; connectors, jackfields; tools.

CANON USA-OPTICS DIV. 3955
New: Lenses. Camera support equip.
See ad on p. 58-59

CARPEL VIDEO 3848

CASCOM 7727
3D modeling, animation; digital video effects; graphics/special efx facility.

DWIGHT CAVENDISH 5470
Telecines.

CBSI 1253
New: Business automation.

CCA ELECTRONICS 1047
Radio transmitters.

CEL ELECTRONICS 4177
New: TBCs; frame synchronizers; standards converters; electronic still stores; digital video effects.

CENTRAL DYNAMICS LTD. 3944
New: Stage*1 NTSC encoders/decoders; SDS-2+ routing switchers. Production switchers (Strata).

CENTRAL TOWER 1004
Antennas, towers; equip. distributor; technical/engineering consultant.

CENTRO CORP. 4956
ENG/EFP vehicles; SNG systems; studio furniture; studio design & construction; mobile vehicle construction; technical/engineering consultant.

CENTURY 21 PROGRAMMING 1621-1623
Compact disc equip.; music/sound efx libraries.

CENTURY PRECISION OPTICS 3470
New: Lenses.

CHANNELMATIC 5519
Cart automation/MERPS; switching automation; routing switchers, DAs; clocks, timers.

CHAPMAN/LEONARD VIDEO EQUIP. A177

CHESTER CABLE/ALCATEL 5203
Wire, cable.

CHRISTIE ELECTRIC 3441
Tape erasers, degaussers; power supplies, batteries.

CHYRON 4538
New: 2D graphics systems. Character generators.
See on p. 37.

CINE 60 4019-4020
New: multi-function batteries. Power supplies, batteries.

CINEDCO 7027
New: Cineflex random-access video editor. Audioflex digital audio workstation. Ediflex random access editors.

CINEMA PRODUCTS CORP. 3758-3760
Lighting equip.; camera support equip.

CINEMILLS CORP. 3181
Lighting equip.

CIPHER DIGITAL 3574
New: CDI-4810 phantom VTR emulator. Tape synchronizers; electronic audio editors (Softouch-PC).

CIRCUIT RESEARCH LABS 1009
New: Audio processors; mics, accessories. MTS equip.; AM stereo equip.; SCA equip.

CIRCUIT STUDIOS 3963
New: Velocity 3D modeling and animation system.

CLEAR-COM 5346-5349
New: Intercoms. Studio monitors; audio test equip.; telco interface equip.

CMC TECHNOLOGY, DIV. OF DATATAPE 4253
New: Refurbish BVH upper drums. VTR heads, electronics; tape erasers, degaussers; heads, accessories.

CMX CORP. 4538
New: 3100A mid-range video editor; hard disk drive for 3600 editor. VTR editor/controllers; multisource video editors; random access editors; electronic audio editors.

COAXIAL DYNAMICS 2527
Other RF, general.

COHERENT COMMUNICATIONS 7618
Field portable consoles.

COLORADO VIDEO 3913
New: Colorizers, field/framestores, video noise reducers. Weather radar/graphics.

COLORGRAPHICS SYSTEMS 4526
Color correctors; 3D modeling, animation; weather radar/graphics.

NAB
LAS VEGAS
1 9 8 9

Circle 136 on Reader Service Card Page 107

COLUMBINE SYSTEMS 4277
New: Business automation; newsroom computers.

COMARK COMMUNICATIONS, DIV. THOMSON-CSF 5141
New; TV transmitters. Transmitter, power tubes.
See ad on p. 114

COMLUX 3085-3086
New: Multichannel, all-digital telecine system.

COMMODORE BUSINESS MACHINES 7033

COMMUNICATIONS GRAPHICS 1600
Promotional items.

COMPREHENSIVE VIDEO SUPPLY 5548
New: Lenses; NTSC encoders/decoders; S-VHS color processor; color correctors; Edit Master multisource video editor; production switchers; S-VHS DA; time code equip.; intercoms. Equipment distributor.

COMPROMPTER 5774
New: Newsroom computers. Teleprompters.

COMPUTER CONCEPTS CORP. 1061
Business automation.

COMPUTER PROMPTING CORP. 3612
Teleprompters; closed captioning systems.

COMPUTER PROMPTING SVCES. 3378

COMREX CORP. 1521
New: Telco interface equip. Field portable mixers.
See ad on p. 87

COMSAT WORLD SYSTEMS DIV. 4383
New: HDTV production equip. Video monitors; & test equip.

COMTECH ANTENNA CORP. 2024-2026
Antennas, towers; satellite earth stations.

COMTEK 5768
New: M-182, M-180 handlheld mic receiver. Mics, accessories; intercoms; remote monitoring systems.

COMWAVE 5262
TV transmitters; antennas, towers; MDS, SMATV systems.

CONCEPT PRODUCTIONS 1453-1455
New: Studio automation equip. (CAPS I, CAPS II). Music/sound efx libraries.

CONIFER 3858
ITFS equip.

CONNECTRONICS CORP. 1571
Connectors, jackfields.

CONRAC DISPLAY PRODS. 1741
New: Component video encoders/decoders. Video monitors.

CONTEL A.S.C. 5777

CONTINENTAL ELECTRONICS/ VARIAN 1125
New: Radio transmitters. Antennas, towers; remote monitoring systems; transmitter remote control; AM stereo equip.; SCA equip.; transmitter, power tubes.

CONTROL CONCEPTS CORP. 3902
Power surge & transient protectors.

CONVERGENCE 1773
New: Slo Motion edit controller. VTR editor/controllers.

COOL-LIGHT CO. 5761
Lighting equip.

CORPORATE COMMUNICATIONS CONSULTANTS 3080
Color correctors.

CORTANA CORP. 7908
Antennas, towers.

COUNTRYMAN ASSOCIATES 1463
Mics, accessories.

CROSSPOINT LATCH CORP. 3977
New: 8200X TBC; 6129 BHK & 6119 YC production switchers.

CROWN INTERNATIONAL 1557
Mics, accessories; audio test equip.

CUBICOMP 703
PictureMaker/60 3D modeling & animation system; PictureMaker/50 midrange 2D & 3D graphics system; PictureMaker/15 full-color paint system; Vertigo Series 2000 graphics and animation workstation.

CURRENT TECHNOLOGY 7621, 7623
New: Digital protection for lighting equip; power conditioning for TV transmitters; power supplies, batteries.

CYCLE SAT 3184
Spot delivery by satellite.
See ad on p. 65

PETER W. DAHL 1663
Power supplies, batteries.

H. L. DALIS 5063

DALSAT SATELLITE COMM. 7417
New: ENG/EFP vehicles; SNG systems; satellite earth stations.

BILL DANIELS CO. 5277

DATA CENTER MANAGEMENT 5586

DATACOUNT 2004
Business automation.

DATATEK CORP. 3951
Routing switchers, DAs; audio routing switchers.

DATAWORLD 1374
New: Graphics/special efx facility; technical/engineering consultant.

dbx 2420
Audio processors; audio noise reduction; audio monitoring equip.; compact disc equip.; MTS equip.

DELCOM USA 4386

DELTA ELECTRONICS 1159
New: Active whip antenna for in-field measurements; stereo noise generator; C-QUAM stereo exciter; high-power ammeters and sampling toroids. RF test equip.; high-power pulse reflectometer.
See ad on p. 91

DENON AMERICA 7127
Turntables; cassette decks; compact disk equip.

DESISTI LIGHTING/ DESMAR CORP. 3583
Lighting equip.

DeWOLF MUSIC LIBRARY 1736
Music/sound efx libraries.

DI-TECH 3716
New: Routing switchers, DAs; audio routing switchers.

DIELECTRIC COMMUNICATIONS 1025
Other RF, general.

DIGITAL ARTS 7633
Character generators; 2D graphics systems; 3D modeling, animation.

DIGITAL AUDIO & VIDEO 4983

DIGITAL AUDIO RESEARCH 7921
Digital audio workstations.

DIGITAL CREATIONS 7133
Studio automation equip; video editor/audio console serial interfaces.

DIGITAL EQUIP. CORP. 7811

DIGITAL F/X 7211
New: Electronic still stores; character generators; 2D graphics systems; digital video effects (DF/X 200).

DIGITAL SERVICES CORP./DSC 4538
New: Digital disk recorders. Digital video effects.

DOLBY LABORATORIES 1457
New: Noise reduction systems.
See ad on p. 76

DORROUGH ELECTRONICS 1035-1037
New: Model 1200 stereo signal test set. Audio processors; on-air consoles, mixers; audio level meters.

PHILLIP DRAKE ELECTRONICS 7005
Audio monitor amps; field portable mixers; on-air consoles, mixers; post-production consoles; intercoms.

words cannot describe the best in the business

LEDDICON®

tubes for all cameras

EEV

USA:
EEV Inc, 4 Westchester Plaza, Elmsford, NY 10523 Telephone: (914) 592 6050 Telex: 6818096 Fax: (914) 682 8922
CANADA:
EEV Canada Ltd, 67 Westmore Drive, Rexdale, Ontario M9V 3Y6 Telephone: (416) 745 9494 Telex: 06 989363 Fax: (416) 745 0618
UK:
EEV, Waterhouse Lane, Chelmsford, Essex CM1 2QU, England Telephone: (0245) 493493 Telex: 99103 Fax: (0245) 492492

Subsidiary of the General Electric Company plc of England GEC

See us at NAB-Booth #4262

® Leddicon is the Registered Trademark of EEV Lead Oxide Camera Tubes

NAB
LAS VEGAS
1 9 8 9

DSI COMMUNICATIONS 1765
Remote monitoring status system; studio design & construction; technical/engineering consultant.

DUBNER COMPUTER SYSTEMS 4130
New: GF-50 Graphics Factory 3D modeling & animation system; 30K character generator; new software for weather package; MCA-14 TV master control automation system. Turbo Paint 2D graphics systems, 20-KEL election reporting system.

DUGGAN MFG. 5328

DX COMMUNICATIONS 2343
New: Satellite earth stations.

DYNAIR ELECTRONICS 1707
Dynasty, Dynamite, Series 1200 video routing switchers; Dynasty, Dynamite audio routing switchers; Series 1200 fiberoptic systems.

DYNAMIC TECHNOLOGY 4682
Switching automation; video routing switchers, DAs; lighting equip.; satellite earth stations.

DYNATECH NEWSTAR 4526
New: Business automation. Election reporting systems; teleprompters; studio automation equip.; newsroom computers.

EASTMAN KODAK 4551
Videotape.

ECHOLAB 1770-1776
New: Digital video effects. Production switchers.

ECONCO BROADCAST SERVICE 1675
Transmitter, power tubes.

EDITRON USA 7632, 7634
VTR editor/controllers; multisource video editors; ATR synchronizers.

EEG ENTERPRISES 3438-3439
New: VBI data transmission, closed captioning, data casting. Teletext equip.; newsroom computers.

EEV 4262
New: Transmitter, power tubes. Camera pickup tubes.
See ad on p. 82

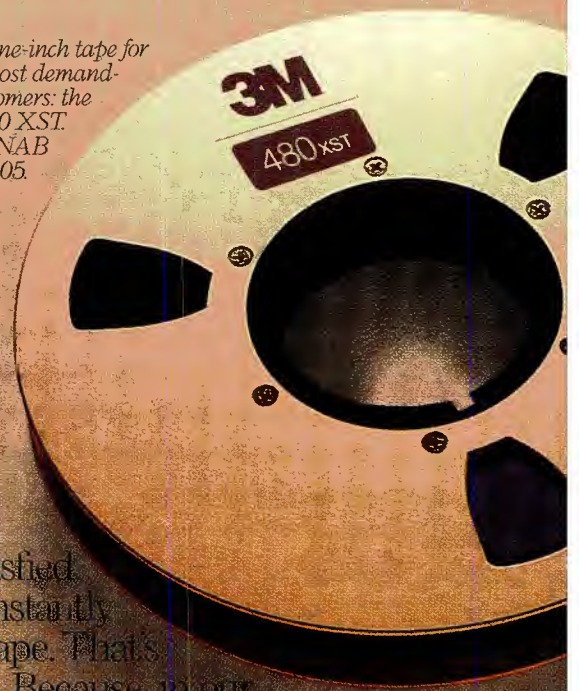
EG&G 3922
Tower lighting.

ELCOM BAUER 1153
Audio processors; radio transmitters.

ELECTRO IMPULSE LAB 1103
Other RF, general.

In this business, you can't afford to be satisfied with less.

The one-inch tape for our most demanding customers: the new 480 XST. See it at NAB booth 3405.



The people who use our tape are not easily satisfied. In fact, our best customers are never satisfied. They constantly demand more from themselves. And more from their tape. That's why they demand 3M tape. And why you should try it. Because, in our products and service, 3M is committed to one goal: **We won't be satisfied until you are.**

3M

NAB LAS VEGAS 1989

ELECTRO-VOICE 4174
New: Audio test equip. Field portable mixers; mics, accessories; studio monitors.

ELECTROHOME 5116
Video monitors.

ELECTRONICS RESEARCH 1017
Antennas, towers; diplexers, multiplexers.

EMCEE BROADCAST PRODUCTS 4251
TV transmitters; technical/engineering consultant.

EMCOR/CRENLO 1573
Studio furniture; transportation cases.

EMERGENCY ALERT RECEIVER 2248
SCA equip.; EBS equip.

ENERGY-ONIX BROADCAST EQUIP. 1730-1732
New: Radio transmitters.

E-N-G MOBILE SYSTEMS 4981

ENTERPRISE ELECTRONICS 3870-3872
New: Doppler weather radar system.

ESD 5461-5462
New: Advanced Weather Graphix, TrueView Dimensional Imager, EasyData 9600 Service.

ESE 3907-3908
New: Character generators. Routing switchers, DAs; time code equip.; clocks, timers; telco interface equip.

EVENTIDE 2535
New: Digital audio workstations. Video and audio broadcast delay; audio processors.

EVERTZ MICROSYSTEMS 5379-5380
Character generators; VTR editor/controllers; tape synchronizers; time code equip.; clocks, timers; ATR synchronizers.

EXCALIBUR INDUSTRIES 3165
Transportation cases.

EXPRESS TOWER CO. 7903
Antennas, towers.

FAIRLIGHT INSTRUMENTS 7717
New: Digital video effects; digital audio workstations.

FAROUDJA LABS 5733-5736
New: HDTV production

equip.; NTSC encoders/ decoders; other processing.
See ad on p. 16

FARRTRONICS 5448-5449
Intercoms; telco interface equip.; connectors, jackfields.
See ad on p. 136

FELDMAR WATCH 3187
Clocks, timers.

FERNO WASHINGTON 7726
Audio and video equip. carts.

FGV PANTHER CORP. OF AMERICA 3838
New: Helios HMIs. Camera support equip.

FIBERBILT CASES 5338
New: Molded shipping cases.

FIDELIPAC 1117
Cart decks; audio tape, carts; tape storage systems.
See ad on p. 3

FIELD ENGINEERING 3084
New: In-camera SMPTE safe action/safe title generator.

FILM HOUSE 1659
TV marketing campaigns for radio stations.

FIRSTCOM BROADCAST SERVICES 1008
Music/sound efx libraries.

FLASH TECHNOLOGY 1553
Tower lighting.

FLORICAL SYSTEMS 5686-5687
New: Cart automation/MERPS (ShowTimer TimeShifterII); switching automation (MACS).

FOCAL PRESS 7616
Book publisher.

FOR-A CORP. OF AMERICA 5151
New: TBCs; frame synchronizers; character generators; digital video effects; post-production consoles. NTSC encoders/decoders; color correctors; VTR editor/ controllers; multisource video editors; routing switchers, DAs; time code equip.; clocks, timers.

FORT WORTH TOWER 3840
Antennas, towers.

FORTEL 5526
TBCs; color correctors.

FOSTEX CORP. OF AMERICA 5280
4020 event controller; character generators; tape synchronizers; time code equip.; FAME software; mics, accessories; studio monitors; studio ATRs; digital ATRs; ATR synchronizers.

FREZZOLINI ELECTRONICS 3916-17
New: SC2, MB10/90 battery chargers; FBP-14/13 nicad battery pack; Frezzi-Portable power case; Mini-Fill pro lighting kit. Lighting equip.; power supplies, batteries.

FUJI PHOTO FILM 3551
Videotape.

FUJINON 3555
New: HDTV production equip. Lenses.
See ad on p. 52

FUTURE PRODUCTIONS 5784-5785
New: Camera control unit.

GARNER INDUSTRIES 5112-5113
Tape erasers, degaussers.

GE AMERICAN COMMUNICATIONS 3419
Program distributor; digital audio transmission service; transponder leasing service.

GEFEN SYSTEMS 2351
New: Compact disc changer; sound efx/music software & hardware.

GENERAL ELECTRIC 3905
Lighting equip.

GENERAL ELECTRIC/ COMBAND 2243
Addressable systems for MMDS/ITFS; multichannel block downconverters.
See ad on p. 135

GENERIC DESIGN 5352
VTR heads, electronics; VTR editor/controllers; time code equip.

GENTNER ELECTRONICS CORP. 2127
New: Audio processors (Audio Prism, Phoenix); transmitter remote control. Field portable mixers; telco interface equip.; audio routing switchers.

GENTNER RF PRODS. DIV. 2127
Transmitter remote control.

GEOCAM 7003
Camera support equip.

GML 7333
New; Audio compressor/ limiter; studio automation equip. Mics, accessories; electronic audio editors; reverb, special efx.

ALAN GORDON ENTERPRISES 3855
Lighting equip.; camera support equip.; mics, accessories.

GORMAN REDLICH MFG. 1271
EBS systems.

GOTHAM AUDIO 3538
New: Mics, accessories. Audio processors; studio monitors; digital ATRs; digital audio workstations; cassette decks; compact disc equip.; turntables; special efx.

G & M POWER PRODUCTS 5083

GRAHAM-PATTEN SYSTEMS 5728-5731
Video keying systems; post-production consoles; subcarrier for digital audio transmission.

THE GRASS VALLEY GROUP 4130
New: Production switchers. HDTV production equip.; character generators; 2D graphics systems; digital video effects; VTR editor/ controllers; multisource video editors; random access editors; MC switchers; switching automation; routing switchers, DAs; weather radar/graphics; election reporting systems; sync & pulse code generators/ processors; post-production consoles; fiberoptic systems.

GRAY ENGINEERING LABS 3947, 4046
Time code equip.

THE GREAT AMERICAN MARKET 3373
New: Access lighting control console.

LYNN GREENBERG ELECTRONIC TELEPROMPTING 7543
New: PC-based teleprompters.

JAMES GRUNDER & ASSOC. 4177
New: CEL P164 eight-bit, 4:2:2 digital efx/framestore/TBC; P165 eight-bit bidirectional standards converter. CEL digital video effects systems.

GTE SPACENET 909
New: SNG systems; SNG voice communication service.

HALLIKAINEN & FRIENDS 1111
On-air consoles, mixers; remote monitoring systems; transmitter remote control.

HARRIS CORP., BROADCAST DIV. 1305
New: Electronic still stores; character generators; 2D graphics systems; 3D modeling, animation; video graphics workstation; DAT recorder; radio transmitters; TV transmitters; antennas, towers. TBCs; frame synchronizers; on-air consoles, mixers; transmitter remote control.

HARRIS CORP., BROADCAST MICROWAVE 1305
ENG & intercity microwave.

HARRIS CORP., BUSINESS COMMUNICATIONS DIV. 1305

HARRIS CORP., VIDEO SYSTEMS DIV. 1305
TBCs; frame synchronizers; Vws video workstation/electronic still store; digital effects devices.

HARRISON SYSTEMS 1116
New: On-air consoles, mixers; post-production consoles; studio automation equip.

H&E MICRO-TRAK 3431

HEDCO (SUBSIDIARY OF LEITCH VIDEO) 3855
New: Routing switchers, DAs; audio routing switchers. Sync and pulse code generators/processors.

The faster things change, the faster

At Camera Mart, we cover video changes faster than you change lanes.

Our video pros are close to the manufacturers, often evaluating new ideas and testing new products before they're introduced.

So, when you ask us, "What's new?" you know we know what we're talking about.

In over 50 years, we've sold and rented more film and video equipment than anyone.

Today, we have millions of dollars invested in the world's best video equipment. For production, post-production, duplication, digital effects and graphics—plus, lighting for any size job.

See us at NAB Booth #5551

Branch Offices:

Burbank, Calif. 91506
(818) 843-6644
FAX: (818) 843-2478

Las Vegas, Nv. 89121
(702) 435-9234
FAX: (702) 451-3229

Sacramento, Ca. 95841
(916) 487-4545
FAX: (916) 487-2940

Liverpool, New York 13088
(315) 457-3703
FAX: (315) 457-3795

Miami, Florida 33172
(305) 227-2975
FAX: (305) 227-0531

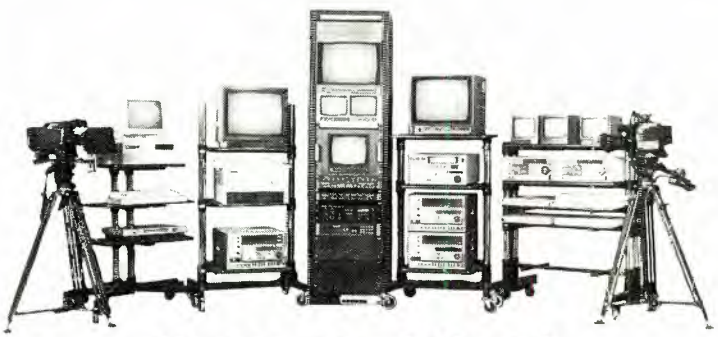
Evansville, In. 47715
(812) 476-6327

we keep up.

In all, we have over 110,000 square feet of equipment on both coasts and an international division to meet the needs of customers anywhere on earth.

In addition, we design, build and install complete video systems. And it all comes with the best service, brightest experts and friendliest rates you'll find anywhere.

If you want to hear about the latest in video, call us. And see how fast we move.



The Camera Mart, Inc.

SALES • SERVICE • RENTAL

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

Circle 144 on Reader Service Card Page 107

KARL HEITZ, INC. 3477-3478
Camera support equip.; videotape; mics, accessories.

HIPOTRONICS, POWER PRODUCTS DIV. 3379
Automatic voltage regulators.

HITACHI DENSHI AMERICA 4519
Studio cameras; ENG/EFP cameras; video test equip.; HDTV production equip.

HM ELECTRONICS 3066
New: Intercoms; telco interface equip. Mics, accessories.

H.M.I. LIGHTING 7536

HOFFEND & SONS 3365-3366
Lighting equip.; camera support equip.

HOLADAY IND. 2028
RF test equip.

HOME SHOPPING NETWORK 7805

HOODMAN CORP. A125
New: Monitor sun shades.

HOTRONIC 3771
TBCs; frame synchronizers.

HOWE TECHNOLOGIES 1465
On-air consoles, mixers; Phase Chaser audio TBC; studio furniture.

HUGHEY & PHILLIPS 4276
Remote monitoring systems.

HUNGERFORD, ALDRIN, NICHOLS 1056

IDB COMMUNICATIONS GROUP A140
Antennas, towers; satellite earth stations.

IGM COMMUNICATIONS 1141
Studio ATRs; studio automation equip.

IKEGAMI ELECTRONICS (USA) 5305
Studio cameras; ENG/EFP cameras; camcorders; HDTV production equip.; NTSC encoders/decoders; telecines; video monitors; video projectors; ENG microwave.
See ad on p. 74-75

ILC TECHNOLOGY 3773
Lighting equip.

IMAGE VIDEO 5574
Video routing switchers, DAs; digital production systems; audio routing switchers.
See ad on p. 138

INDUSTRIAL ACOUSTICS 7641-7643
Studio design & construction.

INFORMATION DISPLAY SYSTEMS/SAIC 7135
HDTV projectors; equip. distributor; studio design & construction; technical/engineering consultant.

INNOVATIVE AUTOMATION 1603
New: Studio automation equip. (Ditrol Jr.). Cart decks; audio tape, carts; equip. distributor.

INNOVISION OPTICS 2020

INOVONICS 1473
New: FM/FMX stereo generator, digital stereo generator. Audio processors.

INTEGRATED ARTS 7821

INTEGRATED MEDIA SYSTEMS 7011
Dyaxis digital audio workstations.

INTEGRATED TECHNOLOGIES 7334
Audio & video DAs; pulse & subcarrier amps; character/graphics systems.

INTELLIGENT LIGHT 7105
New: 3D modeling, animation.

INTELVIDEO 4478
New: NTSC encoders/decoders; "Video Flasher."

INTERACTIVE MOTION CONTROL 5477
Remote motion control systems.

INTERGROUP VIDEO SYSTEMS 3526
New: Production switchers; routing switchers, DAs.

INTERNATIONAL MUSIC/AKAI PROFESSIONAL 7440
New: Akai Digital Samplers. Post-production consoles; studio monitors; studio ATRs; digital ATRs; cassette decks.

ISI 3862

I.T.E. 3938
New: Camera support equip.

ITELCO S.P.A. 3459
Radio transmitters; TV transmitters; microwave for ENG.

ITS CORP. 5180
New: MDS, SMATV systems. TV transmitters.

JAMPRO ANTENNAS 1217
Antennas, towers; wire & cable.

JBL PROFESSIONAL 3577
Studio monitors.

JEFFERSON-PILOT DATA SERVICES 1241
Business automation; newsroom computers.

JENSEN TOOLS 1667
Power supplies, batteries; wire, cable; connectors, jackfields; tools; transportation cases.

JOHNSON ELECTRONICS 1527
SCA equip.

JVC PROFESSIONAL PRODUCTS 4168
New: CCD camera; S-VHS VTRs. Studio cameras; frame synchronizers; video monitors; 2D graphics systems; VTR editor/controllers.

KAHN COMMUNICATIONS 1005
New: AM stereo receiver; audio processors; telco interface equip.; AM stereo equip.

KALAMUSIC 2543
Syndicated radio programming.

KANGAROO VIDEO PRODUCTS 3741-3742
Carrying cases.

KAVOURAS 5719
Weather radar/graphics.

KAY INDUSTRIES 1647
Power supplies & batteries; power converters.

K&H PRODUCTS/PORTA BRACE 5377
Camera cases.

KINGS ELECTRONICS CO. 5123-5124
New: Digital video effects.

KINTEK 1057
Audio processors; audio monitoring equip.; audio test equip.

KINTRONIC LABS 710
AM directional antenna feeder systems.

KLIEGL BROS. 3516
Lighting equip.

KLINE TOWERS 5446
Towers.

KNOX VIDEO 3849
New: Character generators; 2D graphics systems.

LAIRD TELEMEDIA 4874
Color correctors; telecines; character generators; routing switchers, DAs.

LAKE SYSTEMS CORP. 819
LaKart MERPS system; video & audio systems designer.

LANDY ASSOCIATES 5522
Studio furniture; equip. distributor; studio design & construction; mobile vehicle construction; technical/ engineering consultant.

LDL COMMUNICATIONS/ LARCAN 3562
New: TV transmitters; antennas, towers.

LEADER INSTRUMENTS 5371
Video test equip.; sync & pulse generators; audio test equip.; AM stereo equip.

LECTROSONICS 5370

LEE COLORTRAN 3533
Lighting equip.

LEITCH VIDEO OF AMERICA 3568
New: Video test equip.; electronic still stores. Frame synchronizers; routing switchers, DAs; sync & pulse code gen/proc; clocks, timers.
See ad on p. 57

LEMO USA 5107
Connectors, jackfields.

LENCO ELECTRONICS 3716
TBCs; video processors; video test equip.; video routing switchers, DAs (Starflex); reverb, special efx; time compression systems.

LEONETTI CO. A157
New: Lighting equip.

LEXICON 2327
Audio processors; digital audio workstations; reverb, special efx.

LIGHTING METHODS 4483

LIGHTING ELIMINATORS & CONS. 3919

LIPSNER-SMITH CO. 1706
New: Ultrasonic film cleaning equip.

LISTEC VIDEO CORP. 3523
New: Live editing computer prompter.

LOGITEK 1635
On-air consoles, mixers; post-production consoles; audio routing switchers, DAs.

LOWEL-LIGHT MFG. 3768-3868
Lighting equip.

LPB 1541
New: Citation II audio consoles; turntable preamps.

LTM CORP. OF AMERICA 5358
Mics, accessories.

LUCASEY MFG. 5062

LUXOR 2449
A/V tables, stands, cabinets.

L-W ATHENA 5205
Telecines.

LYON LAMB V.A.S. 7111
3D modeling, animation systems and accessories.

3M BROADCASTING & RELATED PRODUCTS 3405
Character generators; routing switchers, DAs.

3M/INTERNATIONAL TAPETRONICS 3405
Cart decks; audio tape, carts; audio routing switchers.
See ad on p. 44

3M MAGNETIC MEDIA DIV. 3405
Audio and videotape.
See ad on p. 84

M/A-COM 3933
Microwave for ENG.

MAGNI SYSTEMS 3173
New: Component/composite signal generators; programmable signal generator, multistandard waveform monitors and vector scopes, programmable HDTV generator. NTSC encoders/decoders; sync and pulse code generators/processors.

MAGNUM TOWERS 1501-1502
Antennas, towers.

MAIL AMERICA/ RADIOXPRESS 7131

MANHATTAN PRODUCTION MUSIC 3064
New: Production music on compact disc.

MARCONI COMMUNICATION SYSTEMS 4338
Radio transmitters.

MARTI ELECTRONICS 1204
Audio processors; mics, accessories; audio monitoring; remote pickup, RENG; STLs, TSLs; remote control systems; SCA equip.

MATCO 5382-5384
Cart automation/MERPS; VTR editor/controllers; routing switchers, DAs.

MATTHEWS STUDIO EQUIP. 4183
Camera support equip.

MAZE BROADCAST 7420
Used equip. distributor.

MCCURDY RADIO INDUSTRIES 1755
New: Digital intercom system. On-air consoles, mixers; audio test equip.; studio automation equip.
See ad on p. 60

MCL A115
See ad on p. 115

MCMARTIN INDUSTRIES 2227
Audio processors; on-air consoles, mixers; audio monitoring equip.; radio transmitters; exciters.

MEDIA COMPUTING 5386
Weather radar/graphics; election reporting systems.

MEDIA DEVELOPMENT 7140

MEDIA TOUCH SYSTEMS 2105
New: Switching automation. Compact disc equip.; studio automation equip.; audio routing switchers.

MERET 4473

MERLIN SNELL & WILCOX 5530
ME 9900, ME 8800 standards converters; ME 2001 HDTV downconverter.

MICRO COMMUNICATIONS 1547
New: Transmitter remote control.

MICRODYNE 5119
Antennas, towers; Quick Link SNG systems; satellite earth stations.

MICRON AUDIO PRODUCTS/ DEDOTEC 5772
New: Lighting equip. (Dedolight, Dedocool); wireless mics.

MICROSONICS 5362
Comb filters.

MICROTIME 4126
New: TBCs; 3D modeling, animation; digital video effects; multisource video editors.

MICROWAVE RADIO 1731
Antennas, towers (ProStar); microwave for ENG.

MIDWEST COMMUNICATIONS CORP. 4568, A110
New: Frame synchronizers; standards convertors; color correctors; 2D graphics systems; routing switchers, DAs; TV transmitters; ENG/EFP vehicles; SNG systems. TBCs; NTSC encoders/decoders; video test equip.; production switchers.
See ad on p. 6, 10, 12

MILLER FLUID HEADS (USA) 5455
Camera support equip.

MINOLTA 4682

MIRALITE COMMUNICATIONS 7530
New: Satellite earth stations; equip. distributor.

MITCHELL CAMERA A165
Camera support equip.

MITSUBISHI ELEC. SALES AMERICA 7101
On-air consoles, mixers (Westar); post-production consoles; studio ATRs (X Series); digital ATRs; cart decks.

MOBILE-CAM PRODUCTS A165
New: Frame synchronizers; mobile vehicle construction. Camera support equip.

MODULATION SCIENCES 5765
Audio processors; MTS equip.; AM stereo equip.; SCA equip.

MODULITE/ BARDWELL 3880
Lighting equip.

MOLE-RICHARDSON 3974
Lighting equip.

KEITH MONKS AUDIO 2151
Record cleaning machines; studio monitors.

MONTAGE GROUP 5283
Random access video editors.

MORTON HI TEK 7800
Studio furniture.

MOSELEY ASSOCIATES 1317
Audio routing switchers, DAs; STLs, TSLs; remote control systems; SCA equip.

MOTOROLA AM STEREO/C & E 1068
STLs, TSLs; AM stereo equip.

MUSCO MOBILE LIGHTING A135
Lighting equip.

MZB/GRAY 3432
ENG/EFP vehicles; mobile vehicle construction.

N.A.R.T.E. 4486

NADY SYSTEMS 3740
New; Two-way portable radios; mics, accessories; radio transmitters.

NAGRA MAGNETIC RECORDERS 4005
Field ATRs.

NAKAMICHI 2149

Switchcraft® SPEAKS... audio -ease

The APP Series audio patch panel speaks broadcast engineers' language with features that make it easy to install, wire, and maintain. No other patch panel offers the level of flexibility and simplicity available in Switchcraft's APP Series.

Insulation Displacement Connectors (IDC's) Make Termination Easy.

Color-coded IDC's insure accurate termination identification. One simple tool eliminates the need for wire stripping and soldering and makes connections quick and easy.

A Variety Of Wiring Options Expand Your Applications Possibilities.

The APP Series gives engineers the ability to terminate two wires at one IDC, so a signal can be transmitted to two locations. The unit can also accommodate 22 or 24 gauge wire, either solid or stranded.

Four Configurations Offer Versatility.

Four convenient unit configurations are offered. Engineers can specify the complete assembly, front and back panel remote without frame, and either rear or front panel only, making the APP Series ideal for any installation.

Identification Features Speed Maintenance.

Front panel identification strips, color-coded IDC's, internal and external wire guides, and a rear cable support bar all provide convenient wiring organization and identification.

Test and compare. Switchcraft audio patch panels are a breeze to operate and deliver the convenience and transmission quality the industry depends on. Specify Switchcraft ...we speak *audio-ease!*

Switchcraft

A **Raytheon** Company

5555 N. Elston Ave.
Chicago, IL 60630
(312) 792-2700

Circle 147 on Reader Service Card Page 107

For instant response to your questions or for more information, FAX us at (312) 792-2129, or call our Audio Department at (312) 792-2700.

NALPAK VIDEO 3368
New: Camera support equip.; ATA rack-pod transportation case. Newsroom computers.

NARDA MICROWAVE 2349
Video test equip.; audio test equip.; ENG microwave.

NAUTEL 1065
Radio transmitters.

NEC AMERICA, BROADCAST EQUIP. DIV. 3444
New: ENG/EFP cameras; digital disk recorders; TV transmitters. Digital video effects.

L.E. NELSON SALES/THORN-EMI 5365
Lighting equip.

NEOTEK 7430, 7432
New: Esprit post-production console.

NETWORK MUSIC 1624
Music/sound efx libraries.

NEUTRIK USA 1734
Connectors, jackfields.

RUPERT NEVE 2407
New: On-air consoles, mixers. Field portable mixers; post-production consoles.

NEW ENGLAND DIGITAL 2307
Digital audio workstations (Synclavier; Direct-to-Disk; Post-Pro).

A.C. NIELSEN 903
Ratings service.

NIKON 3581
Lenses.

NORPAK 3783
New: TTX600 teletext receiver.

NORTRONICS 1537
Heads, accessories.

NOVA SYSTEMS 5472
TBCs; frame synchronizers.
See ad on p. 50

NPR SATELLITE SVCES. 7622
Satellite dist. svces.

NURAD 5538
New: ENG microwave. STLs, TSLs; intercity microwave.

NYTONE ELECTRONIC 5479
Telecines.

O'CONNOR ENGINEERING LABS 4574
Camera support equip.

ODETICS/BROADCAST SALES 711
Cart automation/MERPS.
See ad on p. 129

OKI ELECTRIC INDUSTRY 3087
Standards convertors.

OLESEN 3726
Lighting equip.

OMICRON VIDEO 2515-2517
New: Model 451 NTSC/PAL encoder/decoder. MC switchers; routing switchers, DAs.

OMNIMUSIC 1527
Music/sound efx libraries.

OPTICAL DISC CORP. 2231
New: 534 digital audio processor encoder for LaserDisc. Videodisc recording & playback systems.

ORBAN ASSOC. 1630
New: Optimod-HF; programmable parametric equalizer.

ORION RESEARCH 3068
New: SoundStar post-pro audio console. On-air consoles, mixers.

OSRAM CORP. 7427, 7429
New: Lighting equip.

OTARI CORP. 1353
3/4-, 1/2-inch VTRs; time code equip.; studio ATRs; field ATRs; digital ATRs; heads, accessories; cart decks; ATR synchronizers.

PACIFIC RADIO ELECTRONICS 7330-7332
New: Wire, cable; connectors, jackfields. Tape erasers, degaussers; mics, accessories; tools; equip. distributor.

PACIFIC RECORDERS & ENGINEERING 1325
On-air consoles, mixers (BMX, AMX, ABX, Newsmixers, Stereomixer); post-production consoles (AMX, ABX); cart decks (Tomcat, Micromax); audio routing switchers, DAs; studio design.

PACO ELECTRONICS U.S.A. 3920
Power supplies, batteries.

PALTEX 4156
New: Multisource video editors (Abner, Elite, Elan, ES/D, Esprit Plus). VTR editor/controllers.

PANASONIC BROADCAST SYSTEMS 4142
New: AK-450 camcorder; digital VTR. ENG/EFP cameras; camcorders; digital VTRs; 3/4-, 1/2-inch VTRs; cart automation/MERPS; TBCs; NTSC encoders/decoders.
See ad on p. 66-67

PANASONIC INDUSTRIAL CO./ RAMSA 4142
3/4-, 1/2-inch VTRs; field portable mixers; post-production consoles; mics, accessories; studio monitors; studio ATRs; field ATRs; digital ATRs; compact disc equip.
See ad on p. 22-23, 24, 26

PANSOPHIC SYSTEMS 7917
2D graphics systems; 3D modeling & animation.

PATCH BAY DESIGNATION CO. 5344
Patch bay labels.

PEERLESS SALES 4086-4087
Monitor mounting brackets; speaker mounts.

PENNY & GILES 2201
Rotary & slide attenuators.

PEP 4000
Power supplies, batteries.

PERROTT ENGINEERING LABS 3834
Lighting equip.; camera support equip.; power supplies, batteries.

PESA AMERICA 5712
New: Remote motion control; remote monitoring systems; transmitter remote control. Video monitors; video test equip.; character generators; intercoms; TV transmitters.

PHILIPS LIGHTING 7321
New: Lighting equip.

PHILIPS TEST & MEASURING INSTRUMENTS 5105
Video test equip.; RF test equip.

PHOTOGRAPHIC EQUIP. SVCES. 4882
Camera support equip.; photographic equip.

PINNACLE SYSTEMS 801
New: 3D modeling rendering station; digital video effects (Prizm 601); desktop preproduction & editing system. 1000, 2000 & 3000 Series modular Video Workstations; digital video effects; 2D and 3D graphics; still store systems.

PINZONE COMMUNICATIONS2315
Satellite earth stations; wire, cable.

PORTA-PATTERN 5177
Video test charts.

POTOMAC INTRUMENTS 1375
Audio test equip.; remote monitoring systems; transmitter remote control; AM stereo equip.

PRO BATTERY 3382
Power supplies, batteries.

PROGRESSIVE IMAGE TECHNOLOGY 3381
New: TBCs; frame synchronizers; NTSC encoders/ decoders; PC genlocks; character generators; digital video effects; sync and pulse code generators/ processors.

Q-TV 3713
New: Teleprompters.

QEI CORP. 1147
Radio transmitters; modulation monitors, RF amps.

QSI SYSTEMS 3751-3753
Proc amps; Colorbar generators, video SID, video auto switchover.

QUALITY VIDEO SUPPLY 3383-3384
Equip. distributor.

QUANTA CORP. 4526
Character generators (Microgen, Delta, Orion); 2D graphics systems; 3D modeling, animation; VTR editor/controllers.

QUANTEL 5312
Standards convertors; electronic still stores; character generators; 2D graphics systems; digital video effects; digital disk recorders; VTR editor/controllers; multisource video editors; random access editors; digital audio workstations.

QUICKSET INTERNATIONAL 3513
New: Camera support equip.

R-COLUMBIA PRODUCTS 3468-3469
New: Mics, accessories; intercoms. Telco interface equip.
See ad on p. 136

R*SCAN CORP. 5732
Weather radar/graphics.

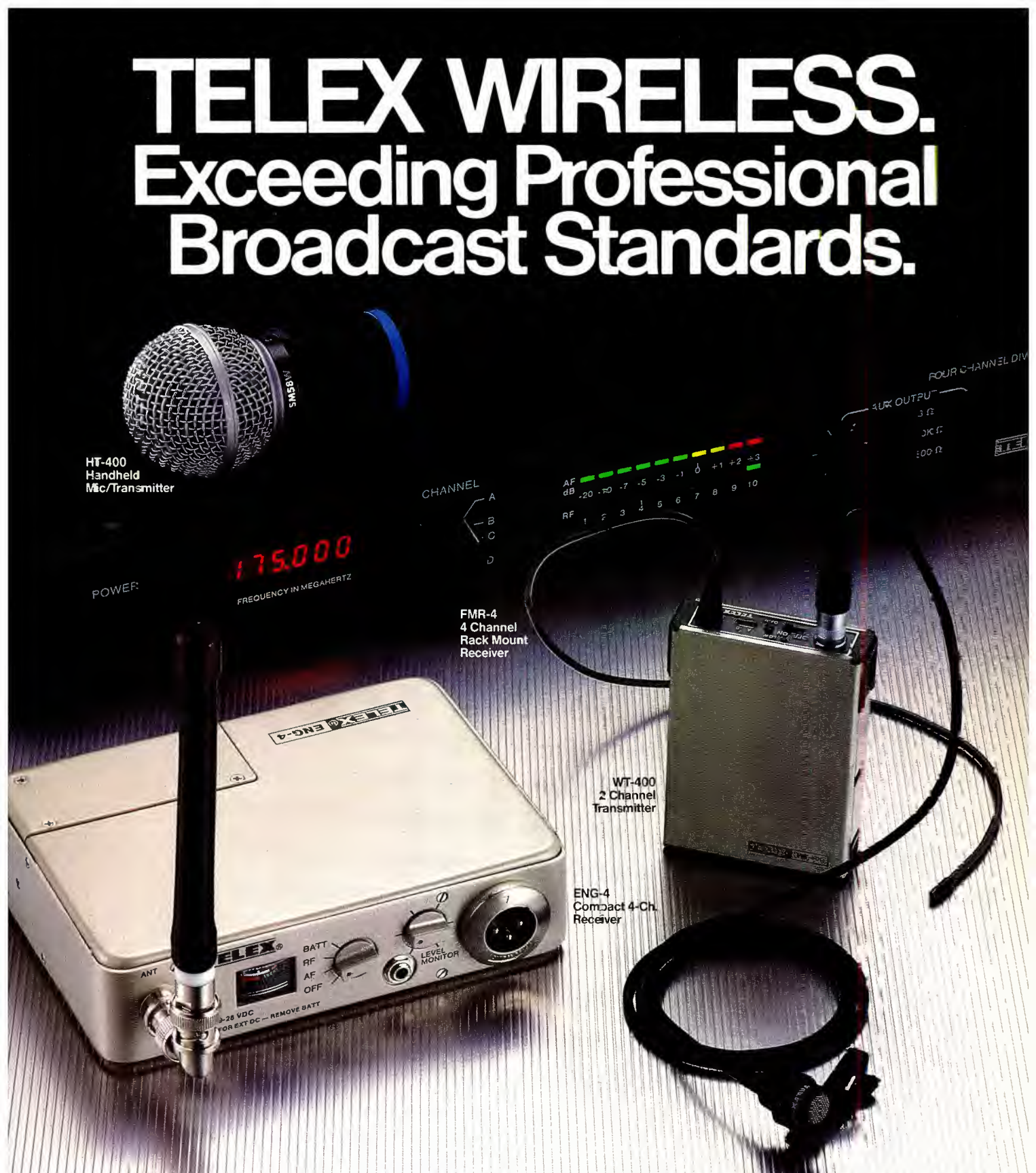
RADIATION SYSTEMS 3070
New: Satellite earth stations.

RADIO SYSTEMS 2037
On-air consoles, mixers; digital ATRs; radio transmitters; studio furniture; equip. distributor; studio design & construction.

RAM BROADCAST SYSTEMS 1001
Equip. distributor.

RANGERTONE RESEARCH 3762-3766
One-inch VTRs; telecines.

TELEX WIRELESS.
Exceeding Professional Broadcast Standards.



At Telex, we've always believed it to be wiser to exceed a standard than to meet it. We've been providing product to the professional broadcast and production industries for over fifty years and we know what it takes.

Our wireless microphone systems have been designed to stand up to the rigors of difficult remote ENG news assignments as well as the daily abuse of studio use. Call or write for detailed information. Telex Communications, Inc., 9600 Aldrich Ave. S., Minneapolis, MN 55420

TELEX®

Circle 148 on Reader Service Card Page 107

RANK CINTEL 3926
New: Electronic still stores (Slide File II, Gallery Photocall, etc.); weather radar/graphics (Cloud File). Color correctors; telecines.

RAPID DEPLOYMENT TOWERS A150
New: Rapup tower mast, controlled guy wire system.

REACH ELECTRONICS 5751-5752
SCA equip.

RECORTEC 3910
Tape erasers, degaussers.

REES ASSOC. 3483-3484
Studio design & construction.

REGISTER DATA SYSTEMS 2337
New: RDS Traffic Master I & II.

RESEARCH TECHNOLOGY INTERNATIONAL 1706
New: V-Series videotape degaussers.

RETEX INTERNATIONAL 7435
Studio furniture.

RF TECHNOLOGY 5451-5453
New: Antennas, towers; ENG microwave; fiberoptic systems; GaAs FET 2/2.5 GHz Amps. STLs, TSLs; intercity microwave.

RICHARDSON ELECTRONICS 3852
New: Cathode ray tubes; technical/engineering consultant. Pickup tubes; transmitter, power tubes.

ROCKTRON 3946

ROCKWELL INTL., NETWORK TRANS. DIV. 3733
STLs, TSLs; fiberoptic systems.

ROH/DIV. ANCHOR AUDIO 3451-3452
New: Studio monitors (Anchor 1000/1400); audio test equip. (Series 190); intercoms (Series 400); audio routing switchers (ARMS 7000).

ROHDE & SCHWARZ 3813
Video test equip.; remote monitoring systems; teletext equip.

ROHN 4013
Antennas, towers.

ROSCO LABS 5340
Lighting equip.

ROSCOR 4238, A210
New: Digital video effects; SNG systems; studio furniture. Equip. distributor; studio design & construction; mobile vehicle construction; mobile facilities rental; technical/engineering consultant.

ROSS VIDEO 4977
New: Downstream multikeyer.

RTNDA 4003

RTS SYSTEMS 4151
New: Intercoms; telco interface equip. Audio test equip.

SACHTLER CORP. OF AMERICA 3958
New: Reporter & Production series lighting equip.; Video 10 camera support equip.
See ad on p. 131

CS 1673
New: Long-life ferrite heads for cart machines.

SAMSON TECHNOLOGIES CORP. 2308-2310
New: Post-production consoles. Mics, accessories.

SANKEN MICROPHONES 1645
Mics, accessories.

SATELLITE MUSIC NETWORK 7617
Program distributor.

SCALA ELECTRONICS 4962

SCHAFER WORLD COMMUNICATIONS 1347
New: Digital ATRs; studio monitors. Field portable mixers; on-air consoles, mixers; cart decks; compact disc equip.; studio automation equip.

SCHNEIDER CORP. OF AMERICA 4162
New: Lenses.

SCHWEM TECHNOLOGY 5482
Lenses.

SCIENTIFIC ATLANTA 3423
Satellite earth stations.

SECK 3577
Digital video effects.

SELCO/SIFAM 1657
Audio level indicators.

SENNHEISER ELEC. CORP. 1052, 1054
New: Mics, accessories; headphones.

SENTRY SYSTEMS 2215
Studio automation equip.

SESCOM 3413-3415
Audio processors; audio test equip.

THE RUMORS DON'T EVEN COME CLOSE.

NAB '89

SONY®

SONY COMMUNICATIONS PRODUCTS COMPANY

SG COMMUNICATIONS 2405
Tower and antenna installations, repair.

SHIMA SEIKI 3073
2D graphics systems; 3D modeling, animation; digital video effects.

SHIVELY LABS 1341
Antennas, towers.

SHOOK ELECTRONICS A117

SHURE BROTHERS 1517
New: Mics, accessories (Beta Series); audio processors; field portable mixers; on-air consoles, mixers.

SIERRA VIDEO SYSTEMS 7904-7906
New: CIK-1 HDTV keyer. Color correctors; format converters, keyers; production switchers; routing switchers, DAs; sync/pulse routing; time code equip.; component video products; audio routing switchers.

SIGMA ELECTRONICS 3168
New: NTSC encoders/decoders (IGM 2.0). Routing switchers, DAs; sync and pulse code generators/processors; clocks, timers; audio routing switchers.

SIRA/DATA SECURITY/COMAD COMMUNICATIONS 2121
Tape erasers, degaussers; antennas, towers.

SISCOM 7117
New: NewsPro teleprompter. Newsroom computers.

SKOTEL CORP. 4021-4022
New: Time code generator.

SMPTE 5726

SBE 4886

SOCIETY OF PROF. VIDEOGRAPHERS 4487

SOLID STATE LOGIC 2005
New: Electronic audio editors (Screensound). On-air consoles, mixers; post-production consoles; digital audio workstations.

SOLUTEC 5748
Cart automation/MERPS; routing switchers, DAs; stereo audio DAs.

SONO-MAG CORP. 1105-1107
Cart decks; compact disc equip.; studio automation equip.; audio routing switchers.

SONY BROADCAST PRODUCTS DIV. 4101
New: Betacam SP CCD camcorder; still store; new versions of D-2 composite digital VTR; new LMS machine. BVP-7 CCD EFP camera; BVW-200 one-piece Betacam CCD camcorder; BVW-70, BVW-75 Betacam SP recorder/editors; BVW-60 play-only deck; DVR-10 D-2 composite digital VTR; DVR-1000 D-1 component digital VTR; digital interface series; Library Management System; BVM-1315 broadcast monitor.
See ad on p. 4-5, 104-105

SONY COMMUNICATIONS PRODUCTS 4101
New: ENG/EFP cameras; digital VTRs; 3/4-, 1/2-inch VTRs; cart automation/MERPS; NTSC encoders/decoders; electronic still stores; VTR editor/controllers; studio cameras; camcorders; HDTV production equip.; one-inch VTRs; TBCs; standards convertors; video monitors; video projectors; multisource video editors; on-air consoles, mixers; post-production consoles; mics, accessories; studio ATRs; field ATRs; digital ATRs; compact disc equip.
See ad on p. 99

SONY INFORMATION SYSTEMS DIV. 4101

SONY MAGNETIC PRODUCTS 4101
New: D-2 videocassettes; upgraded Betacam cassettes.
See ad on p. 20

SONY PRO AUDIO DIV. 4101
New: PCM-3348 48-track digital ATR; PCM-3324A digital ATR; digital audio mixer and interface enhancements. APR-24 multitrack ATR; APR-5003V two-channel ATR; MXP series digital audio mixers; mics.

SONY PRO VIDEO DIV. 4101
New: VO-9850/9800 U-matic SP editor and feeder/recorder; VO-8800 field portable recorder; BVU-920 player. DXC-325 camera; color monitors; projection systems; high-band 8mm video products.
See ad on p. 48-49

SOUND IDEAS 3826
Production music libraries.

SOUND TECHNOLOGY 4577
New: Audio test equip.

SOUND WORKSHOP PROF. AUDIO 7231

SOUNDCRAFT ELECTRONICS 3577
On-air consoles, mixers.

SOUNDMASTER USA 7340
Electronic audio editors.

SPECTRA SYSTEMS 3077
New: Videodisc player. VTR editor/controllers; multisource video editors; random access editors; post-production consoles; electronic audio editors.

SPRAGUE MAGNETICS 1446
Heads, accessories.

STAINLESS 3479-3480
Antennas, towers.

STANDARD COMMUNICATIONS CORP. 2545-2547
Agile Omni satellite TV receiver.
See ad on p. 41

STANTON MAGNETICS 1649
Headphones, accessories.

STANTRON/UNIT OF ZERO CORP. 1712-1716
Tape storage systems; studio furniture.

STAR CASE 4782
Transportation cases.

STATUS CABINETRY 7001
Studio furniture.

STEADI-FILM 7927
Lenses; remote motion control; pin-registered film gate for Rank Cintel telecines.

STEENBECK 3877-3879
Telecines.

STOREEL CORP. 5238
Tape storage systems.

STRAND LIGHTING 4351
Lighting equip.

STREAMLINE COMMUNICATIONS 7211

STUDER REVOX AMERICA 1261
Field portable mixers; on-air consoles, mixers; post-production consoles; studio monitors; studio ATRs; digital ATRs; cassette decks; telco interface; ATR synchronizers.

STUDIO TECHNOLOGIES 3828
MicPreEminence mic preamp; MTS equip.

SURE SHOT SATELLITE NETWORK 3686
Mobile facilities rental.

SWINTEK ENTERPRISES 2205
Mics, accessories; intercoms.

SWITCHCRAFT 1042, 1044
Mics, accessories; connectors, jackfields.
See ad on p. 94

SWR 4009
Antennas, towers; wire, cable; RF switches.
See ad on p. 106

SYLVANIA LIGHTING 3900
Lamps.

SYMBOLICS 7017
3D modeling, animation.

SYMETRIX 2304, 2306
New: Adaptive hybrid disk-based recorder/processor; digital processing recorder; precision level indicator.
Video projectors.

SYSTEM ASSOCIATES 5355
Equip. distributor.

SYSTEMATION 1032
Studio automation equip.

TABER MFG. & ENGINEERING 4017
Tape erasers, degaussers.

TAMRON INDUSTRIES 3777
Lenses.

TANNOY NORTH AMERICA 7533
New: PBM Series & AVM studio monitors; studio monitors.

TAPSCAN 1012
Ratings analysis system.

TARGET TUNING 5440

TDK ELECTRONICS CORP. 4983
Audio tape, carts; tape erasers, degaussers.

TEAC/TASCAM PRO AUDIO DIV. 5577
Audio processors; field portable mixers; on-air consoles, mixers; post-production consoles; mics, accessories; cassette decks; compact disc equip.; reverb, special efx; audio tape, carts; ATR synchronizers.

TEATRONICS 5738-5742
New: Lighting equip.

TECCOM 3948

TEKNO 7227
Lighting equip.

TEKSKIL INDUSTRIES 3586
Teleprompters.

TEKTRONIX 3700
New: HDTV generator family; video test equip.; audio test equip. TBCs; frame synchronizers; video monitors; sync and pulse code generators/processors.

TELEMET, DIV. GEOTEL 5138
NTSC encoders/decoders; video test equip.; routing switchers, DAs; fiberoptic systems.

TELEMETRICS 5105
Triax camera controllers.

TELEPAK SAN DIEGO 5746-5747
New: Camera covers, cases.

TELESCRIPT 5335-5336
Teleprompters.

TELETTRA USA 3086
New: Digital video codec for 45 Mo/s transmission.

TELEVISION ENGINEERING CORP. 1742
ENG/EFP vehicles; mobile production units.

TELEVISION EQUIP. ASSOC. 5200
Video delay lines, filters); audio headsets; antialiasing audio filter; video filters to remove audio subcarriers.

TELEX COMMUNICATIONS 3541
Wireless mic systems; intercoms; telco interface equip.; high-speed tape duplicators.
See ad on p. 97

TELMAK PTY. 7240

TELUS SYSTEMS 2301
New: Telco interface equip.

TENNAPLEX SYSTEMS 5441-5442
Music Manager automated CD player; antennas, towers; technical/engineering consultant.

TENTEL CORP. 5223-5224
New: Video test equip.

TFT 2115
New: Model 8888 RPU system. EBS systems.

THEATRE SERVICE & SUPPLY 3865-3866
Lighting equip.

THERMODYNE INTL. 2415
Transportation cases.

THOMSON-CSF BROADCAST 5141
See also COMARK, THOMSON LGT and THOMSON VIDEO
New: TV transmitters; antennas, towers; remote monitoring systems; MTS equip. technical/engineering consultant.

THOMSON-L.G.T. 5141
New: TV transmitters; antennas, towers; remote monitoring systems; MTS equip. technical/engineering consultant.

THOMSON ELECTRON TUBES & DEVICES 1165
Transmitter, power tubes.

THOMSON VIDEO EQUIP. 5141
Video proc amps, pulse amps, DAs; 2D graphics systems; studio & ENG/EFP cameras; title keyers, chromakeyers, downstream keyers.

TIFFEN MFG. CORP. 3744-3746
Lens filters.

TIMELINE 2416
VTR editor/controllers; tape synchronizers; Lynx keyboard control unit; Lynx system supervisor.

TIMES SQUARE LIGHTING 3286
New: Fresnels, broads.

TOKO AMERICA 7100
Standards converters; HDTV framestore.

TORPEY CONTROLS/KEY VIDEO 5102
MC switchers; switching automation; routing switchers, DAs; clocks, timers; central digital thermometers.

TOSHIBA AMERICA 5168
Studio cameras; ENG/EFP cameras; digital efx systems; SNG systems; TV transmitters.
See ad on p. 133

TOWNSEND BROADCAST SYSTEMS 5555
TV transmitters; antennas, towers; STLs, TSLs; transmitter remote control; MTS equip.; studio furniture; mobile vehicle construction; technical/engineering consultant.

TRANSMISSION STRUCTURES LTD. 1617, 1619
Antennas, towers.

TRF PRODUCTION MUSIC 701
New: Carlin music library, compact discs.

TRIMM 7636
Connectors, jackfields.

TROMPETER ELECTRONICS 4023-4024
New: Satellite earth stations; wire, cable; connectors, jackfields; tools.

TRUEVISION 7627
Computer graphics hardware, software.

TSM/TOTAL SPECTRUM MANUFACTURING 719
Robotic camera systems; camera support equip.

TTC/TELEVISION TECHNOLOGY CORP. 3500
New: Radio transmitters; TV transmitters; transmitter remote control.

TVI/THEATRE VISION INC. 5757-5759
Lighting equip.

TWENTIER SYSTEMS 7827
Business automation; newsroom computers.

27th DIMENSION 2533
New; Hyperfex music/sound efx libraries.

TWR LIGHTING 5110
Tower lighting.

U.S. AUDIO 5368
New: Audio amplifiers, mixers; headphone monitor system.

U.S. TAPE & LABEL 1533
Promotional bumper strips & inside window labels.

ULTIMATTE CORP. 5165
Video image compositing devices; camera support (Ultimatte Memory Head).

UNION CONNECTOR CO. 4582-4583
Lighting equip.; wire, cable; connectors, jackfields.

UNITED AD LABEL CO. 7526-7528
Labels for audio & video equip.

UNITED MEDIA 5544
New: UMI 500 video editor. Multi-Tasking series, Commander series multisource video editors, random access editors; sync & pulse gens/procs; time code equip.; ATR synchronizers.

UNITED PRESS INTL. 1134
Syndicated radio programming).

UNITED ROPEWORKS (USA) 1722
Tower guys.

UNI SET 1752
Studio furniture.

UREI 3577
On-air consoles, mixers; studio monitors.

USHIO AMERICA 7735
Halogen lamps.

UTAH SCIENTIFIC 4526
New: TAS-1 automation system). Production switchers.
See ad on p. C3

UTILITY TOWER CO. 1447
Antennas, towers.

VALENTINO 1627-1629
NEW: Music/sound efx libraries.

VALLEY INT'L 2030, 2032
Digital audio compressor expander. Mics, accessories; noise reduction systems.

VALMONT INDUSTRIES 3371
New: Antennas, towers.

VARIAN ASSOCIATES 5300
Transmitter, power tubes.

VEAM, DIV. LITTON SYSTEMS 3611
New: Fiberoptic mic snake multipin connectors. Connectors, jackfields.

VECTOR TECHNOLOGY 2137
New: Radio transmitters.

VEETRONIX 5751-5752
MC switchers.

VEGA/A MARK IV CO. 3846-3847
New: T-88 Pro Plus wireless mic, "Q" Plus intercom. Mics, accessories; intercoms.

VIDEO ACCESSORY CORP. 5212
Routing switchers, DAs; sync and pulse code generators/processors.

VIDEO ASSOCIATES LABS 4015-4016
New: NTSC encoders/decoders (Mark 10).

VIDEO BROKERS 3411-3512
New: Turbo telecine. Equip. distributor.

VIDEO COMMUNICATIONS 7117
Business automation; newsroom computers.

VIDEO DESIGN PRO 7317
Studio design & construction.

VIDEO FINANCIAL CORP./RIVIERA BROADCAST LEASING 3883
Financial services.

VIDEO INTL. DEVELOPMENT 3486-3487
New: Standards convertors.

VIDEOLAB 7303
New: VTR heads, electronics; time code equip.

VIDEOMAGNETICS 5438
New: VTR heads, electronics; tape erasers, degaussers; transmitter, power tubes.

VIDEO SVCES. UNLIMITED 7228
Camera support equip.

VIDEOMEDIA/SED 3959
VTR editor/controllers; multisource video editors; routing switchers, DAs; time code equip.

VIDEOTEK 5563
New: RM-8 color video monitor; DM-5RA RF demodulator. Frame synchronizers; video test equip.; production switchers (Prodigy); routing switchers, DAs; sync and pulse code generators/processors (Times Six, Times Plus, VSG-201); audio program monitors; RF demodulators.
See ad on p. 112

VIKING CASES 5326
Transportation cases.

VINTEN BROADCAST 809
New: Robotic camera systems; camera support equip.
See ad on p. 123

VISTEK ELECTRONICS 5530
New: NTSC encoders/decoders; standards convertors; video monitors; digital video effects.

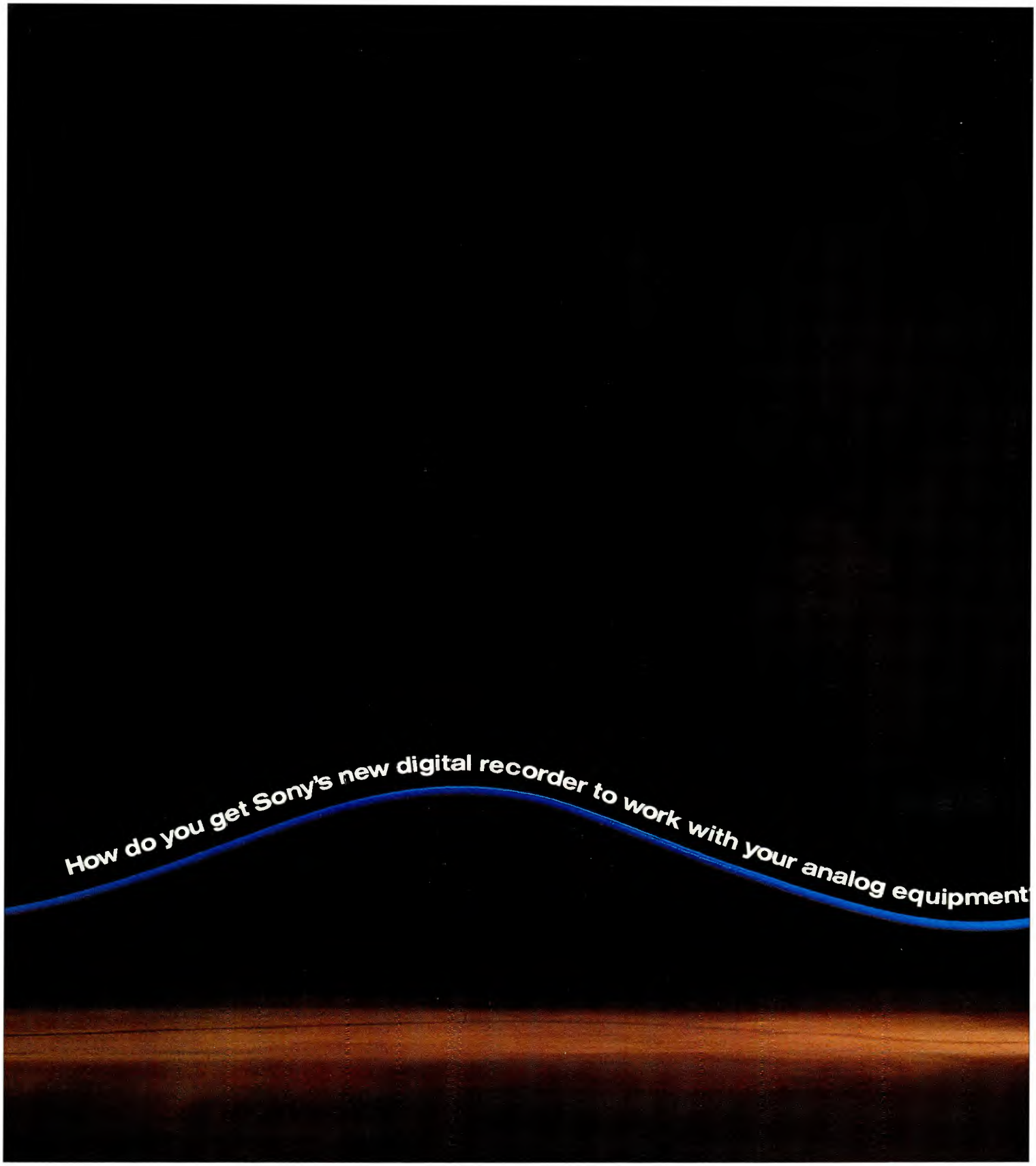
VITAL INDUSTRIES 4326
Production switchers; MC switchers; switching automation; routing switchers, DAs.

VORTEX COMMUNICATIONS 1521
New: VTR heads, electronics; NTSC encoders/decoders; standards convertors; video test equip.; routing switchers, DAs; sync and pulse code generators/processors; time code equip.; audio processors; intercoms; audio routing switchers. Clocks, timers.

WARD-BECK SYSTEMS LTD. 5319
New: On-air consoles, mixers; audio test equip.; intercoms; telco interface equip. Field portable mixers; audio routing switchers; connectors, jackfields.
See ad on p. C4

WAVEFRAME CORP. 7817
New: Universal digital interface module. Digital audio workstations; electronic audio editors; reverb, special efx.

WAVEFRONT TECHNOLOGIES 7217
3D modeling, animation.



You can slip Sony's new composite digital video recorder right into your current editing suite. With its analog inputs and outputs, it connects directly to your existing equipment.

Yet it does what only digital can do. For example, the Sony DVR-10 composite DTTR gives you more than 20 generations of transparent digital dubbing. And with its write-after-read capability, one machine can operate simultaneously as both a source and recorder.

The DVR-10 is physically small—half the size of a BVH-2000 recorder—and its price is as compact as its size.

And the DVR-10 records four PCM channels of audio, bringing you the same dramatic digital sound you've been hearing on compact discs.

With digital techniques, you get superior dubbing capability, data error correction, and built-in editing functions.

But see the power of digital for yourself...Contact your Sony Broadcast Sales Engineer. Or call Sony at (800) 635-SONY.

SONY®

BROADCAST PRODUCTS

WEATHERBANK 5770
Weather radar/graphics.

WEATHER CONNECT 7534

WEGENER COMMUNICATIONS 2109
Digital audio transmission systems; STLs, TSLs; FM subcarrier receiver; subcarrier digital audio receiver.

WHEATSTONE CORP. 1034
New: On-air consoles, mixers; post-production consoles; stereo selector routing switcher.
See ad on p. C2

WHEELIT 3844
Transportation cases.

WHIRLWIND 5368
Power supplies, batteries; wire, cable; connectors, jackfields.

THE WILL-BURT CO. 4883-4884
Antennas, towers.

WINSTED CORP. 4965
Studio furniture.

WIREWORKS CORP. 1760
Wire, cable; connectors, jackfields.

WOLD COMMUNICATIONS 1764
Satellite time brokers, uplink/downlink svces.

WOLF COACH 1787
ENG/EFP vehicles; mobile production units; mobile vehicle construction.

WORLD TOWER CO. 1470
Antennas, towers.

WSI CORP. 3774-3775
New: Weather radar/graphics (NOWrad).

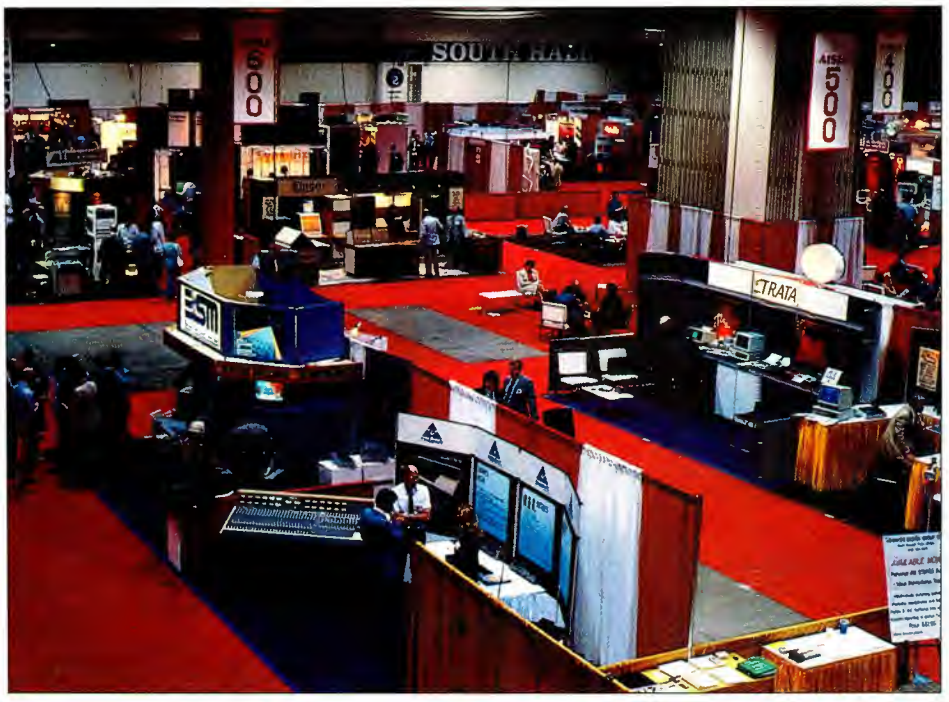
YAMAHA MUSIC 7205
Audio processors; field portable mixers; on-air consoles, mixers; post-production consoles; mics, accessories; studio monitors; reverb, special efx.

YAMASHITA ENGINEERING MANUFACTURE 3712, 3811
New: CVS-950A standards converter. NTSC encoders/decoders; standards converters; sync and pulse code generators/processors.

ZAXCOM VIDEO 5459
New: TBC remote control.

ZONAL LTD. 2401-2403
Audio tape, carts; magnetic sound recording film.

ON THE AIR
Proud Tradition • Dynamic Future



NAB ENGINEERING PROGRAM

RADIO ENGINEERING SESSIONS

Friday, April 28

8:50 a.m. - 12:00 a.m.

Digital Audio and Radio Systems

Digital Audio Interconnection...Testing Digital Audio Devices in the Digital Domain...The CD Player in the Broadcast Environment...Planning a Digital Production Studio...Digital Audio for Links and Subcarriers...A Completely Digital FM Broadcast Stereo System...New Digital Sound Broadcasting Modulation System—CD Quality for Mobiles

1:30 p.m. - 4:40 p.m.

FM Improvement

FCC FM Regulatory Technical Actions...FM Stereo Separation v. Receiver Blend...High-Powered Synchronous FM Boosters...Optimum Bandwidth for FM Transmission...A Report on Formation of the NRSC FM Subcommittee...FM Directional Antennas and New FM Short-Spacing Rules...NTIA Irregular Terrain Propagation Studio

Saturday, April 29

8:45 a.m. - 11:55 a.m.

Radio Engineering

FCC Remote Control Policy: An Update...Consolidating AM and FM Transmitter Sites...Determination of the CP Gain of Sidemount CP-FM Antennas...Practical Maintenance...The NAB Test CD—Use and Applications...Approaches to Diplexing AM Antennas...Automated Maintenance Testing

Sunday, April 30

8:30 a.m. - 11:50 a.m.

AM Systems Engineering

Overview of FCC AM Actions...Progress Report on NAB AM Improvement...Development of a Low Profile AM Antenna System...Low Profile Anti-Skywave Antenna...Alternate Production of Groundwave by Structures of Inherently Low Skywave Potential...AM Directional Antenna Tuning: New Methodology, New Tools...Diplexer Design: Q-Matching Technique...The Splatter Monitor and Spectrum Analyzer

Monday, May 1

1:30 p.m. - 4:40 p.m.

Radio Production and Audio Processing

Broadcast Applications for Voice Ac-

Downlink Double Feature...

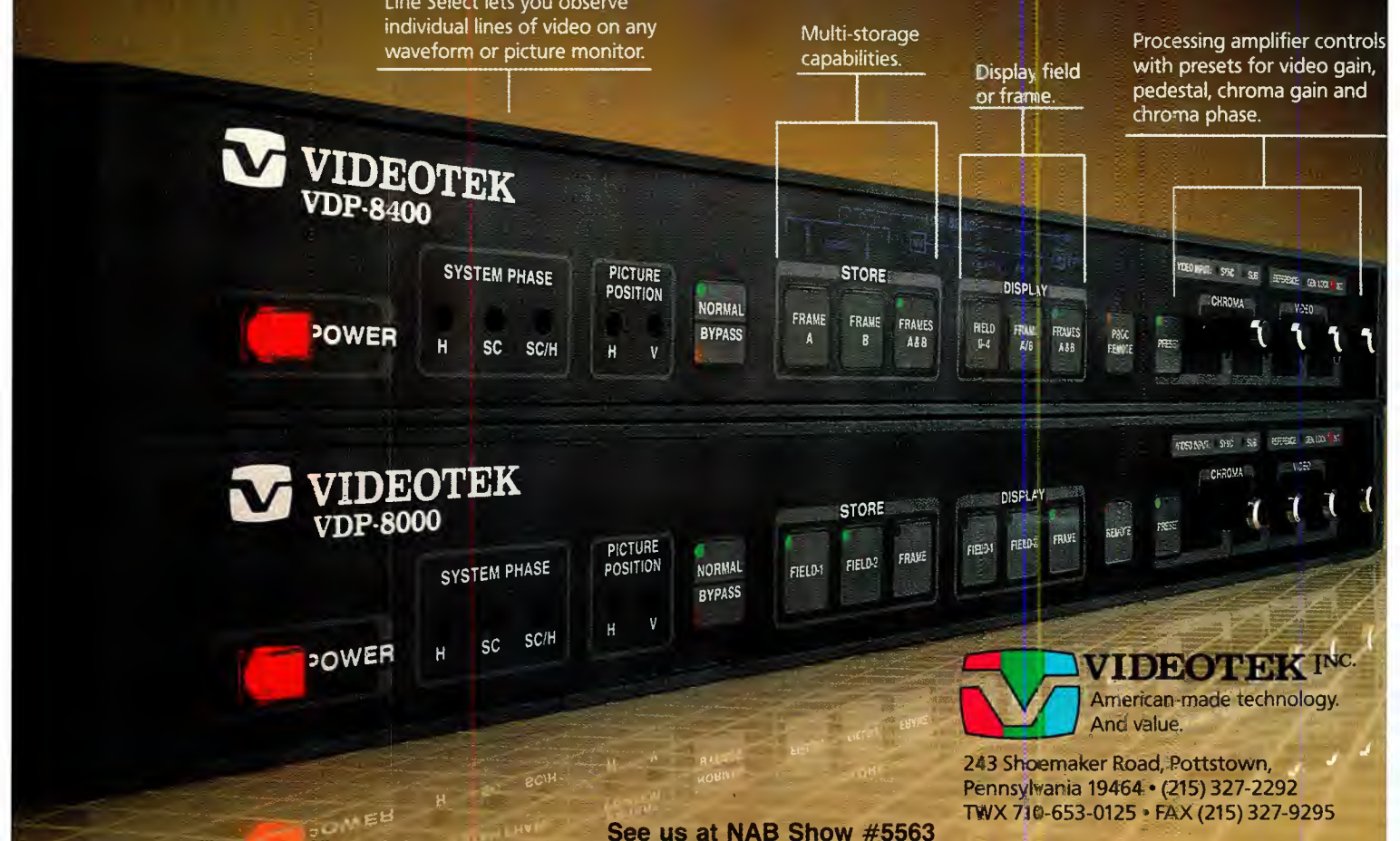
Upgrade with our new VDP-8400 frame store synchronizer or our field-proven VDP-8000.

Lock up and synchronize noisy satellite and microwave signals for uninterrupted operation with our two high-performance frame store synchronizers.

The new VDP-8400 has the same reliable front-end circuitry as the dependable VDP-8000. And both come with outstanding features to match. Like a processing amplifier to enhance picture quality even in the freeze mode. Clean "hot switching" of non-synchronous sources, and a line select that lets you observe individual lines of video on any waveform or picture monitor. What's more, a blackburst output allows you to use each of these units as a stand-alone sync generator. Want more? How about a price that's thousands less than the competition.

What's really uplifting about our down-link duo is their freeze-field/frame storage capabilities. The VDP-8000 lets you store two different fields or one field continuously, without interruption of live video. While the powerful VDP-8400 gives you enhanced storage capability of up to four fields.

So if you want to be in total sync, check out the VDP-8400 and VDP-8000 at your Videotek dealer today.



VIDEOTEK INC.
American-made technology.
And value.

243 Shoemaker Road, Pottstown,
Pennsylvania 19464 • (215) 327-2292
TWX 710-653-0125 • FAX (215) 327-9295

See us at NAB Show #5563
Circle 151 on Reader Service Card Page 107

NAB ENGINEERING PROGRAM

tivated Microphones...Acoustic Noise Level Measurement and Control Techniques for Broadcast Equipment...A Digital Dynamics Processor for FM Broadcast...Operational Features and User Interface Considerations of a RAM-Based Digital Audio Workstation...Analog and Digital Technology for Audio Processing... Audio Processing for NRSC...Digital Audio Tape in Broadcasting

TELEVISION ENGINEERING SESSIONS

Friday, April 28

8:30 a.m. - 12:05 p.m.

Television Automation

Multiplicity of Videotape and Satellite Delivery Formats...The Automated Library System...The Design and Implementation of a Three-Camera Studio Remote Control System...Interfacing Newsroom and Station Automation Systems...UTECS—A Unified System for Remotely Controlling Television Analog Functions...The Mouse: A New Approach to Character Generator User Interface...Increased Versatility for the ESBus...Integrated Station Automation

---

1:30 p.m. - 4:40 p.m.

Graphics and Animation

Distributed Anti-Aliasing Through the Use of Pipeline Architecture in Graphic Systems...NBC Olympic Graphics and Animation...Electronic Graphic Interface to Newsroom Computers...Film Style Creativity and Digital Power in Video Animation... Trends in Weather Graphics, Images and Hardware...High Resolution Computer Scan Conversion

---

3:00 p.m. - 5:10 p.m.

Television Audio

Report on the BTSC Modulation Monitoring Committee...A New Approach to Television and Film Post-Production Audio...Group Delay Corrector for Improved TV Stereo Performance...How to Acoustically Upgrade for Stereo Television Production... Digital Audio Data Compression—A Practical Solution

Saturday, April 29

8:20 a.m. - 11:55 p.m.

Television Engineering and New Technology

A Universal Control Network...Managing Routing Switcher Growth in a Multiformat World...Digital Video: Converting Between Digital Standards...S-VHS Signal Processing in Time Base Correctors...Interfacing the Tektronix VM700 Video Measurement Set to the Real World...Recent Developments in Solid State TV Transmitters...Multichannel RS-250B Short-Haul Video Transmission on Fiber Optic Systems...The PBS Technical Evaluation Process

Sunday, April 30

9:00 a.m. - 12:10 p.m.

UHF Transmission Systems

Three-Tube Switchless Combiner... An Improved Circular Waveguide for UHF-TV...Klystrode-Equipped UHF-TV Transmitters—Report on the Initial Station Installations...Giving Renewed Life to an Old UHF Transmitter...I.F. Diplexed Tetrodes vs. Multiplexed Klystrons/Klystrodes ...High Power Isolator for UHF Television...A 60 kW UHF-TV MSDC Klystron Transmitter

---

1:30 p.m. - 4:40 p.m.

HDTV Production

Lighting for HDTV Production... HARP—High Sensitivity, Hand-held HDTV Camera...High Definition Television Post-Production...HDTV Transcoding, A Versatile Standards Converter...HDTV Camera Lens Requirements...The Hardware and Software of HDTV Production... Multistandard HDTV Signal Generation

NAB ENGINEERING PROGRAM

Monday, May 1

8:45 a.m. - 12:20 p.m.

Advanced Television I

Report on the FCC Advisory Committee...Testing of ATV Systems for Terrestrial Broadcasting by the Advanced Television Test Center...Cable Testing for Advanced Television Systems...Propagation Testing for Advanced Television Broadcasting Systems...The Cost of Converting a Broadcast Facility to HDTV...The Spectrum-Compatible HDTV Transmission System...Advanced Compatible Television—An Update...The Use of Genesys Technology for HDTV

1:30 p.m. - 4:40 p.m.

Advanced Television II

NTSC-Compatible MUSE System... Super NTSC: An ATV Proposal... Compatible Introduction of HDTV in North America...NTSC-Compatible Wide Aspect EDTV...A Status Report on HD-NTSC—Compatible HDTV in a Single Channel...Cross Color and Chroma Crawl Free High Resolution NTSC...A Friendly Family of Transmission Standards.

SPECIAL ENGINEERING SESSIONS

Sunday, April 30

9:00 a.m. - 12:00 a.m.

Professional Development

Images, Stereotypes and the Broadcast Engineer...Engineering Management Made Simple

---

1:30 p.m. - 5:00 p.m.

Computers for Broadcast Engineers

Computers in an Engineering Department...Applications of High Speed Local Area Networks in the Broadcast Environment...Technical Documentation and the Personal Computer...The Use of On-Line Services for the Broadcast Profession...The Evolution of Microcomputer File Transfer Protocols...On-Line Communications and the Broadcaster

---

3:00 p.m. - 5:30 p.m.

Professional Licensing for Engineers

Monday, May 1

8:45 a.m. - 9:40 a.m.

Preparing for an FCC Technical Inspection

Technical Compliance in a Deregulated Environment

9:40 a.m. - 12:10 p.m.

Broadcast Auxiliary & Satellite Systems

Solving Frequency Coordination Problems at the 1988 Political Conventions...HPA Technology Overview... CBS Television Network Distribution by Satellite...Dual-Band Satellite Earth Station Antennas...Operations Considerations for Satellite News Gathering...Technical Considerations

for Satellite Transmission Standards

1:30 p.m. - 4:40 p.m.

Safety, Interference and Environmental Concerns

Necessary Environmental Concerns for Broadcasters...Personal Safety Considerations with Broadcast Transmitters...New Tower Structural Standards...Guidelines for Vibration Control of Tower Guy Cables...Resuming Broadcasting after the Empire State Building Fire...Electromagnetic Interference to Aviation Receivers...Dealing with RF Interference Complaints

Tuesday, May 2

8:30 a.m. - 12:05 a.m.

New Communications Technology

A Distributed Architecture for Solid State VHF Transmitters...Digital Fiber Optics for Television and Radio Transmission...Design of Analog Fiber Optic Protection for Video Transmission Systems...Advanced RF System Measurement Techniques...The Broadcaster's Need for Packet Radio...Eight-City DS3 Digital Video Trial—Progress and Networking Features...Broadband ISDN Architecture

WORKSHOPS

Sunday, April 30

7:00 p.m. - 8:30 p.m.

Acoustics

Moderator: Dr. Peter D'Antonio, RPG Diffusor Systems

RF Radiation Regulation Compliance

Moderator: Jules Cohen, Jules Cohen & Associates

Contract Engineers

Moderator: James Loupas, James Loupas & Associates

AM Antenna Systems

Moderator: Benjamin F. Dawson, Hatfield and Dawson

WHY WTVH-TV'S BRUCE LEVY LOVES HIS EPO ROBOTIC CAMERA CONTROL SYSTEM.

For more than 20 years, WTVH-TV, the CBS affiliate in Syracuse, N.Y., has broadcast its news using EPO remote camera control systems. During that time, the systems have outlasted four sets of cameras—a clear testament to EPO's durability and reliability.

For most of those years, as Bruce Levy, the production chief at WTVH-TV, will tell you, the station was virtually alone among American broadcasters.

Now, of course, all that has changed. Americans are beginning to wake up to what their European brethren have known for some time—that **EPO Camera Control Systems can save them money. Lots of money!**

But even EPO Robotic Camera Systems don't last forever. Recently, when WTVH-TV's 20-year-old unit began to show some wear and tear, Bruce Levy confidently ordered three new ones from A.F. Associates, thereby continuing his and WTVH-TV's long association with the EPO systems.

If you would like to know more about Bruce Levy's favorite way to save money, call A.F. Associates. In the east: (201) 767-1201; in the west: (619) 277-0291.

THE RADAMEC EPO ROBOTIC CAMERA CONTROL SYSTEMS.
Distributed exclusively in the U.S. by

NAB BOOTH #3719

A.F. ASSOCIATES INC.
ADVANCED SYSTEMS AND PRODUCTS FOR THE VIDEO INDUSTRY
100 STONEHURST COURT, NORTHVALE, NJ 07647
A.F. Associates, Inc. is a Video Services Corporation company.

RADIO ENGINEERING

NUMBER SEVEN SPECIAL SECTION APRIL 1989

BTP Says Bose FMX Report Flawed

Broadcast Technology Partners (BTP) of Greenwich, CT has formally responded to a report critical of the FMX stereo broadcast model authored by Drs. Amar Bose and William Short of the Bose Corp. The Bose/Short report was presented at MIT in Boston on January 25, 1989. (See *BME*, March 1989, p. 67.) BTP developed the FMX system.

Terming the report "sophistry," BTP executives Emil Torick and Tom Keller cite real-world experience of over 50 stations transmitting FMX in varied formats and terrain conditions. This data does not support the Bose-Short result; BTP further concludes the report is flawed in theory and method.

BTP says the Bose/Short mathematical model claimed as an original development was first used by RCA as early as 1945. The Bose report does not define the FMX system mathematically and also treats time-varying modulation functions as static values, BTP says.

The fixed values chosen for these variables are worst-case examples with small statistical probability of occurrence in real-life, the company adds. In addition, the report illustrates an inadequate understanding of multipath theory and applies flawed reasoning in order to "shock" readers, BTP says.

BTP further claims Bose and Short followed inappropriate experimental procedures. Worst-case data was generated, for example, by parking a mobile receiver in a deep null during measurement. BTP also says the radio station and the receiver used in the test were seriously impaired. A proof-of-performance was not conducted on the RF chain of the station in question (WMBR-FM, MIT-licensed, 200 W), while the receiver's FMX decoder chip was an early prototype not suitable for mobile reception.

BTP concludes the poor test results may derive from a high degree of synchronous AM noise in the transmission chain coupled with multipath reception conditions. *BME* will analyze both points of view in-depth in the May issue, while BTP and Bose Corp. will debate at the Public Radio Conference, San Francisco, also in May.

Errata: NCMO

References to x- and y- axes of periodic waveform display were transposed in text on p. 80, "The NCMO Breakthrough", *BME*, December 1988.

CompuSonics Quits Manufacturing

Digital audio company CompuSonics Corp. has stopped manufacturing its radio-oriented recording, editing and automation equipment. The Palo Alto, CA-based firm will become a contract engineering and R&D licensing firm concentrating on its core data processing and CSX data compression technologies.

"We have no doubts about the actual technology and we would never abandon current owners," CompuSonics chairman David Schwartz told *BME*, pointing out that the company will support existing warranties. "We blazed a trail with this technology. Now it's time for other people to manufacture and design correctly targeted broadcasting products."

Digital Trends Inc. of Concord, CA and British corporation Ferrograph Ltd. have been granted full licenses to manufacture the company's existing line of magnetic and optical disk recording equipment. Digital Trends and Ferrograph, which extended a limited CompuSonics license, will also service existing products.

The move should not greatly affect radio broadcasting, according to CompuSonics owner Andy Laird, CE of KDAY-AM, Santa Monica, CA. "If someone else picks up the licenses and manufactures compatible product, that will be great. Sonically, it's a great product and it doesn't use a lot of memory."

Ironically, the move may lead to the manufacture of mass storage functionality, the one "piece of the pie" that broadcasters have long sought from digital audio systems. "The CompuSonics algorithm doesn't require as much space as direct recording—mass storage would make it all worthwhile," Laird said.

NRSC FM Committee to Test at WAEB-AM/FM

The National Radio Systems FM Committee will conduct a six-month test project on FM multipath at contemporary hits station WAEB-AM/FM, Allentown, PA. Edward Schober, Radiotechniques, will act as consulting engineer. Project co-ordinator Harry Simons, CE of WAEB-AM/FM and a member of the NRSC, says the station offers a "textbook example" of multipath. Site tests focusing on the station transmitter and a mobile test van supplied by Delco Electronics are expected to begin in late May. Other manufacturers are also providing resources.

WHAT'S NEW IN RADIO TRANSMITTERS?

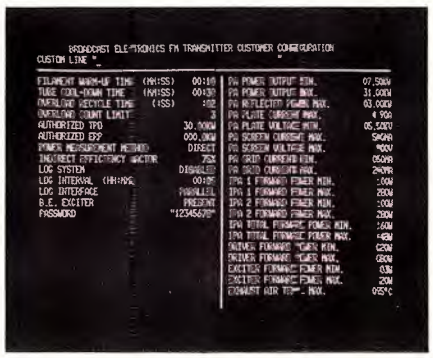
Incremental improvements continue in AM and FM broadcast transmitter design. Here's an overview of some recent innovations.

A survey of the major radio transmitter manufacturers points out some clear trends. Solid state RF stages and computer control are the current theaters of refinement in transmitter design throughout the marketplace.

For example, Continental Electronics has introduced fully solid-state transmitters for both AM and FM applications. The Continental XL-310 is a 10 kW, all-solid-state AM transmitter utilizing power-FET devices. A 1 kW version, the XL-301, is also available. The power amplifiers, exciter and control system are all supplied on plug-in modules, providing easy replacement, and "soft-failure" in the case of the amplifiers. The manufacturer claims these transmitters are relatively insensitive to load conditions, and can be trimmed to match a wide range of antenna impedances with self-contained networks. Continental has also designed a retrofit solid-state RF driver for direct field replacement of the 4-400C driver tubes in its high-power AM transmitters. Current models of Continental's 317C-3 50 kW AM transmitters are now so equipped from the factory. All of the company's AM power amplifiers now feature broadband untuned circuits, and bandpass rather than harmonic filtering, thereby eliminating tuning controls and improving audio quality and AM stereo performance. This type of circuitry seems to reflect another mini-trend throughout the industry.

On the FM side, 1988 saw Continental's introduction of a fully solid-state 3.8 kW FM transmitter, the 814C, featuring compact size and a single-phase power supply. A "splitter/combiner" technique is used with 700 W broadband amplifier modules. The transmitter also features a 50 W exciter. Continental has implemented a modular solid-state RF driver system in its higher powered 816R series of FM transmitters as well. This series ranges up to 70 kW. The company claims increased reliability and lower maintenance costs as the primary assets of the upgrade.

Continental has also released its "Datatrax" system for computerized control of its FM and solid-state AM transmitters. The system provides monitoring and control both locally and remotely (via modem to an outboard PC) of all major transmitter functions. Transmitter on/off, power level and phaser pattern change (for AM) or antenna heater control (for FM) can be preprogrammed and stored for over a year in advance. Measured data is also stored down to millisecond resolution, allowing the tracing of trends, and logging output to a standard printer is available. Storage memory is internally backed up by battery. All common electrical parameters of transmitter operation can be measured, as well as room temperature and air flow status. User-defined limits and alarms can be established for selected parameters, and additional control/monitoring paths for external equipment are also provided.



Broadcast Electronics' MVDS system screen display. Shown here is page three, the "Customer Configuration" screen, with which the user determines allowable maxima and minima for all monitored functions.

Meanwhile, at Harris Corp., the R&D department has been busy. Primary among their new developments is the DX series of digital AM transmitters. For a full description of these groundbreaking devices, see *BME*'s March 1989 issue. But Harris has introduced some noteworthy FM transmitter improvements as well. The first is a 55 W exciter, included in the

BY SKIP PIZZI

current Harris line of FM transmitters, but suited for retrofitting as well. The THE-1 exciter, as it is slyly called, is capable of modulating to +/- 200 kHz any frequency from 30 Hz to 100 kHz. It can be switched to operate at a 15 W output level as well. Thermal protection on the exciter reduces its output to either 0 or 4 W (user-selectable), and automatically restores when internal temperatures of the RF output amplifier and main supply return to within specified limits. Front-panel composite test inputs and outputs are provided, along with a true peak-reading baseband input meter. The metering includes a x10 multiplier, a handy new feature for increasing sensitivity when adjusting SCA or pilot injection. Specifications also show some improvement over earlier product, with FM composite S/N at 80 dB below 100 percent modulation, measured with 400 Hz at +/- 75 kHz deviation, with 75 μs deemphasis, across a 20 Hz to 200 kHz bandwidth. Composite IMD is quoted at 0.02 percent, using a 60 Hz/7 kHz 1:1 test tone pair. TIM distortion is stated as 0.05 percent, with 2.96 kHz square wave/14 kHz sine wave modulation.

The "Flexpatch" system is a recent Harris innovation on its HT series of FM transmitters that provides a uniform 50 ohm interface between all sections. This allows any lower power RF stage to be directly connected to the transmitter's output, should the PA fail. A failed lower power stage may also be bypassed by patching the preceding stage's output directly to the PA input.

On most models, this is achieved on an internal RF patchbay.

Although these FM transmitters still contain a single-tube final stage, it is housed in a quarter-wave cavity rather than the more common folded half-wave variety, providing lower SCA crosstalk and -50 dB AM synchronous noise, due to its superior bandwidth characteristics, according to Harris.

This represents about a 10 dB improvement in AM synchronous noise over earlier designs. In keeping with the trend mentioned earlier, these transmitters also employ a bandpass rather than a harmonic filter, thus more effectively eliminating spurious propagations. This has proven especially helpful where interference with FAA frequencies is concerned, according to the manufacturer.

Power supplies have also been upgraded in these transmitters to meet the ANSI/IEEE standard of 6 kV/3 kA (open circuit) transient tolerance on mains input.

Transmitters in this HT family are available at 3.5, 5, 10, 20, 25, 30 and 35 kW levels. Top-of-the-line units also include a secondary control unit, in case of failure of the primary controller, with automatic switchover capability. An alphanumeric multimeter is featured on these models as well, providing display of parameter name, value and unit of measure, and nonvolatile storage of recent overloads, their date and time. Dual bargraph display of IPA forward and reflected powers is also featured.

Broadcast Electronics, Inc. has expanded the popular Microprocessor Video Diagnostic System (MVDS) on its "A" Series FM transmitters to include a remote control feature. Using any MS-DOS computer, a transmitter can be monitored and controlled via modem on a dial-up or dedicated phone line, or via an STL/SCA link. The system can be operated in a periodic or a constant link mode.

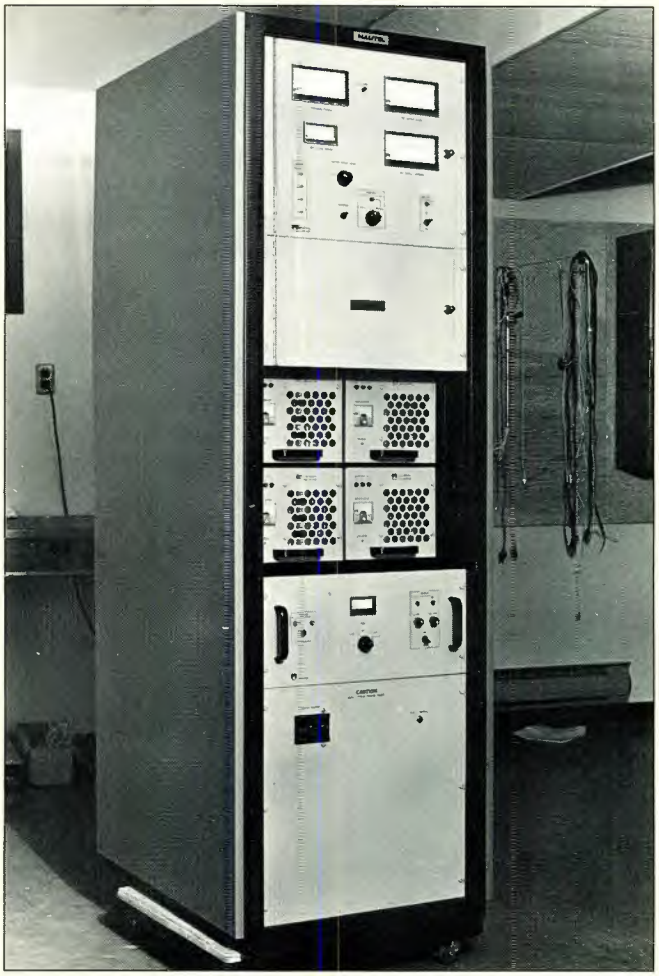
The MVDS system provides real-time display of plate, screen and grid voltages and currents, calculated plate efficiency, exciter/IPA forward and reflected power, IPA voltage and current, TPO and calculated ERP. Any values that exceed user-defined preset limits are displayed in reverse video.

In addition to straight measurement, the system exerts some additional smarts to provide overall transmitter condition and diagnosis of any problems, along with times and causes of any carrier interruptions. Output of this data to standard computer printers is supported. A second page of the system features bargraph and numeric displays used for monitoring parameters such as IPA and PA forward and reflected powers, plate, screen and grid currents, and calculated plate efficiency during setup and tuning. The third page allows the user to establish the maximum and minimum limits for all measured parameters, and to invoke various system options. Access here is password protected.

The new remote control feature al-

Continental Electronics' solid-state RF driver module, featured in their 317C-3 50 kW AM transmitter.

The Harris HT-35FM, their top-of-the-line 35 kW FM transmitter, featuring the "Flexpatch" on-board RF patching system and dual-redundant controllers. Note new THE-1 55 W exciter at center left.



The Nautel AMPFET ND-5, a 5 kW all-solid-state AM transmitter to be introduced at the 1989 NAB Convention. Note four independent 1.4 kW P.A. modules at center.

lows MVDS pages one and three to be accessed and certain transmitter parameters adjusted from an IBM PC or clone, equipped with at least one floppy drive and 256K RAM, running MS-DOS 3.10 or above. Hayes-compatible auto-dial/auto-answer modems at the transmitter and remote computer location are also required, operating at 300, 1200 or 2400 baud. All remote access and operations are further password protected to prevent access by unauthorized persons.

An additional option allows multiple transmitters to be remotely controlled at a site which includes at least one MVDS-equipped B.E. transmitter. This can be a handy feature for AM/FM operations, or for co-located Main/Alternate sites. This Multiple Transmitter Interface option (MTI) also provides access to control of non-RF equipment such as building alarm systems, air handlers, tower light sensors, switching and audio processing, via its eight status channels, eight analog channels and 16 relay output channels. An auto-dial call-out feature dials a stored telephone number in the event any monitored parameter exceeds its preset criteria, as programmed by the user.

When the limits of any technology are approached, improvements come with increasingly greater difficulty and expense.

The MVDS remote control can be added to any MVDS-equipped B.E. transmitter. These "A" Series transmitters are available in power levels from 1 to 35 kW. The manufacturer specifies, however, that the original inboard MVDS system must be ordered with the transmitter, and factory installed.

Broadcast Electronics also plans a

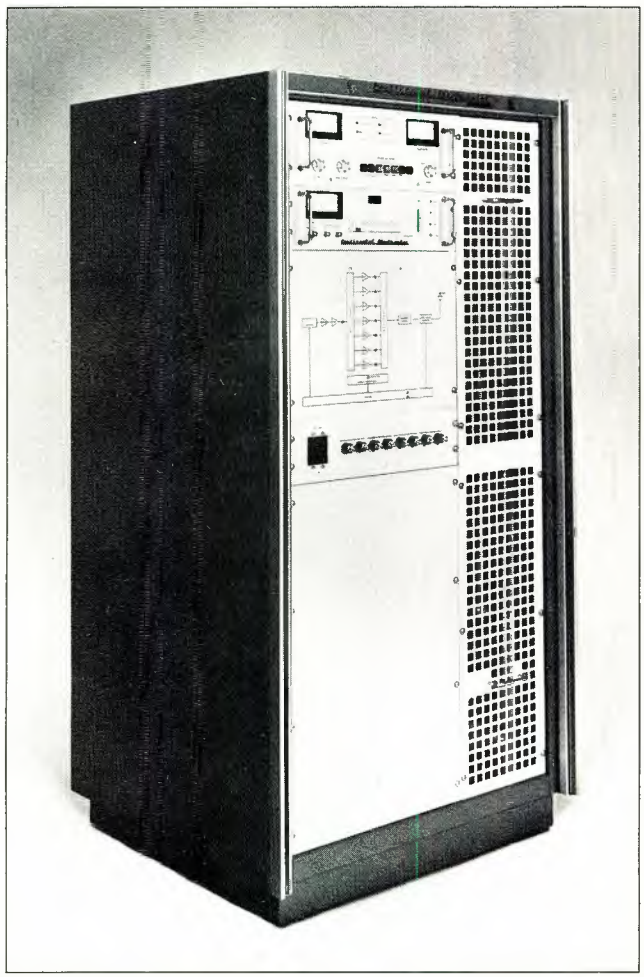
major RF product announcement at the NAB Convention this month in Las Vegas, but will not disclose any of the details in advance of the convention date.

The Canadian transmitter manufacturer, Nautical Electronics Laboratories Ltd., maker of the Nautel AMPFET line, continues its pioneering tradition in the solid-state AM transmitter arena, with its planned introduction of a new 5 kW unit at NAB this year. Slated for mid-1989 is the installation of a Nautel 100 kW all-solid-state AM transmitter in Israel, the first of its kind at that power level.

Nautel virtually revolutionized the aeronautical radio beacon world with the first all-solid-state transmitters for that market in 1969, and is now the western world's major supplier of such wares. Since entering the AM broadcast market in 1982, the company has taken a more evolutionary approach, starting with a 10 kW all-solid-state, and gradually expanding the line to span the power levels from 400 W to 100 kW. Nautel claims to continually streamline and simplify its hardware, and a comparison of their past and present specifications appears to confirm the improvements. Harmonic suppression is 20 dB better now than in 1982, and distortion parameters are less than half what they were.

Nautel's new 5 kW model incorporates the most recent of their refinements, yielding superior specs, high reliability, and relatively simple design. Its modular approach uses four independent "power cubes" capable of 1.4 kW each, in a "soft-fail" configuration, and a dual-redundant exciter stage. No IPA section is used, reflecting their streamlining scheme, and little control is required.

Nautel continues to examine the FM broadcast market, but so far has no definite plans for entering it, being satisfied with its current share of the AM/MW and navigational radio markets. But something big may be in the works, which the company will only vaguely hint at as yet. Stay tuned for the latest developments.



Model 814C from Continental, a 3.8 kW, all-solid-state, compact high-performance, modular-design FM transmitter.

And at QEI, a relative newcomer, the modular approach has been given a slightly different twist. Their FMQ series of FM transmitters can be field-upgraded in power by exchanging driver cards and P.A. assemblies, thus turning a 3.5 kW model to a 5 kW or a 10 kW unit. These compact devices measure only 24 inches wide by 76 inches high and run on single-phase power. QEI's higher powered transmitters can use any of these FMQ units as a driver section for its 20, 30 or 60 kW designs.

When the limits of any technology are approached, improvements come with increasingly greater difficulty and expense. And so it goes here, as these manufacturers continue to press the frontier along, generally with small but significant steps. We can look forward to more of the same, with the implementing of further automation, digital and solid-state devices, and other advances, in pursuit of greater transmission quality and reliability. ■

For More Information

To find out more about transmitter advances, contact:

Broadcast Electronics, Inc.
Quincy, IL
(217) 224-9600

Continental Electronics
Dallas, TX
(214) 381-7161

Harris Corporation
Quincy, IL
(217) 222-8200

Nautical Electronics Laboratories, Ltd. (Nautel)
Halifax County, Nova Scotia, Canada
(902) 823-2233

QEI Corporation
Williamstown, NJ
(609) 728-2020

Calculate Approximate 'Flat Earth' Groundwave Field Strength

By Ronald F. Balonis

By the turn of the century, futurists predict, there will be more computers on this planet than human beings. "Benevolent" PCs, dedicated to the needs of individuals, useful for increasing skills, productivity, and lightening work loads will become an invading innovation impacting nearly every facet of human life and every human endeavor.

Useful innovations have a way of doing that, and also have a way of defining their own uses—their own reasons for being. The best reasons and uses flow from the curiosity and the ingenuity of users, becoming redefined and shaped by their needs and their personalities, and changing the way we think, and the way we do things—in broadcasting too.

The FCC, in a recent Notice of Proposed Rulemaking, MM Docket No. 88-510; FCC 88-326, proposes to specify the computer program GWFCC.FOR, listed in FCC/OET86-1, as the way to calculate AM groundwave field strength. The Commission proposes to replace antiquated light boxes with computers. GWFCC.FOR, written in Fortran, gives the three necessary significant decimal digits of accuracy, and, in addition, the program has been compiled to work on microcomputers.

Such accuracy is necessary, of course, for filings with the FCC. But, for the kind of armchair what-if engineering most of us do, such accuracy is not necessary. This month's Compute program, GWBME.BAS, calculates just an approximate "flat earth" groundwave field strength at a distance, to keep speculation and simulation simple.

Regardless of frequency, the methods of calculating or predicting field strengths, manually or by computer, are not simple or easy. They tend to be complex and involved because propagation in the real world is complex and involved—many factors can affect field strength at a distance. At distances beyond the radio horizon (beyond the earth-is-flat-distance), calculations, accurate ones, require complex equations to compensate for the effect of the curvature of the earth, and the refraction and diffraction in the atmosphere.

However, according to propagation theory, the earth's curvature does not introduce serious errors until the flat earth distance $50/(\text{MHz})^{1/3}$ is exceeded by a factor of two. At that distance, the reduction in field strength tends to be caused more by the curvature of the earth than by ground losses. GWBME.BAS displays the flat earth distance as the *Too Far* distance.

GWBME.BAS calculates groundwave field strength by the relatively simple method given by A. Sommerfeld (1909, 1930) and K. A. Norton (1936). Their method assumes a flat, plane earth, and it is plotted as Graph 20, "Ground Wave Field Intensity versus Numerical Distance over a Plane Earth" in section 73.184 of the FCC rulebook. The method uses the same sort of equations as GWFCC.FOR does, with the exception that GWBME.BAS calculates an approximation of field strength of the surface wave, and it does it

```
GWBME.BAS          * Approximate Groundwave Field Strength *

Distance in <K>M or <M>I or <> to quit : ? M

Freq.     Eff.Fld.      Cond.       Dist.   *Too Far*     GW F.S.
(mHz)   (mv/m@1mi)   (mmho/ms)     (mi)       (mi)       (mv/m)

 1.60       100.0        10.0        1.00      42.75     85.2432  <again>?
 1.60       100.0        10.0       10.00      42.75      3.3853  <again>?
 1.60       100.0        10.0       40.00      42.75      0.1602  <again>?


GWBME.BAS          * Approximate Groundwave Field Strength *

Distance in <K>M or <M>I or <> to quit : ? K

Freq.     Eff.Fld.      Cond.       Dist.   *Too Far*     GW F.S.
(mHz)   (mv/m@1km)   (mmho/ms)     (km)       (km)       (mv/m)

 1.60       100.0        10.0        1.00      68.80     89.6015  <again>?
 1.60       100.0        10.0       10.00      68.80      4.8246  <again>?
 1.60       100.0        10.0       40.00      68.80      0.2974  <again>?
```

Figure 1: *demo screen for GWBME.BAS*

Get the Full Picture.

For almost a century, VINTEN has been the choice of professionals the world over. Why?

Quite simply, it's our panorama of features ranging from smoothness of motion to the precision accuracy of our Classic Range of Camera Mountings. Equipment that's clearly superior — able to quickly capture each shot both in the studio and in the field.

Look to us for engineering excellence proven over time and backed by a total commitment seldom seen in today's fast-paced broadcast industry.

A full spectrum of support systems designed for durability with the assurance of quality makes VINTEN equipment the best investment now and over the long term.

Ask any user and you'll be convinced that only Vinten dependability will keep you ahead of the competition and deliver picture perfect results time after time.

3702
FULMAR PEDESTAL
Height Range: 21" to 59"
Capacity: 350 lbs.

3741
TERN
PEDESTAL
Height Range: 33" to 54"
Capacity: 290 lbs.

3267 HAWK PEDESTAL
Height Range: 24" to 59"
Capacity: 160 lbs.

The **HAWK PEDESTAL**, perfect for studio use; and the **TEAL PEDESTAL**, ideal for remote and studio applications, provide finger tip control for ultra smooth elevation.

Capable of supporting and fully counterbalancing light and heavy loads with ease, they are designed for use with the new generation lightweight portable and studio cameras.

3197 TEAL PEDESTAL
Height Range: 30" to 51"
Capacity: 160 lbs.

TEAL PEDESTAL
shown in two parts
for portability.

At Vinten, we listen to our customers and support them with action.

Vinten Broadcast Inc.

NEW YORK
Fax: (516) 273-9759
Phone: (516) 273-9750

CALIFORNIA
Fax: (818) 767-0772
Phone: (818) 767-0306

CATCH THE EXCITEMENT AT NAB ROTUNDA BOOTH 809

Circle 155 on Reader Service Card Page 107

3-Way Lounger

One of these revolutio the world looks at TV w

BTS did not invent the three-way lounge chair. Barcalounger® did.

But you'd be surprised at how many of the most revolutionary ideas in the history of video did come from BTS. In fact, because we look at things differently, the whole world looks at things differently.

We introduced the first CCD film scanner, for instance. The first Plumbicon camera tube. The first software-based character generator. The B format for videotape recording. The modular routing switcher. And of course, the first 3-D computer animation system, for which we won one of our three Emmies.

BTS has been a technological innovator in the video industry for six decades. Our cameras,

3-D Computer Animation

ıary changes in the way
ıs not invented by BTS.

switchers, videotape recorders and graphics equipment are among the best-engineered, highest quality and most reliable in the world. Our work in High Definition and CCD products is pacing an industry which faces the most sweeping technological advances since its beginning.

And we're as dedicated to better product service and support as we are to better products.

So although BTS may not yet be a household word, here's a word to the wise. In the years ahead, BTS will continue to be more forward thinking, more responsive and more innovative in our approach to video technology than anyone else.

Including Barcalounger.

BTS
The name behind what's ahead.™

BTS is Broadcast Television Systems, a joint company of Bosch and Philips. For more information, please call **1-800-562-1136** or write BTS, P.O. Box 30816, Salt Lake City, UT 84130-0816.

Circle 157 on Reader Service Card Page 107

Engineers: Time to Renew

By Harry Cole

As just about every broadcaster realizes by now, license renewal season is back. In the early 1980s Congress extended the normal license terms of broadcast stations from three years for all stations to five years for television licenses and seven years for radio. This meant that for the last five years most broadcasters were probably not particularly worried about preparing renewal applications. This is doubly true for a station's engineering staff, since renewal applications seldom demanded much detailed engineering information. But two aspects of the present renewal process do entail involvement by the station's technical staff. With that in mind, we offer the following background.

First, station engineering staff are likely to be most directly involved in preparing a certificate concerning the station's compliance with RF radiation guidelines established by the American National Standards Institute (ANSI). Pursuant to the National Environmental Policy Act of 1969, the FCC is required to consider as part of the licensing process whether any license or permit it issues significantly affects "the quality of the human environment." Several years ago the Commission concluded that this mandate included the effect of RF radiation on the area surrounding antennas. In particular the Commission must determine whether its actions would lead to the exposure of workers or the general public to levels of RF radiation exceeding ANSI health and safety guidelines.

These guidelines are fully described in the FCC's Office of Science and Technology Bulletin No. 65, "Evaluating Compliance with FCC-Specified Guidelines for Human Exposure to Radiofrequency Radiation," October 1985. You can order a copy from the National Technical Information Service, (800) 336-4700—ask for Order No. PB 86-127081. The standard itself is available in "American National Standard Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 300 kHz to 100 GHz" (ANSI C95.1-1982). The document is available from the ANSI sales department at (212) 642-4900.

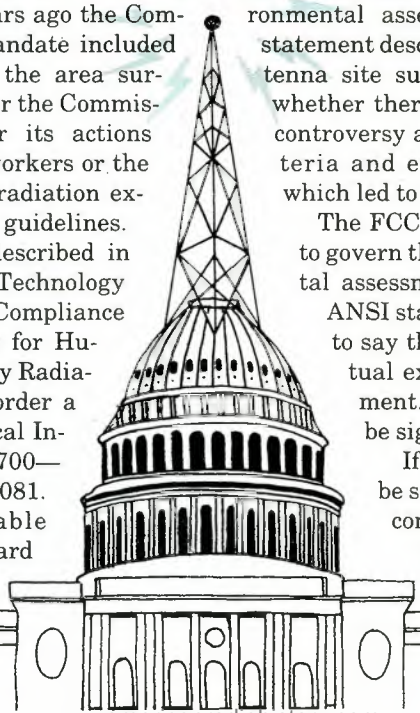
If you were already a licensed station when the Commission initiated its efforts on RF radiation, those efforts had no immediate impact since you could continue to operate without any further action by the Commission. The guidelines apply only to actions taken by the FCC such as granting construction permits. But renewals of outstanding licenses are deemed "actions". Thus by virtue of the license renewal process, every broadcast licensee will now be subject to FCC scrutiny relative to RF radiation.

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

This means that each licensee must include a statement that the station is in compliance with ANSI standards relative to RF radiation as part of its renewal application. If the station is not in compliance with ANSI standards, the licensee must (except in very limited cases) submit an "environmental assessment." This is a narrative statement describing various aspects of the antenna site such as its zoning classification, whether there has been local environmental controversy about use of the site and the criteria and environmental considerations which led to the selection site.

The FCC has not adopted a specific form to govern the certificate or the environmental assessment. If your station meets the ANSI standards, normally you only need to say that and possibly add a little factual explanation to support the statement. Obviously, the statement must be signed and dated.

If you determine that there might be some question as to your station's compliance with the ANSI standards, the Commission has provided some useful tips. For



More Odetics library management video cart machines are playing to air today

than all others combined.

With more than fifty Odetics cart systems installed and operating in markets from #1 to #166, we're way ahead of the competition.

If you talk to the stations that are enjoying the benefits of an Odetics cart system, you'll learn that we're ahead in more than just number of units installed. You'll hear about dramatic reductions in makegoods, the easy interface with traffic computers and a superior on-air look.

There's another advantage to investing in an Odetics cart system. Our leading-edge technology ensures that every Odetics' library management cart system will adapt to future station-automation plans.

To learn more about the number-one library management video cart system, call Odetics today.

Odetics Broadcast

1515 South Manchester Avenue, Anaheim, California 92802-2907 ✆ 800-243-2001 or 714-774-2200

Director of Sales	Northeast	Southeast	West	South Central	Midwest
Bill Keegan	Jesse Nickels	Emerson Ray	Chuck Martin	Phillip Smith	Bill Boyd
✆ 913-862-2824	✆ 608-754-2139	✆ 813-960-0853	✆ 818-880-4165	✆ 214-250-4429	✆ 612-894-2121

See Us At NAB, Booth #0711

Circle 158 on Reader Service Card Page 107

example, if you determine that your antenna is producing high RF levels at ground level, you may still be able to certify that you are in compliance if the site is a remote one not likely to be visited by the public and if appropriate warning signs are posted. If the site is in an area which is likely to be used by the public (including trespassers), you can still assume that no significant effect is being caused on the human environment if the area in question is fenced and marked by appropriate warning signs.

If, however, high RF levels are being produced in occupied structures (like offices, homes, balconies, rooftops, etc.) or at ground level in an area which is used or is likely to be used by the public and which cannot be restricted from public access, then a mere certificate won't do the trick: You'll have to do a full environmental assessment. And the bad news is that you may be required to modify your facilities to reduce exposure to RF or risk not getting your license renewed.

Obviously, the matter of RF radiation is one which the Commission is treating seriously. In view of the potential downside exposure for any station which wants its license renewed, it's an area to which attention should be paid well before preparing the application.

The second area of the current renewal process which may involve engineers may come as something of a surprise: the station's equal employment opportunity report. As you are probably aware, the FCC expects its broadcast licensees to adopt and implement an affirmative action employment program aimed at assuring a reasonable number of minority and female job applicants and, ideally, a reasonable number of minority and female employees in each licensee's employment profile.

If you happen to be consulted about hiring technical personnel, you should be sensitive to the Commission's expectations in the EEO areas. First, any time you have a position to fill, you should try to notify minority and female recruitment sources. The idea is to maximize the likelihood that qualified minority and female candidates can be made aware of the position in time to apply for it. Potential sources include local schools with significant minority or female enrollment and special interest organizations (e.g., NAACP, National Organization for Women, LULAC, etc.).

If you are given primary responsibility for interviewing job applicants and making hiring decisions, you should keep a list of all the applicants you speak with plus copies of all resumes, job applications and other paperwork submitted in connection with the application. You may include in your files notations as to each applicant's race, ethnic origins and gender, together with an indication of how each applicant happened to learn of the job opening. This is to ensure that if a question is ever raised about the station's hiring efforts, you will be able to document those efforts — few things are worse than knowing that you have made diligent recruitment efforts and not being able to prove it.

We mention the EEO aspects of hiring engineers in particular because there may be a tendency to utilize, literally, an "old-boy" network for such positions. According to a January 1989 report from the FCC, fewer than 14 percent of all the technicians employed at broadcast stations are women. This is less than half the percentage of females represented in the "officials and managers" category or the "professionals" category. Some may attribute the low number of women in technical positions to a shortage of qualified female engineers. Others may assert that there is no such shortfall and that the low employment figures reflect a bias in the industry — and particularly among technicians — against hiring women. The best way to prove this latter group wrong is through the adoption and diligent implementation of an EEO program, and thorough record-keeping.

Since the renewal application is intended to provide the Commission an indication of how your station has performed during the past license term, there is precious little you can do during the last couple of months of that term to improve on shortfalls which may have extended over the entire remainder of the term. You would therefore be well-advised to do your homework throughout the license term. If you do — believe it or not — the renewal process should be a simple, non-stressful experience. ■

Sachtler. The new dimension in lighting. For news gathering and productions.

Brighter, more equal distribution; lighter, more durable.

We will prove it to you at
NAB '89.
Open face technology with a focussing range up to 1:6.
Tungsten-halogen and flickerfree daylight (HMI).
From 100 Watts up to 1.2 kw.
For battery- and 110 AC-operation.

Switch on to Sachtler at
NAB '89
April 29th – May 2nd,
or write for more information.

sachtler®
corporation of america

55 North Main Street
Freeport, N.Y. 11520
Phone (516) 867-4900
Telex 140107 sac frpt
Fax (516) 623-6844

California office:
3316 West Victory Blvd.
Burbank, CA 91505
Phone (818) 845-4446

Circle 159 on Reader Service Card Page 107

Visit us at NAB Booth 3968

EQUIPMENT

Hypertronics Unveils Power Supply Connector... U.S. Line Master Offers Ground Fault Alarm... Digital Offline Editors Introduced... RGB Has Scan Converters... Altronic Premieres Dummy Loads

Hypertronics Unveils Power Supply Connector

Models with 8, 15, 25, 50, and 200 amp contacts comprise the new "L" series low insertion force (LIF) connector line from Hypertronics. These rack and panel blind matable connectors combine small size with low, .25 to 2.5 milliohm, contact resistance. Solder cup, crimp, and flow solder contacts are available. Delivery is 14 weeks. Price is $40 to $100 in unit quantities of 1000.
Reader Service #202

U.S. Line Master Offers Ground Fault Alarm

Model GFA-450 detects and alerts the user of ground-loop currents as small as 5 milliamperes. Coaxial cable (digital data, video, multiplexed baseband and synchronizing) circuits are especially susceptible to ground loops. A separate current sensor is positioned either around conductors carrying all phases and neutral or around the neutral to ground connector. Remote hookups of up to 100 or 1000 feet are possible. Even when a grounding problem has been found and corrected, continuous monitoring is desirable.
Reader Service #203

Digital Offline Editors Introduced

Editing Machines Corp.'s Emc2 digital offline editing system is a random access system that allows an editor or producer to view scenes in any order instantly, according to the manufacturer. Up to eight hours of source material can be transferred into the system and stored digitally as low resolution color images. Raw footage can be scanned at 16 times normal speed or frame-by-frame. Changes can be made at the beginning of a sequence without losing work done past the edit point.
Reader Service #204

RGB Has Scan Converters

RGB Technology has announced the availability of its RGB/Videolink line of scan converters to convert computer graphics from MAC II, PS-2 and PC computers to NTSC video. These converters feature a filter which eliminates the tendency of thin horizontal lines in wire frame drawings and user interfaces to flicker in an interlaced display format. The RGB/Videolink accepts full screen, non-interlaced RGB input and provides genlock, sync generation and encoding to output NTSC video. Conversion is accomplished in real time without software modifications and provides the solution to making videotape from any computer source.
Reader Service #205

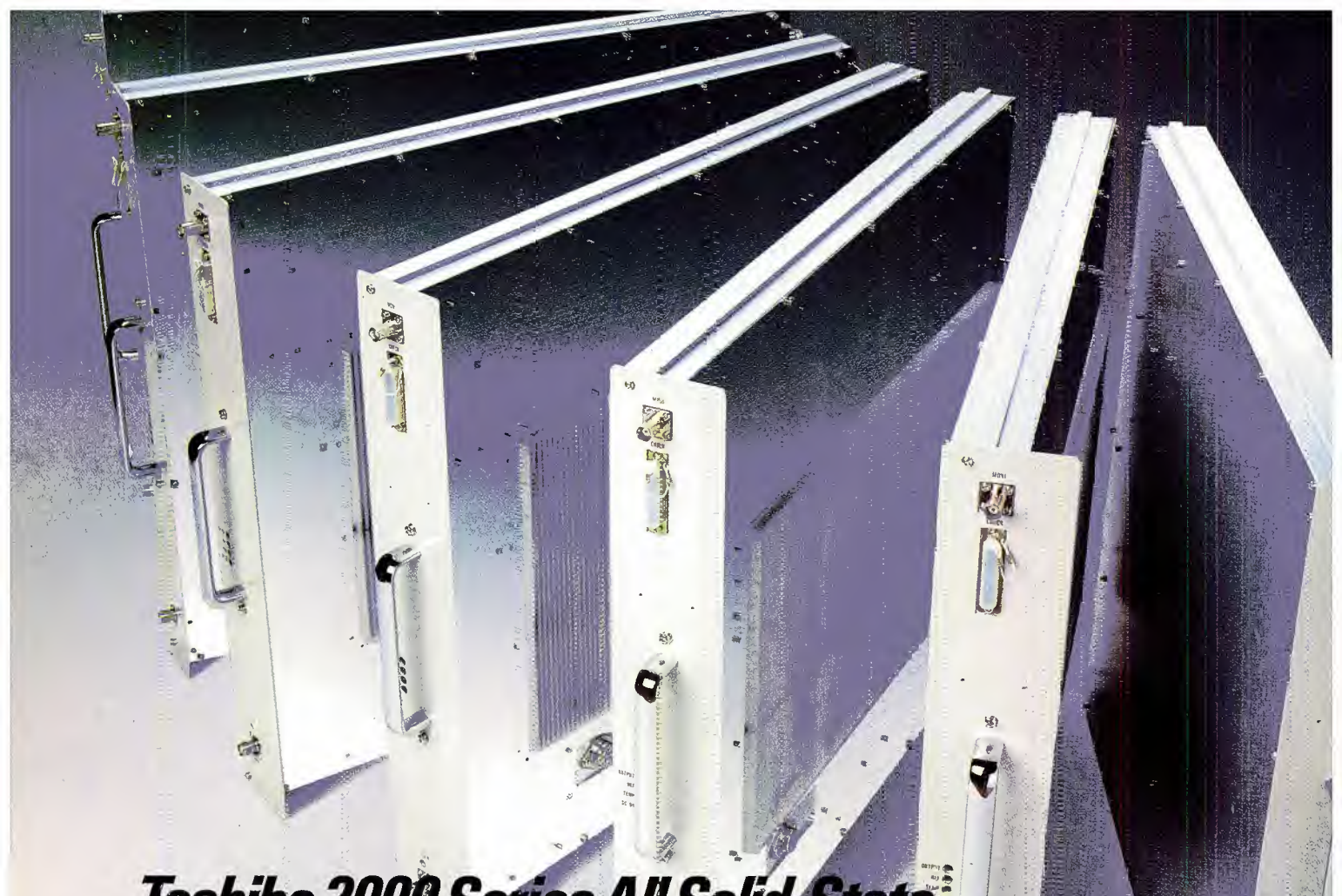
Altronic Premieres Dummy Loads

Part of the Omegaline 5700 series, model 57100B from Altronic Research is a dependable, high-power water-cooled load at a reasonable price. Rated for continuous duty at at 100,000 W of RF power, the unit offers a reflective power ratio of less than 1.15 to 1 through 800 MHz and a water flow of only 12 gpm. The single resistor design improves water flow and simplifies resistor replacement.

Model 57200B is rated for continuous duty at 200,000 W of RF power and has a VSWR of less than 1.10 to 1 through 450 MHz. Water flow is 19 gpm.
Reader Service #206

SSE Introduces 8 Watt Ku-Band Transceiver

A powerful 8 W transceiver for use in Ku-band satellite terminals has been introduced by SSE Technologies. The unit can be used in very small aperture terminals (VSATs), ground station hubs, and



Toshiba 2000 Series All Solid-State VHF Transmitters Deliver More of Everything You Need Most.

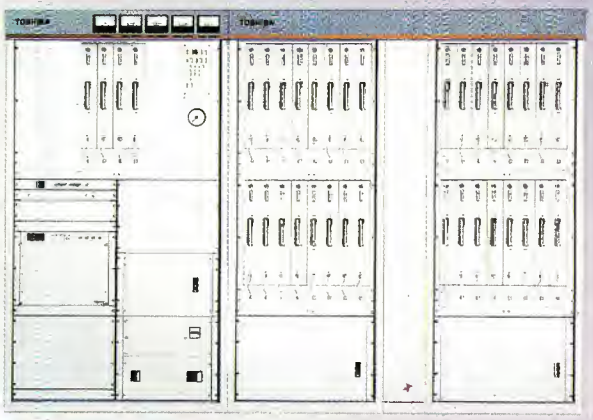
The Toshiba 2000 Series meets your total needs with unbeatable reliability, cost-efficiency and flexibility.

Power outputs range from 8kW to 64kW. Over 35 years of proven experience, original high technology and in-house key component production give you a reassuring edge.

An exclusive new RF power MOSFET, our Progressive Air Cooling System and one-to-one power supply-amplifier redundancy combine with superb MTBF ratings to keep you on the air. High stability minimizes adjustments and training. Thoroughly user-friendly design features front access and lightweight plug-in modules.

Discover the advantage a Toshiba 2000 Series All Solid-State VHF Transmitter gives you. Contact Midwest today.

●32kW 2000 Series VHF transmitter.



TOSHIBA

TOSHIBA CORPORATION TOKYO JAPAN

Distributed by

MIDWEST Communications Corp.

One Sperti Drive
Edgewood, KY41017
606-331-8990 Fax. 606-331-0048 Telex 21-4370

Circle 169 on Reader Service Card Page 107

point-to-point systems. Increased power allows higher speed data without changing the antenna size. The 8 W unit joins the 2 and 4 W versions of the ASAT 1214 family, all of which are compatible with the North American, Intelsat, Eutelsat and Aussat standards. Operation is full two-way mode, or transmit or receive only. SSE Technologies is the former Satellite Business Communications Group of Avantek, Inc.

Reader Service #207

Ortel Presents TVRO Fiber Optic Link

System 6000 from Ortel Corp. consists of a model 6300A fiber optic laser transmitter and a model 6400A photodiode receiver. The system is used to transmit the LNB output from a satellite earth station antenna to a remote receiver or headend over an optic fiber for distances up to 15 miles. Transmission is immune to microwave interference and weather conditions and does not require a repeater. An input automatic gain control (AGC) circuit optimizes system noise and linearity performance over a wide range of input signal levels. An output AGC circuit maintains the desired output signal level over the specified range of optical loss.

Reader Service #208

E-MU Systems Intros Digital Sound Module

Proteus contains, in a one rack-space enclosure, four megabytes (internally expandable to 8 megabytes) of high quality 16-bit samples selected from the Emulator III sound library and stored in ROMs for instant access. The module allows a sound's brightness to change naturally with its dynamics and also has the ability to take sounds apart and reassemble them into multitudinous new sounds. For ease of use by the serious programmer, Opcode Systems will offer an editor/librarian package to be available for both the Macintosh and Atari ST computers. Available this spring at $995.00.

Reader Service #209

Midwest Offers Satellite Indicator/Controller

Model RC-8097B from Midwest Communications is the answer to fast, accurate satellite news vehicle operation by even non-technical operators, says the manufacturer. Loran-C navigation signals

determine the precise location of the up-link truck along with its heading and attitude. The operator then selects the satellite to which access is desired and the RC-8097B computes the correct azimuth and elevation of the antenna. As the final operation, the antenna controller function of the RC-8097B takes over and automatically points the mobile KU-band antenna.
Reader Service #210

Oscilloscope Probe Kits From Pomona

Two new series of replacement oscilloscope probe kits have been introduced by Pomona Electronics. Probes mate with all B&K, Tektronix, Hewlett-Packard, Philips and Leader scopes. One version is a standard replacement series and the other is a modular replacement series fitted with threaded connections to facilitate field repair.
Reader Service #211

NEC Debuts Digital Codec

Operating at a rate between 384 Kb/s and 2.048 Mb/s as determined by the user, the Visualink 3000 video codec codes analog video to digital and digital to analog. The Visualink 3000 is an advanced digital international/domestic television codec which is software upgradable to conform with known future requirements of the CCITT standards for TI codecs. The codec transmits audio and video signals together with other digital data such as that from a facsimile machine, electronic wiring board or graphics table.
Reader Service #212

Orchard Has FM Modulation Equipment

Orchard Communications is introducing the 1000 series, a new generation of FM modulation equipment for fiber optic transmission of video and audio. The new series delivers up to 16 channels per fiber, with video channels allocated between 100 and 700 MHz and audio between 15 and 75 MHz. Features include microprocessor-controlled frequency agility, superior quality audio, and the ability to accept NTSC or composite video inputs from varied sources, such as VCRs, computers, and video cameras. The unit is easy to operate and suited to a number of applications including CATV trunking and distribution, interactive

EQUIPMENT

video conferencing and distance learning networks.
Reader Service #221

Gentner Announces New Remote Control System

Gentner has its new VRC-2000 remote control system for AM, FM and TV transmitters ready for immediate shipment. Transmitters may be monitored and controlled from any number of computer terminals or through any touch tone telephone. The system will remind the user if he attempts to exceed any preset parameter and will call five phone numbers in succession if a failure causes any of these parameters to be exceeded. The new system is an upgrade of the VRC-1000 remote control unit. Features include a built-in surge protector and an optional data interface including 2400 baud modem.
Reader Service #213

Yamaha Offers Stereo Powered Mixers

Each of three models from Yamaha's Professional Audio Division, the EMX2150 with six inputs and two 150 W amplifiers, the EMX2200 with eight inputs and two 250 W amplifiers and the EMX23000 with 12 inputs and two 250 W amplifiers features a built-in digital signal processor, dual graphic equalizers and built-in high-power stereo amplifiers. Units are intended as affordable consoles for sound reinforcement, entertainment systems, or any application requiring high performance at moderate cost. Prices depending on model are $1795, $1995, and $2195.
Reader Service #214

Drake Unveils Audio/Video Modulator

Cable companies, as well as owners of hotels, motels and apartment buildings who need to con-

trol pay TV access, will appreciate this audio/video modulator from the R. L. Drake Co. Model VM2410A users can regulate the decoding of pay channels, directing the unscrambled signal to subscription-paying customers. The modulator is a high-quality, vestigial side-band unit with access to 60 channels, including all standard and cable channels up to 400 MHz. Synthesized visual and aural carriers provide total system flexibility making it easy for cable companies to move from one channel to another since all the user has to do is dial up the desired channel.
Reader Service #215

Sound Tech Intros Programmable Audio Signal Generator

Designed to exceed test equipment requirements in the 16-bit digital era, Sound Technology's Model 3100B programmable audio signal generator offers three distinct operational modes: manual, front-panel control for trouble shooting; built-in automation for quick tests; and complete computerized test and measurement capability using external, menu-driven software. The generator sends FSK signals over the audio channel being tested, which configures the companion 3200B analyzer for each test. Either or both units can be completely controlled and interrogated by a compatible terminal or PC. The 3100B uses digitally controlled analog oscillators to produce sine and square wave signals in addition to SMPTE IMD, tone-burst and sine/step waveforms.
Reader Service #216

Video Overlay Board Integrates Text, Graphics, Video

Processor Sciences has introduced the VGAVision video overlay board, designed to add full NTSC video to an IBM PC or compatible equipped with any brand VGA board and monitor. The board features non-interlaced video output and permits live video within windows. The full-size board requires one slot and two I/O ports. List price is $1299.
Reader Service #217

Tape Degausser Premieres from RTI

Research Technology International's Model V100 conveyor tape degausser erases metal and

oxide tapes. The unit achieves 75 dB erasure of metal tapes, deeper erasure of oxide tapes. Bi-axis magnetic field even erases time code, audio and control track signals, says the manufacturer. The V100 can erase 22 metal cassettes per minute and is designed not to overheat, even under constant use.

Reader Service #218

NEC Convertor Puts S-Video on RGB Monitors

The SVC-10 S-Video Convertor from NEC's Professional Systems Division allows any RGB monitor to show S-video presentations. A personal computer can also be connected to the unit, permitting the viewer to switch between S-video images and PC-generated displays. Standard features include 4-pin DIN Y/C input with left and right audio connections and loop-through output, 34-pin RGB input, and individual controls for color, tint and sharpness.

Reader Service #219

Fluke Presents New Family of Oscilloscopes

Cursor facilities, Autoset and optional GPIB/IEEE-488 interface are among the features in John Fluke's new three-member family of Philips analog/digital storage oscilloscopes. The units—PM 3335, PM 3350 and PM 3365—offer analog bandwidths from 50 MHz to 100 MHz, sampling rates from 20 MS/s to 100 MS/s for each channel and up to 8 K memory. The GPIB/IEEE-488 or RS-232 interface options enhance functionality of the scopes by allowing them to be used under computer control or in automatic measuring systems. Measurements can be downloaded to the computer for mass storage or further processing, while special instrument settings for complex test routines, user-definable softkey guidance and on-screen operator prompts can be downloaded from the controller.

Reader Service #220

CLASSIFIED

TV BROADCAST SALES

Famous international optical company seeks a New York area based individual to handle sales of TV camera lenses to dealers, mfrs., prod. studios and TV stations and networks. A knowledge of broadcast television camera electronics and/or microprocessor technology helpful. Able to travel U.S. and occasionally abroad.

Please send resume and salary requirements (no telephone calls please) in complete confidence to:

Angenieux Corp. of America
7700 N. Kendall Drive, Miami, FL 33156

FIELD SERVICE TECHNICIAN

Optical mfr. seeks qualified individual for field/bench service. Skills in precision mechanics preferred. Knowledge in electronics helpful. Cpportunity for growth into direct sales. Based in Miami, Fla. Must be willing to travel in U.S. & abroad.

Please send resume and salary requirements (no telephone calls please) in complete confidence to:

Angenieux Corp. of America
7700 N. Kendall Drive, Miami, FL 33156

SPOOLER

JUNIOR CADDY

Dispenses multiple 5" to 18" diameter rolls of wire or cable easily. Economy size, easy knock down for travel or storage. **$189.90**

Exclusively from:

PORTLAND CABLEWORKS

818-500-0137

BUSINESS BRIEFS

American Broadcast Systems has installed a DC-800 two-channel TV automation system at PBS station **KLRU-TV**, Austin, TX. One channel is used to automate playback of KLRU's on-air station breaks. The second dedicated channel provides full-time automated programming for KLRU-TOO, a dedicated channel on Austin's local cable system. The DC-800 programs the cable channel with essentially the same schedule as the broadcast station, but in a different order—thus broadening KLRU's viewer base for increased viewer support. ABS has also installed an AmeriCart DC-80 automatic video cart system for **KDOC-TV**, Anaheim, CA. KDOC uses the system to automate both program and spot playback operations...**WaveFrame Corp.** has announced installation of its AudioFrame digital audio workstation at eight facilities, including singer-songwriter Stevie Wonder's Los Angeles studio, Wonderland. The other locations are Rob Arbittier, Los Angeles; Sheffield Recordings Ltd., Maryland; Sound Associates, New York; The Process Recording Studios, Greensboro, NC; Trax Sounds, Toronto; University of California, Santa Barbara; and West Productions, Burbank, CA. Wonder has announced his AudioFrame will be used on his next tour...**Broadcast Television Systems** has announced the shipping of its 1000th LDK-90 CCD camera since its introduction in 1987. BTS has extended the LDK-90 family with the launch of the LDK-900, touted as the first frame transfer CCD production camera.

Video Tape Associates now has five Ampex D-2 digital tape machines available for film-to-tape transfer, editing and other services. VTA president Ken Chambliss notes, "The greatest advantage to the D-2 is the picture quality of the recordings. After as many as 20 passes, the quality is equal to first generation." VTA plans a series of seminars to acquaint its clients with the capabilities and uses of digital...**Conus Communications** offered its subscribers complete coverage of the inauguration of President George Bush. "We offered clients the opportunity to go live from all the inaugural balls, and from the opening ceremony of the weekend," says Conus White House correspondent Mike McKee. Thirty-two TV news organizations used Conus' feed, including Japan's Fuji-TV and Univision...**NASA's** Marshall Space Flight Center, Huntsville, AL, has completed a scientific visualization project using animation and imaging technology from **Intelligent Light**. The visualization is used to describe and analyze NASA's proposed Small Expandable Deployer Systems (SEDS), designed to provide a controlled deployment of payloads from the space shuttle or a space station.

R. Terry Hoffman has been named president of **Centro Corp.**, Salt Lake City. Hoffman, former president and CEO of Telemation, Inc., has more than 20 years experience in the professional video field...**Acrian Inc.**, San Jose, CA, has appointed **Frank Klarer** eastern regional sales manager. Klarer, formerly with Motorola, will report directly to Acrian vice president of sales Don Smith.

The **1989 HDTV Conference and Exhibition** will be held at New York's Marriott Marquis June 1 and 2. There will be a preconference session on May 31, titled "Introduction to HDTV." The conference is sponsored by *HDTV Newsletter* and Meckler Conference Management. ■

Mark Richer, director of programming for the Public Broadcasting Service, shows off the system's new half-inch MII format equipment from Panasonic. The new equipment went on line in mid-October 1988, replacing one-inch machines, and is expected to save PBS hundreds of thousands of dollars annually.

ADVERTISERS INDEX

Manufacturer	Page No.	Circle No.
Abekas Video Systems	28	**128**
Ace Communications	70	**129**
Acoustic Systems	70	**130**
ADX Systems Pty Ltd.	72	**131**
AF Associates	116	**154**
Alexander Manufacturing	77	**170-172**
Alpha Video & Electronics	30	**113**
Alta Group, Inc.	68	**112**
Ampex Avsd	14-15	**106**
Andrew Corp.	81	**138**
Andrew Corp.	83	**140**
Andrew Corp.	85	**142**
Associated Production Music	138	**167**
Avcom of Virginia	79	**136**
Belar Electronics	137	**164**
Broadcast Electronics	8	**103**
BTS Inc.	126-127	**157**
Camera Mart	88-89	**144**
Canon USA, Inc.	58-59	**124**
Chyron Corporation	37	**115**
Comark Communications	114	**152**
Comrex Corporation	87	**143**
John Crowe Productions	73	**132**
Cyclesat, Inc.	65	**126**
Delta Electronics	91	**145**
Dolby Laboratories, Inc.	76	**134**
Ellis & Watts	93	**146**
EEV, Inc.	82	**139**
Faroudja Laboratories	16	**107**
Farrtronics, Ltd.	136	**163**
Fidelipac Corp.	3	**101**
Fujinon Inc.	52	**122**
GE Broadcast Systems Integration	135	**161**
Ikegami Electronics	74-75	**133**
Image Video Ltd.	138	**166**
Intl. Tapetronics/3M	44	**111**
Leitch Video Ltd.	57	**123**
McCurdy Radio	60	**125**
MCL, Inc.	115	**153**
Midwest Communications	6	**102**
Midwest Communications	10	**104**
Midwest Communications	12	**105**
Rupert Neve Inc.	47	**119**
Nova Systems	50	**121**
Odetics	129	**158**
Panasonic Broadcast Systems Co.	66-67	**127**
Panasonic Industrial Co.	22-23	**114**
Panasonic Industrial Co.	24	**116**
Panasonic Industrial Co.	26	**117**
PCO Inc.	134	**160**
Polyline Corp.	137	**165**
R-Columbia Products	136	**162**
Sachtler Corp. of America	131	**159**
Sony Corp. of America	99	**149**
Sony Broadcast Products Inc.	4-5	–
Sony Broadcast Products Inc.	32-33	–
Sony Broadcast Products Inc.	104-105	–
Sony Tape Sales Co.	20	**109**
Sony Pro-Video	48-49	**120**
Standard Communications Corp.	41	**110**
Switchcraft	94	**147**
SWR	106	**150**
Telex Communications	97	**148**
3M Magnetic Media	84	**141**
Toshiba Corp., Broadcast Equip.	133	**169**
Utah Scientific	Cov.III	**168**
Vicon Industries	18	**108**
Video Display Corp.	125	**156**
Videotek	112	**151**
Vinten Equipment	123	**155**
Ward-Beck Systems Ltd.	Cov.IV	–
Wheatstone Corp.	Cov.II	**100**

A Vote for Dual HDTV Standards

By Bruce Bredon

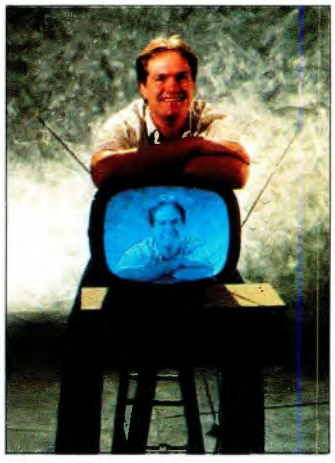
The recent emergence of HDTV technology has brought about much discussion concerning a possible "world standard" for HDTV. Despite the disagreement over bandwidth and broadcasting standards, it surprises me that a suitable basic scan standard has not yet been agreed upon by the industry.

My impression is that everyone is so focused on how pretty a picture RGB HDTV makes, they seem to completely ignore the severity of the temporal distortion that results from standards conversions between different field rate systems. The European 1250/50 standard makes sense for conversion to 50 Hz field rate European TV; but we are all well aware of the severe temporal distortion involved when converting to 59.94 Hz. The talked-about 59.94 Hz field rate HDTV makes sense only for conversion to 59.94 Hz TV standards. What makes no sense at all is the tentative 1125/60 standard proposed by Japanese and U.S. concerns. It is needless to mention that a 60 Hz standard will never be acceptable in the 50 Hz camp.

When converting 60 Hz temporal rate motion to 59.94 Hz, it is necessary to omit one image approximately every 17 seconds. The perceived effect of this conversion is usually not very noticeable unless there is a fair amount of motion in the program material during the repeated image. This phenomenon will be particularly annoying when viewing sporting events such as the Olympics. Imagine watching a wonderful floor exercise and perceiving that the athlete seems to "stumble" slightly every 17 seconds or so! Advanced temporal interpolation techniques could be employed, but I find it difficult to believe that such methods could adapt to all program material without some undesirable artifacts.

The only method that can completely eliminate temporal distortion when converting to existing TV standards is to adopt two standards—50 Hz and 59.94 Hz—for primary use where these field rates are already being used. To simplify the manufacture and maintenance of equipment for these standards as much as possible, an attempt should be made to standardize other aspects of the signal such as H line rate, pixel rate, and color encoding method.

This is a case where digital acquisition and recording can be of great benefit. Digital recording, for example, need not involve exactly one rotation of a scanner (or whatever future method is developed) for each field. In fact, I don't believe there needs to be any particular association between media scanning speed and field rate. Therefore, the scanner need not run at different speeds for recording/reproducing the different field rates. Additionally, if the pixel rate is standardized for both temporal standards, the only difference between recording/reproducing digitized HDTV for the two temporal standards need be how the pixels are transferred between the buffer memory and the outside world. The recorders for HDTV could be simple "pixel stream recorders," and the horizontal and vertical timing information could be easily encoded and decoded within this data stream.



We must stop arguing about which world HDTV scan standard to adopt, and accept that, like it or not, two standards are required. I believe we should spend our time and energy analyzing the ramifications of acquiring, recording, editing and distributing these two temporal standards on the same equipment with the least amount of inherent problems. We can then, for the first time, truly work together to develop a set of compatible requirements for the dual standard that this industry desperately needs. ■

Bredon is chief engineer of Mincey Productions, San Diego, CA.

AUTOMATION SYSTEMS

Wouldn't it be great if somebody supplied fully-integrated, on-air automation systems, designed specifically to your requirements, using standard hardware, and backed by a full ten-year warranty?

SOMEBODY DOES. UTAH SCIENTIFIC.

Utah Scientific can supply your station with an automation system which is specifically tailored to your requirements and designed with easy future expansion in mind.

Our family of automation products ranges all the way from a simple PC-based event programmer for our Routing Switcher/Machine Control systems to the new TAS Total Automation System for handling the most comprehensive and demanding real-time applications.

This wide range of system choices makes Utah Scientific the perfect source for your automation system.

Call us today for more information. Find out how Utah Scientific's automation products can work for you now and in the future.

Somebody does!

SEE OUR FULL RANGE OF AUTOMATION SYSTEMS AT NAB BOOTH #4526.

UTAH SCIENTIFIC
DYNATECH Broadcast Group

1685 West 2200 South, Salt Lake City, Utah 84119
(801) 973-6840 Toll Free: 1-800-453-8782

Circle 166 on Reader Service Card Page 107

MiniCOM® brings a totally new dimension to professional communications!

Until now setting up a production communications system required bulky hardware and plenty of space.

MiniCOM® changes all that! It delivers mainframe performance in a "desktop" sized package. A 24 x 56 matrix in just 8¾" of rack space (5 rack units).

And, because we've been able to put all that traditional Ward-Beck quality and performance into such a compact frame, the price has come down to "desktop" proportions too!

No need to dream any more about having a MiniCOM System sometime in the future... You really can afford one today!

WBS

WARD-BECK SYSTEMS

Ward-Beck Systems Ltd., 841 Progress Avenue, Scarborough, Ontario, Canada M1H 2X4.
Tel (416) 438-6550. Fax: (416) 438-3865.