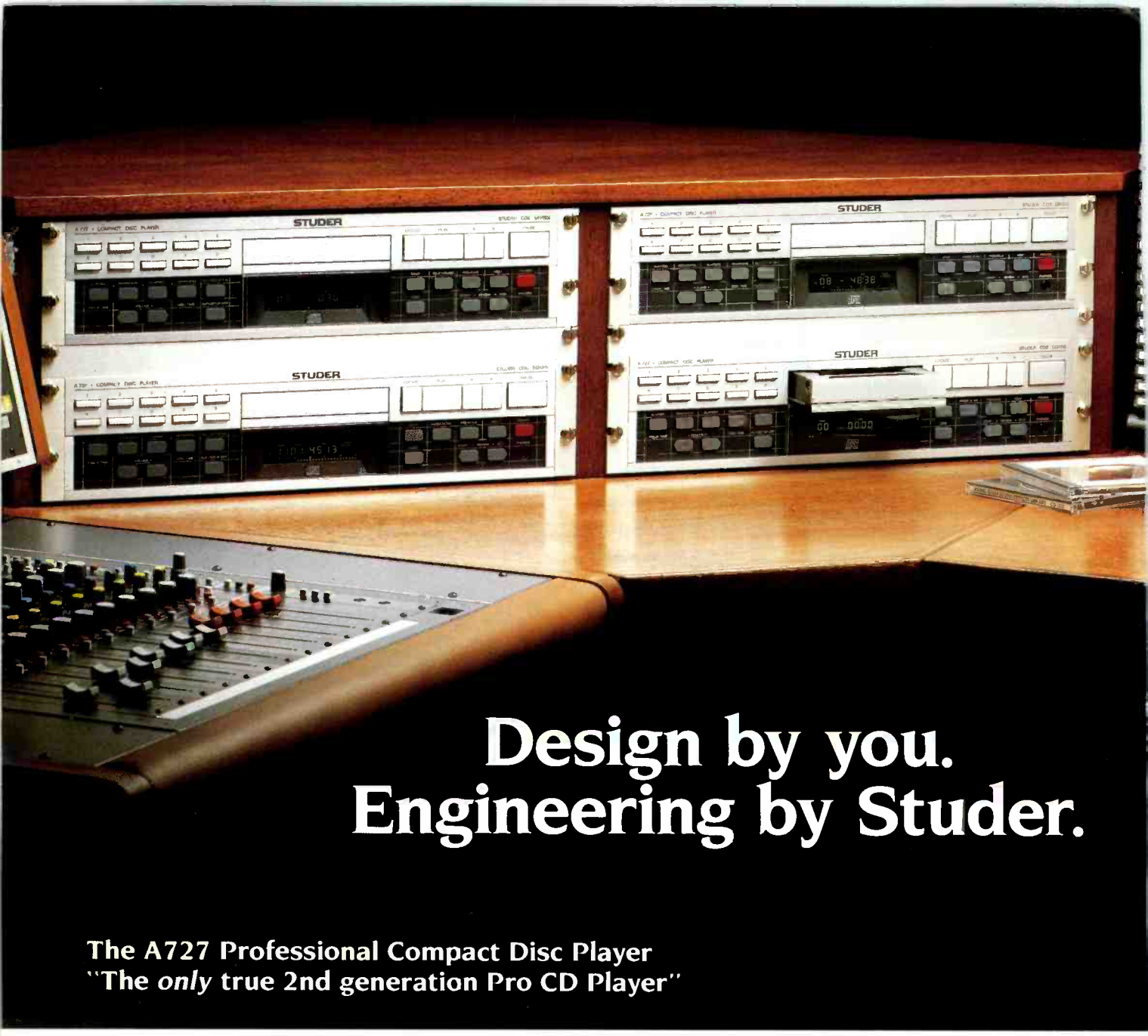
JANUARY 1988 $3.00

BM/E

BROADCAST MANAGEMENT/ENGINEERING

1988 Excellence in Engineering Awards



Design by you. Engineering by Studer.

The A727 Professional Compact Disc Player "The *only* true 2nd generation Pro CD Player"

The Studer A727 is exactly what you need in a truly professional CD player. It's that way by design.

Broadcast and production professionals from all over the world told us what they needed. That became our blueprint. Then Studer engineers went to work. The result. . .a true 2nd generation professional CD Player, with a long list of advantages over the competition.

Listen to the Studer-engineered A727. . .What you hear comes from separate 16-bit D/A converters, 4-times oversampling, and proprietary Studer digital and analog filtering. In other words, what you hear is legendary Studer sonic quality.

Use the features that professionals demanded and Studer engineered into the A727:

Studer modular full function parallel remote control with display

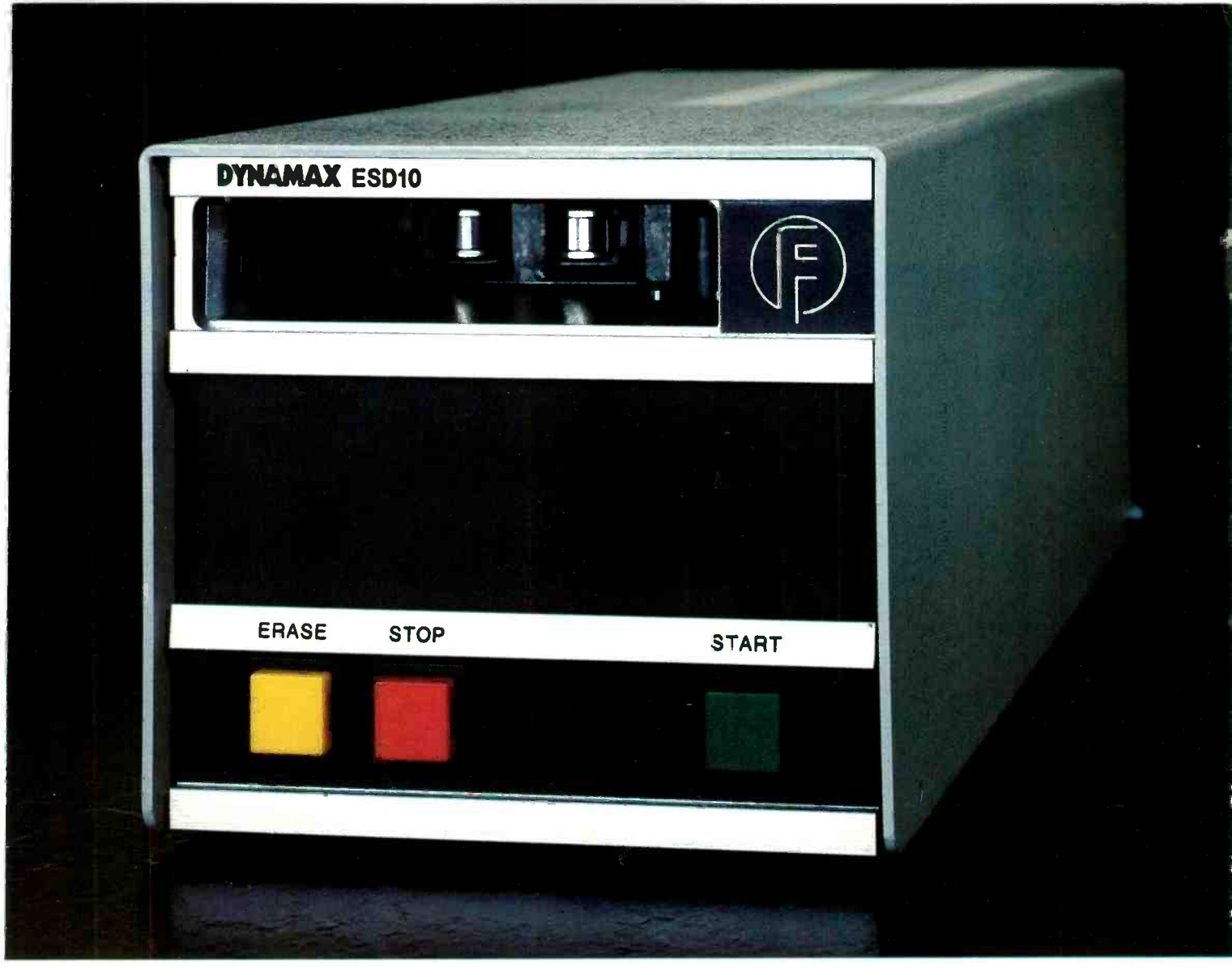
- very quick *direct* access to tracks *and* indexes;
- Auto Cue (aka, "cue to music") to find exact start of program material;
- Auto Stop to pause at end of any track;
- Start Review & End Review to allow quick checks of "in" and "out" cues;
- parallel remote with status tallies *and* fader start;
- bright self-illuminating display shows elapsed and remaining time for both track and disc;
- provision for RS 422 serial interface;
- rugged die-cast aluminum CD drive assembly with quiet CD drawer;
- I/O configurations. Analog—stereo balanced XLR, 2 sets of stereo unbalanced RCA (fixed level and variable level), *and* mono. Digital—balanced XLR, unbalanced RCA. Clock—input for vari-speed, output for synchronization.

If the Studer A727 seems to be everything you need in a professional CD player, it's no accident. It was built that way. By design.

STUDER REVOX

STUDER REVOX AMERICA INC.
1425 Elm Hill Pike, Nashville, TN 37210
615-254-5651

Circle 100 on Reader Service Card



Dynamax® ESD10 Eraser/Splice Detector
Cleanest Erasure Ever!

Now there's a better way to erase your carts. Without degaussing coils. Without heat. Without damaging your tapes.

The DYNAMAX® ESD10 Eraser/Splice Detector improves on reel-to-reel technology by using two precision full-track erase heads. The result is a significant improvement in cartridge signal-to-noise ratio, and on-air sound beyond anything you might have thought possible.

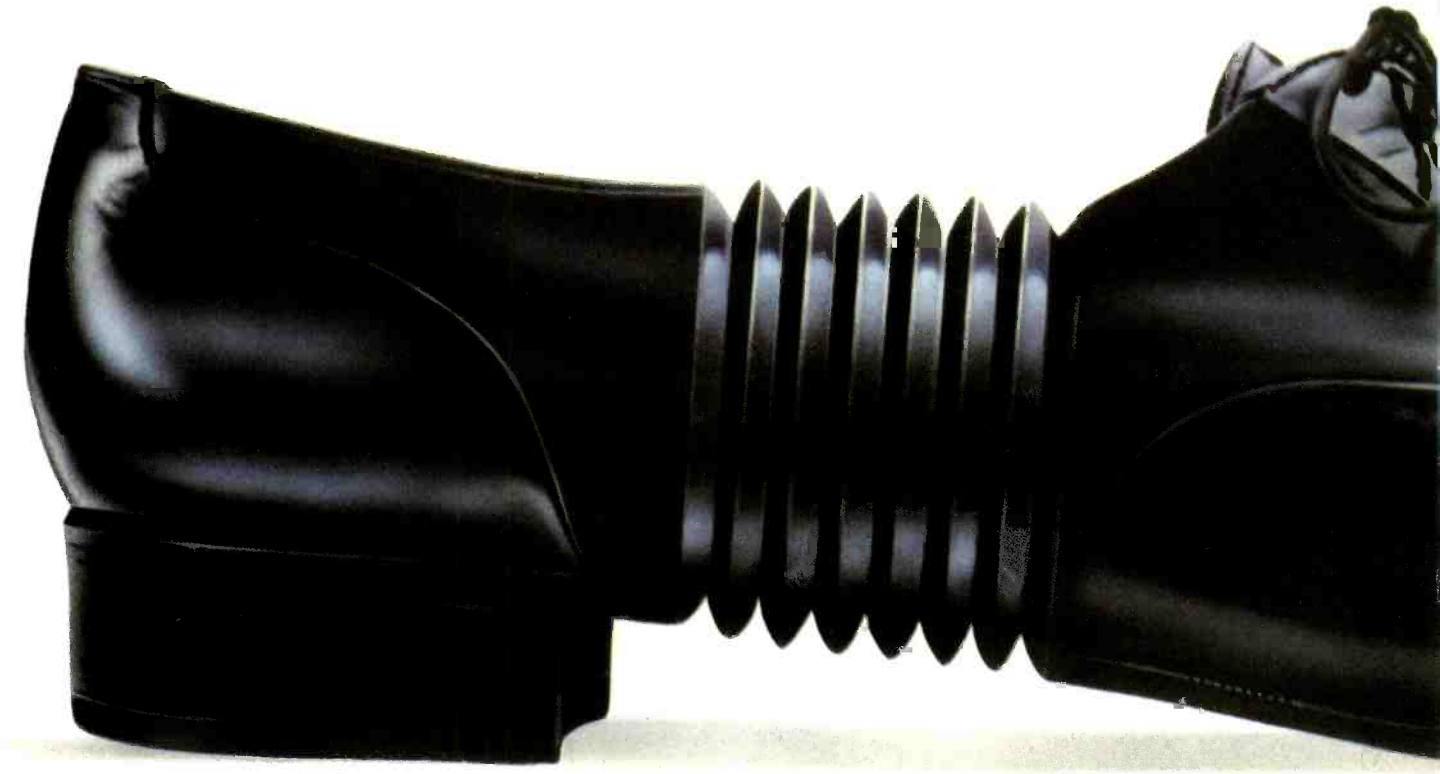
In addition, a patented system guarantees reliable, automatic splice detection with no sensitivity adjustments. Operating at 27.5 ips, the *continuous duty* ESD10 will erase and splice-locate a 40-second cartridge in less than 22 seconds.

Get the full story on the fastest growing cartridge machine family. Contact Fidelipac or your authorized DYNAMAX Distributor.

DYNAMAX®
BROADCAST PRODUCTS BY FIDELIPAC®

Fidelipac Corporation □ P.O. Box 808 □ Moorestown, NJ 08057 U.S.A. □ 609-235-3900 □ TELEX: 710-897-0245 □ Toll Free 800-HOT TAPE

MII.
ONE SIZE FITS ALL.



FINALLY! THE UNIVERSAL FORMAT THAT TAKES YOU FROM ACTION, TO EDITING, TO OVER-THE-AIR WITHOUT MISSING A STEP.

At JVC, we know what it's like to be in your shoes. Every day you have to tap dance between a barrage of equipment and format changes.

Fortunately, MII can make your job a whole lot easier. It's the first truly universal format that answers the needs of people in the field, in the studio and in production — while delivering broadcast quality results. And MII delivers these results in half the space and with less than half the weight of 1" C systems.

As you might expect, our new MII component video recording systems more than live up to the JVC reputation for value. In fact, to pack any more value or features into our economical MII units would probably take a shoehorn.

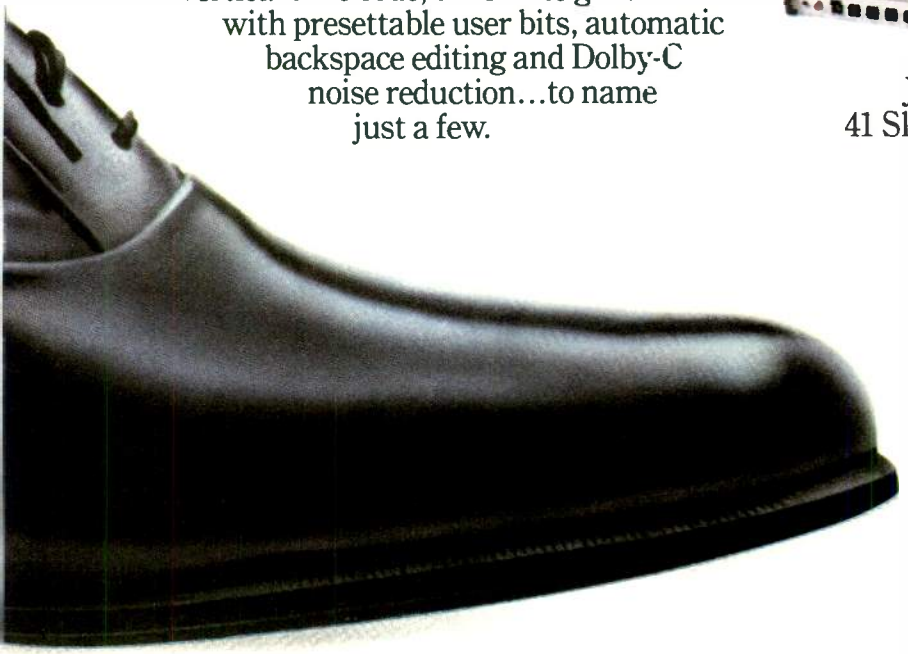
For example, you'll find features to choose from like four audio tracks, a time base corrector, an integral longitudinal and vertical time code, time/date generator with presettable user bits, automatic backspace editing and Dolby-C noise reduction...to name just a few.

Plus, by combining the CTCM (Chrome Time-Compressed Multiplex) recording system with high-density metal particle tape, JVC's MII format can deliver up to 90 minutes of broadcast quality recording/playback time in VHS-sized ½" cassettes. All without worrying about format switches or losing quality during editing — even several generations down the line.

Most importantly, *only* JVC gives you a choice. This means you can select a less sophisticated MII system, say for ENG/EFP, and a more advanced MII system for studio work. Also, since each unit is completely compatible with each other, you can virtually build your own system, feature for feature. And upgrade at any time.

JVC's MII. The affordable, universal format you've been waiting for.

For literature or demonstration, call toll free: 1-800-JVC-5825.
JVC Professional Products Company,
41 Slater Drive, Elmwood Park, NJ 07407.



JVC®

**ALWAYS A STEP AHEAD...
TO KEEP YOU A STEP AHEAD.**

Circle 145 on Reader Service Card

BM/E
BROADCAST MANAGEMENT/ENGINEERING

EDITOR-IN-CHIEF
Robert Rivlin

EDITOR
Tim Wetmore

SENIOR EDITOR
Eva J. Blinder

ASSOCIATE EDITOR
Steven Schwartz

PRODUCTION EDITOR
Michael D. Espindle

ART DIRECTOR
Andra Douglas

ASSOCIATE ART DIRECTOR
Raymond Wong

PRODUCTION DIRECTOR
Nick Tartaglia

PRODUCTION ASSISTANT
Barbara Mendelsohn

FCC COUNSEL
Bechtel & Cole

GROUP PUBLISHER
Kevin J. Condon

ASSOCIATE PUBLISHER
Patrick J. Moloney

MARKETING SERVICES DIRECTOR
Arlene M. Peters

MARKETING ASSOCIATE
Joseph M. Decibus

CONTROLLER
Joseph M. Pannullo

ASSISTANT TO CONTROLLER
Jesse Milord

EXECUTIVE ASSISTANT
Sharon Porges

OFFICE MANAGER
Donald Cooke

RECEPTIONIST
Sharon Cureton

Broadband Publications

CHAIRMAN
Paul David Schaeffer
PRESIDENT
Charles C. Lenz, Jr.
EXECUTIVE VICE PRESIDENT
Kevin J. Condon
SENIOR VICE PRESIDENT, CORPORATE DEVELOPMENT & PLANNING
Martha Lorini
VICE PRESIDENT, FINANCE & ADMINISTRATION
Bronna A. Butler

Broadband Publications
295 Madison Ave., New York, NY 10017
(212) 685-5320, Telex 64-4001
Also publishers of:
BM/E's **World Broadcast News**
E-ITV Educational-Industrial Television

ABP BPA BM/E BROADCAST MANAGEMENT ENGINEERING (ISSN 0005-3201) is published monthly by NBB Acquisitions, Inc. BM/E 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, N.Y. and additional mailing offices.
POSTMASTER: send address changes to BM/E Broadcast Management/Engineering, P.O. Box 6056, Duluth, MN 55806.

ON THE HEELS OF THE CURRENT BUDGET CRUNCH, JVC VALUE HELPS POLISH YOUR IMAGE WITHOUT SELLING YOUR SOLE.

JVC®

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

Circle 103 on Reader Service Card

Something you'll never have to do...

...if you own a Grass Valley switcher.

Whether you are in a live or post production environment, the moment of truth comes when the lever arm is finally moved. Peace of mind is knowing that your

Grass Valley Group switcher won't let you down.

There are four switcher families with many possible configurations in the Grass Valley line up. From the now legendary Model 300, to the compact, yet extremely powerful Model 100, there are no better switchers anywhere. Every system has the quality, reliability and performance that professionals around the world know that they can expect from Grass Valley Group.

So, uncross your fingers and call us today. Let us know your requirements, and we will offer a switcher tailored to satisfy your every need.

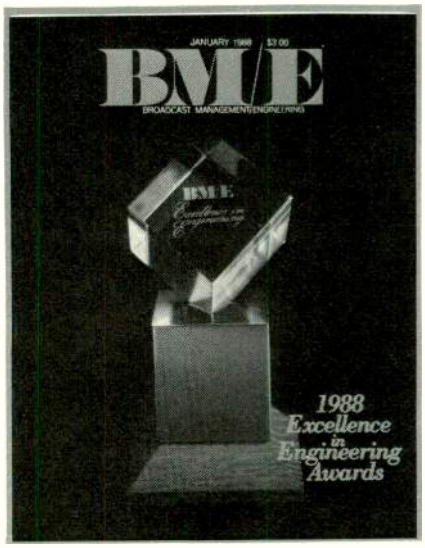
Grass Valley Group®

A TEKTRONIX COMPANY

THE GRASS VALLEY GROUP INC.
P.O. Box 1114, Grass Valley, CA 95945 USA
Telephone (916) 478-3000
TRT: 160432

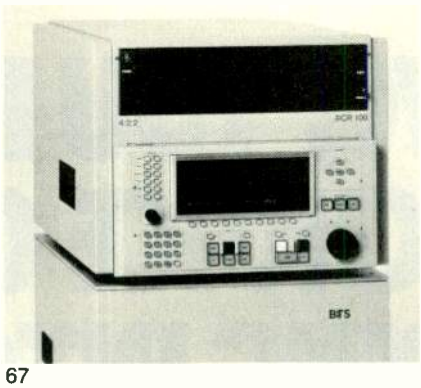
OFFICES: New York (201) 845-7988; District of Columbia (301) 622-6313; Atlanta (404) 493-1255; Chicago (219) 264-0931; Minneapolis (612) 483-2593; Dallas/FortWorth (817) 483-7447; Los Angeles (818) 999-2303; San Francisco (415) 968-6680; GVG International Ltd. (UK) + 44-962-843939; Grass Valley Group Asia (HK) + 852-3-7396632

Model 100 circle 104, Model 200 circle 105, 300 series circle 106, 1680 series circle 107



JANUARY 1988 VOLUME 24/NUMBER 1

BM/E
BROADCAST MANAGEMENT/ENGINEERING



67

73

Features

Departments

Cover:

Shot at Studio 26 by Bruce Weintraub, BM/E*'s excellence in engineering award graces this month's cover.*
Special section starts p. 27.

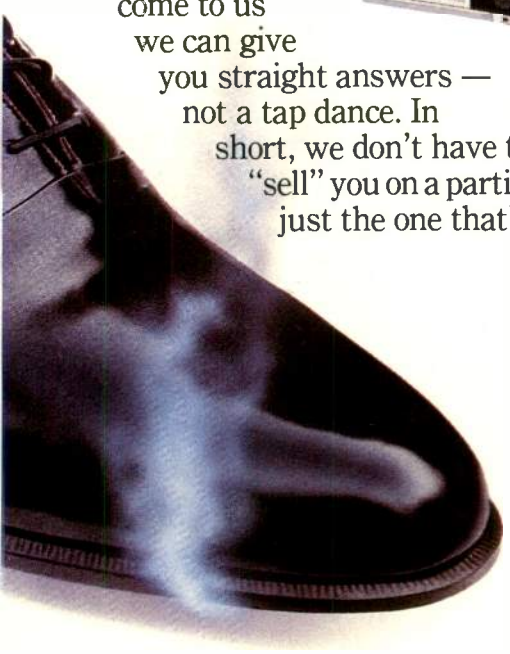
AT JVC, YOU HAVE A CHOICE OF STEPPING INTO THE 3 HOTTEST FORMATS IN TOWN...

¾", S-VHS, MII.
WHATEVER THE BUDGET, WHATEVER THE NEED, JVC CAN HELP YOU GET A LEG UP ON YOUR COMPETITION.

At JVC, we know what it's like to be in your shoes. Just when you're about to plant your feet firmly into a format and commit yourself — those nagging questions start popping up. So where do you turn to for answers?

The same place you've always turned to for value and performance, JVC, of course. Today, when budgets are decreasing and demands on broadcasters are increasing — JVC gives you the most important option of all — freedom of choice.

Only JVC can give you total system support in all three formats. Which means when you come to us we can give you straight answers — not a tap dance. In short, we don't have to "sell" you on a particular format — just the one that's right for you.



For example, while some manufacturers are starting to walk away from ¾" technology, we keep bringing out new products to support our ¾" customers.

Then, of course, there's MII. It's truly a universal format that allows you to handle a variety of assignments from the field, to editing, to over-the-air — without having to switch equipment or formats.

Last but not least is S-VHS — the very affordable high resolution format that makes sure customers with smaller budgets can still have bigger-than-life picture quality.

Add it all up and you'll see the first step to take when you're choosing a format is to call JVC.

For literature or a demonstration, call toll-free: 1-800-JVC-5825. JVC Professional Products Company, 41 Slater Drive, Elmwood Park, New Jersey 07407.

JVC®

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

Circle 108 on Reader Service Card

Letter from the Editor

At the beginning of this new year, we thought it appropriate to introduce you to some of the significant and exciting changes going on here at *BM/E* in order to address the challenges facing technical and engineering management. The increasing use of computers, the need to engineer for major events such as conventions and elections, facility planning that allows for constantly evolving recorder formats, digital equipment that must be integrated into an analog environment—all are issues that require up-to-date, knowledgable decisions, based on the kind of information we take pride in presenting in *BM/E*.

As announced previously, *BM/E* was recently acquired by Act III Publishing, a unit of Norman Lear's Act III Communications. Among the many strengths this provides is the ability to focus our resources and energy on this most important segment of the broadcast and teleproduction businesses: technical and engineering management. You will already have noticed that the issue is devoted to recognizing the contributions made by engineering management in developing facilities and products that have impact on our industry. And this is just the beginning.

Impact. With new columns and new editorial programs, with a renewed dedication to radio coverage, and with an eye towards what lies ahead for our industry, *BM/E* is providing what the technical leadership in radio, television, and teleproduction is demanding and what, until now, it could not get.

Columns such as "PCs in Engineering" geared to the select, practical needs of today's enginereering manager, will allow our readers to make hands-on use of the material they find in each issue of *BM/E*. "Tech-Watch" will alert the leaders of engineering to advanced technologies that will soon have direct affect on the video and audio environment in which they work. And new columns and expanded features on leaders of our industry and the technical minds that influence the way facilities operate and the way the industry employs systems will be coming your way throughout the year.

Leadership. That's what we're after as we use our vision to see the changes in technology and systems and how they interact with advanced engineering concepts to guide us on our course to tomorrow's world of audio and video realities.

New articles and columns, our program to recognize engineering excellence, our editorial approach designed to satisfy the needs of technical and engineering management: we refuse to remain static and are continually evolving to keep pace with the industry's own need to grow. We believe that we have come up with the best formula for serving our readership, and we hope you will look closely and let us know how you feel both about the exciting changes we have instituted with this issue and the changes still to come as the year progresses.


WHEN LOOKING FOR THE LATEST TECHNOLOGY
IN UHF AND VHF TRANSMITTERS...
Comark's recent track record of technological innovations is unmatched by any other LS manufacturer. This impressive history of recognized advancements demonstrates our commitment to the future. A commitment backed by continuing substant al investments in research and product development activ ties.
Incorporating new technology into today's products is your ass urance that the Comark transmitter purchased now will still be current in the year 2000.
COMARK IS HERE
COMARK COMMUNICATIONS, INC.
A Thomson-CSF Company
Route 309 & Advance Lane • Colmar, PA 18915
(215) 822-0777 • Telex: 846075
Circle 109 on Reader Service Card

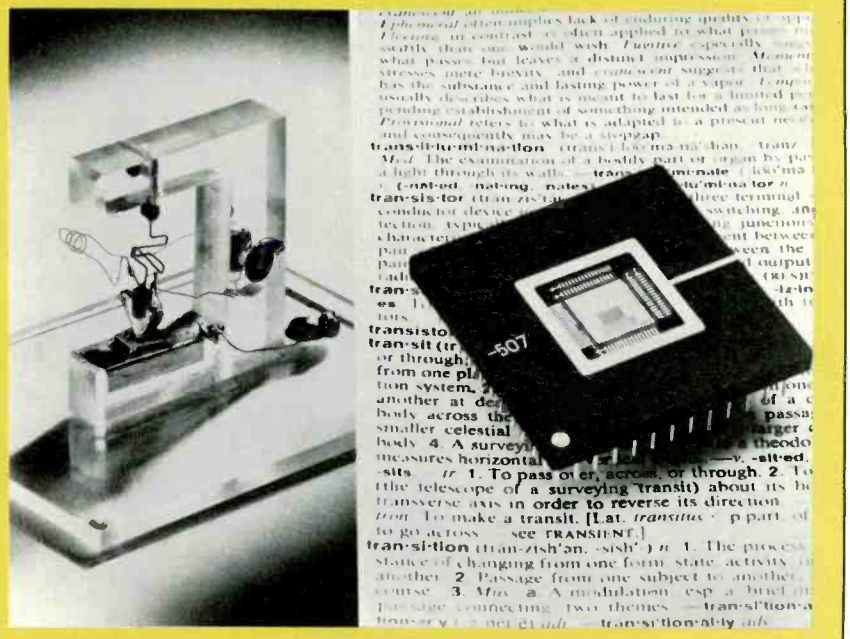
NAB Seeks Proposals for Research Grants

The NAB is currently accepting proposals for its 1988 Grants for Research in Broadcasting. Now in its 22nd year, the program awards four to six grants of up to $5000 to selected individuals. The competition is open to all academic personnel, graduate students, and senior undergraduates.

"This program is aimed at stimulating interest in broadcast research, especially on economic, social, or policy issues important to the U.S. broadcast industry," says NAB Research Committee chairman Donald J. Newberg. "It also makes high-quality academic research available to the industry as well as academics."

Proposals will be evaluated by an independent committee composed of broadcast industry professionals and academicians. The criteria used for judging each submission will be problem conceptualization, research technique, contribution to the field, clarity, and thoroughness. Proposals dealing with instructional or public radio and TV are specifically excluded from the competition, while at least one award will be given for research on the relationship of children and the broadcast media.

The deadline for submissions is February 1, 1988; winners will be announced at the 1988 Broadcast Education Association Convention in Las Vegas next April.



Yesterday and today... That odd-looking contraption you see pictured on the left happens to be the first transistor ever assembled. This historic device, which celebrated its 40th birthday last month, is known as a "point contact" transistor and was developed at AT&T Bell Laboratories in Murray Hill, NJ. Its name comes from the fact that amplification occurred when the two pointed gold contacts were pressed onto the surface of a wedge of "homegrown" germanium.

Designed as a replacement for the bulky, fragile vacuum tube, the invention quickly transformed the pace of technology and won the 1956 Nobel Prize in Physics for the team of physicists—John Bardeen, Walter Brattain, and William Shockley—responsible for its development.

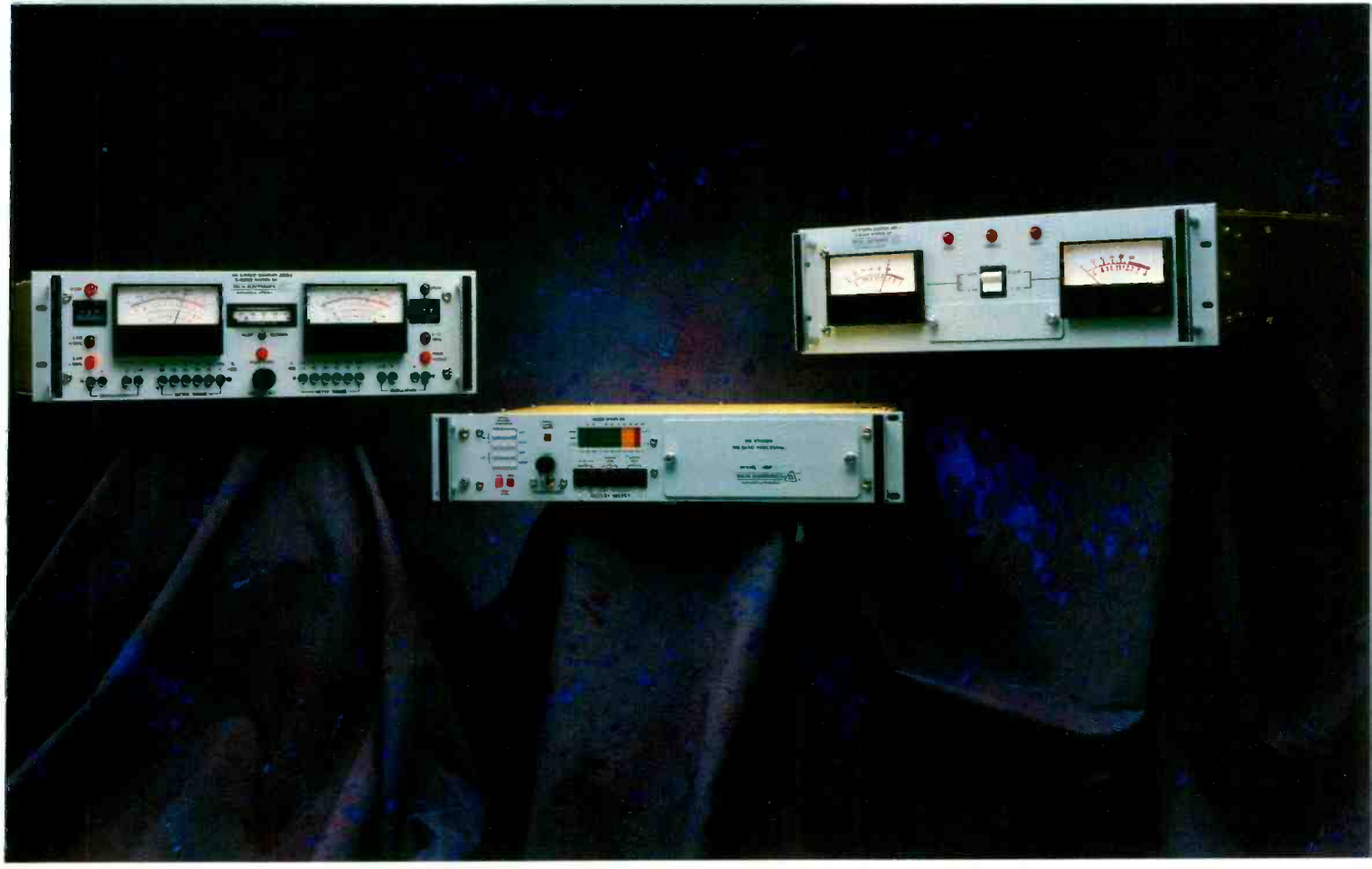
On the right is its dimunitive progeny, AT&T's state-of-the-art custom logic chip, a silicon-based integrated circuit in a 133-pin ceramic grid array containing the equivalent of 72,000 transistors. Or, a chip off the old block, you might say.

High-Tech Hospitality for Summit

Last month's Reagan-Gorbachev summit meeting in Washington was marked by technological as well as diplomatic breakthroughs. A hastily arranged agreement between a New York-based satellite communications company and Gosteleradio, the Soviet State Committee for Television & Radio Broadcasting, brought Russian TV programming to the U.S. employing satellites that were never before used for this purpose.

While the U.S. Information Agency (USIA) had agreed to supply the Soviets with tapes of Moscow news programs, the agency noted that there would be a delay of up to a day and half, resulting from the time of broadcast to the time of the transmission by Moscow via the satellite monitored by the USIA in Washington. The news came as a disappointment to the Soviets, who wanted to keep close tabs on the reports of the summit being broadcast at home.

Upon hearing about the problem, Ken Schaffer, president of New York's Orbita Technologies Corp., a company that specializes in arranging Soviet-American broadcast exchanges, contacted Gosteleradio co-chairman Henrikas Yushkiavitchus three days before the Soviet delegation's arrival in the U.S. to request that Moscow redirect its programming to four of the older *Molniya* satellites, which had never before carried the city's programming. Gosteleradio consented, allowing Orbita to downlink the programming in New York and to provide the Russians with SECAM/VHS-format tapes of *Vremya*, the Moscow evening news program, hours after it was broadcast in the Soviet Union. It further provided several U.S. universities—including Columbia, Ohio State, and the



THE ABOVE STANDARD INDUSTRY STANDARD.

In Canada, Australia and Brazil, C-QUAM® has been named the AM stereo industry standard. When you stop and think about it, it's quite obvious why the Delta C-QUAM® AM Stereo System is the above standard industry standard. Just one look at the engineering that goes into our system and you'll see it's built to last a lifetime.

The ASE-1 Exciter, ASM-1 Modulation Monitor and the all new AMP-1 Tri-Band Processor all work together in perfect harmony to bring you unmatched stereo performance.

Day-in and day-out Delta delivers pure, clean sound and optimal separation from your existing transmitter. And the system's active balanced input/output circuits we've included give excellent frequency response as well as outstanding low distortion. Plus, the Tri-Band Processor complements the performance of the Exciter with impressive modulation peak control.

But how can a system that sounds so good be so tough? It's the Delta difference.

You'll notice little details that make the Delta system fit for the long haul. Things like a ruggedly constructed chassis. Zero insertion force card edge connectors for longer life. Stable crystal oscillators in both the Exciter and Monitor, as well as extensive quality assurance testing and a dynamic burn-in.

You'll also notice that we used common sense when we designed the Delta system. It's easy to install thanks to the extra RF and logic level outputs we've included. For further flexibility there's a day/night or main/auxiliary audio equalization board available at no extra charge. Factory authorized system installation is also included. And every system is backed by over 25 years of dedication to AM broadcasting and customer satisfaction.

To find out more about the Delta C-QUAM® AM Stereo System and attractive package pricing, give us a call at (703) 354-3350. Or write Delta Electronics, 5730 General Washington Drive, Alexandria, VA 22312.

Years from now when you look back on your decision to install a Delta C-QUAM® AM Stereo System, you'll recognize it for what it really is—an above standard decision.

Over 25 Years of Quality.

DELTA ELECTRONICS

University of Michigan—with the opportunity to view Soviet coverage of the summit as it was being broadcast in Moscow.

U.S. Teleport Market Booming

The teleport market in the U.S. is alive and extremely well according to a new 325-page report on the industry by the international market research group Frost & Sullivan.

The report charts an almost exponential growth rate in the marketplace, which has blossomed from "about half a dozen" metropolitan cities with teleports in 1984 to more than 20 teleport-supported cities today (with several cities having more than one). Noting that approximately 40 teleports will be in operation nationwide by the end of 1987, the report forecasts that the number will grow to 55 in 1988, 100 by 1991, and 200 by 1997.

Increased revenues are also anticipated in relation to a rising demand for services. Although the average revenue per teleport in 1987 and 1988 is expected to stay around $2.3 million (for telecommunications services only), the study predicts a jump to $3 million by 1991, and $5.3 million by 1997. This translates to total industry revenues of $91 million in 1987 to $1 billion by 1997.

Technological advancements are seen as well. While most teleports got started in the business by providing uplinking and downlinking services of anlog video signals for broadcast and cable clients, the report notes the rapid progress of digital technology in the field.

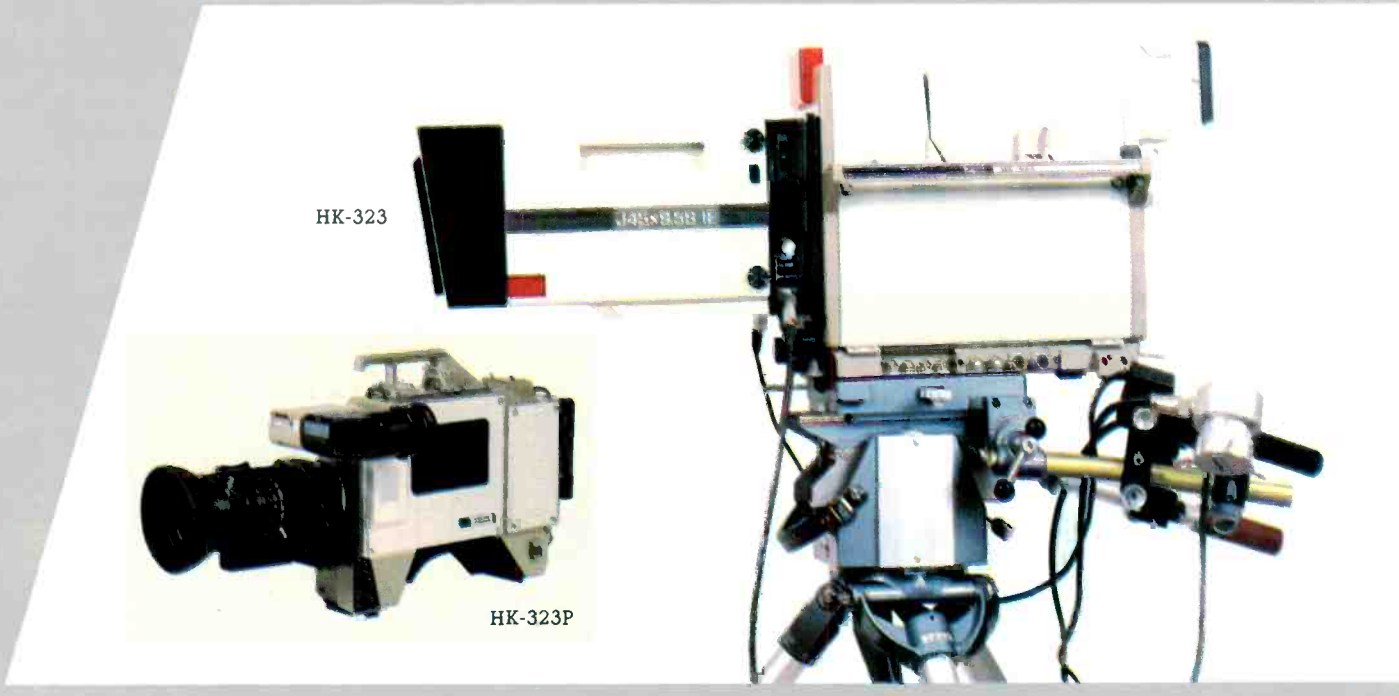
The report also points out the complexity involved in establishing a teleport, and cites the planning and development efforts that are required between the government and private sector. It goes on to point out that a number of existing teleports—such as HBO's Shepley Center on Long Island—evolved from uplinks originally installed by video programmers for their own use. Meanwhile, the study shows that close to half of the nation's current teleport facilities began as entrepreneurial start-ups, some of which established successful operations following failed business/government efforts.

Changes in NAB Science & Technology Department

NAB President and CEO Edward O. Fritts announced last month that Science and Technology head Thomas B. Keller will leave the department to be the NAB's chief scientist at the orgnaization's Broadcast Technology Center (BTC), which was formed to focus on the realization of a high definition television system for U.S. broadcasters, in addition to other research projects.

At the same time, Fritts named Michael C. Rau as vice president and acting head of the depart-

the SOURCE for Ikegami Video Equipment



MIDWEST

As the nation's largest Ikegami dealer, Midwest offers you immediate delivery and dependable service on the full line of Ikegami products, including the HK-323 Field/Studio Camera.

Available in 1" or 2/3" tube configurations, the HK-323 features a control panel that connects directly to the camera head for self-contained operation. A built-in micro-processor provides fully automatic set-up and various software based control functions. And the camera offers high performance prism optics, auto-knee circuitry for high contrast situations and scene files for sharp picture quality. This plus selectable gamma values, two motorized filter wheels and a backup memory system and it is all in a camera weighing only 55 lbs.

The HK-323 is also available in a hand-held configuration, the HK-323P, which can operate off the same base station. Remote control can be via triax, multicore or fiber optics cable.

For all your video production needs rely on the recognized leader. Midwest . . . the Source.

MIDWEST
Communications Corp.

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

Circle 112 on Reader Service Card

ment. Rau was formerly director of spectrum engineering and regulatory affairs at Science and Technology.

"Tom Keller is an outstanding scientist who will make vital contributions to the development of high definition television," Fritts said. "Mike Rau's experience and talents equip him superbly to manage the Science and Technology as Tom's successor."

Keller, who headed Science and Technology since 1981, was chairman of the special EIA committee responsible for selecting the MTS standard.

Rau joined the NAB staff in 1981 and was named the department's director of spectrum engineering and regulatory affairs last year. He was also instrumental in establishing the NRSC AM improvement standard.

Program Announced for SMPTE TV Conference

The technical program for the 22nd annual SMPTE TV conference has been announced by program chairman J. Wayne Caluger. "Technology in Transition" will be the theme for this year's show, which will be held at the Opryland Hotel in Nashville on January 29 and 30.

The meeting will bring together engineers, scientists, researchers, and other technicians from the U.S., England, Japan, West Germany, and other countries to assess the current state and future direction of TV technology. The conference program will include 28 technical papers, which Caluger has divided up into four half-day topic sessions.

Video Recording Formats is the topic of the first session on Friday morning, January 29, which will feature an examination of the various VTR formats that have proliferated the marketplace in recent years.

Distribution and Processing will be the topic in Friday's afternoon session, in which speakers will analyze the electronic video signal: how it is processed, distributed, and transmitted.

The morning session on Saturday will be devoted to the TV studio, and will consist of presentations on planning the physical layout of a studio, design and implementation of equipment, and proper system maintenance. Postproduction issues will dominate the afternoon session on Saturday. Topics will include edit decision lists, integrating analog and digital formats, mixing and synchronization, systems control, and other relevant subjects.

There will also be an equipment exhibition displaying the television systems and devices discussed by the authors in the technical sessions. Other highlights include an opening address by the Society's editorial vice president Howard T. LaZare; and a luncheon with featured guest speaker, Joseph A. Flaherty, vice president of the engineering and development department at CBS.

MOTOROLA

Join Motorola's Exciting RADIOFEST

You Could Win A Free Car Telephone!

Get a 2-way radio for as little as $9.01 a month!*

Hang up the streamers! The Motorola RadioFest is here... and you're the guest of honor!

That's right! We've put together all kinds of great 2-way radio values...along with a chance for you to win a FREE car telephone!

During the Motorola RadioFest, the high quality HT90 portable has been specially priced at only $299...just $9.01 a month*.. but only until March 31, 1988! Or choose our dependable, easy-to-install MaxTrac 100 mobile–it's synthesized, field programmable and affordable!

Whichever radio you choose, you'll get the help you need to handle emergencies faster and more easily...get more done with less people...help increase safety and security...minimize costly backtracking and more!

Just to keep the celebration going, we're giving you a chance to win a FREE Car Telephone–a $2,600 value! All you have to do is call Motorola toll-free, 1-800-367-2346, or return the attached reply card today. We'll automatically enter you in the MOTOROLA CAR TELEPHONE DRAWING–without obligation–and you could be one of ten winners!

HT90 PORTABLE Starting At $299! You Save $99!

ENTER TO WIN A FREE CAR TELEPHONE–VALUED UP TO $2,600

When you call toll-free or mail the reply card!
Entries must be received by February 29, 1988

CALL MOTOROLA

TOLL-FREE 1-800-367-2346

OR MAIL THE CARD TODAY!

*$299 price based on featured 2 watt, VHF, 1 channel, carrier squelch portable. Prices vary based on band, power and options selected. FCC license required. Payments based on 20% down with a 21% APR paid over 36 mos. through Motorola financing, available to qualified applicants.

S-1-L-R

Circle 114 on Reader Service Card

NEW COLUMN

Calculating FM Field Strength on a Computer

By R. F. Balonis, WILK-FM, Wilkes-Barre, PA

Docket 8090 will generate an enormous amount of "what-if" thinking and activity. It has done, and will do, a lot of things for a lot of people. Its purpose was "to increase the availability of FM broadcast assignments," and the FM channel allotments it created will go a long way to accomplishing what the FCC set out to do. But, the modifications it made to the 20-year-old FM channel allocation (rules) scheme will do much more than that.

In another time, it couldn't have happened. This, however, is the age of the computer. Most everyone's got one or has used one. To many in the engineering and technical management ranks, the computer has become a constant companion, a useful tool to help solve the problems incurred in the normal execution of one's job.

FM signal coverage and propagation

In radio, signal coverage area is as important as anything for a station's success. This is the result of a station's signal coverage area defining the station's ultimate potential audience and advertising coverage areas. However, predicting signal coverage is a mean task requiring some obscure and rather occult technical skills.

That makes it a perfect what-if kind of computer problem to solve. And that's what the program I present here does: It allows FM signal prediction on a PC. Given values of ERP (Effective Radiated Power), HAAT (Height Above Average Terrain), and terrain roughness factors, it will calculate an approximation of the F(50:50) signal prediction to three contours: 70dbu, 60dbu, and 34dbu. But first some information about what the calculation involves.

FM signal propagation is a complex phenomenon. On its way to a receiver, the signal has many things that can and do affect its propagation. At FM frequencies (88 to 108Mhz), the primary mode of propagation is by the space-wave; the groundwave doesn't go very far, and the skywave is an infrequent, unreliable happening. So, this direct "line-of-sight" signal, is generally the best unaffected FM signal that the receiver can get.

However, normal everyday reception seldom consists only of the unaffected space-wave. Usually, the received signal, in most parts of an FM coverage area, is a vector sum of the direct space-wave, ground reflected wave(s), and a multitude of effects on them such as reflection, refraction, diffraction, absorption, scattering, grazing, and Fresnel zone clearance.

The theory of its prediction

That's how it is in the real world. In FM radio wave propagation theory, things are a little simpler. Propagation theory assumes the space-wave travels over a flat earth. The FM signal that reaches the receiver consists of only two waves, a direct wave and a ground reflected one with its phase reversed. And, the signal strength at a receiver is a vector sum of both waves that varies (in a standing wave-like pattern) with distance between, and with the heights of, the antennas.

The flat earth theory works up to about 40 miles—the optical "line-of-sight" horizon, and there, the flat earth assumption is a close approximation to reality. But at distances greater than that, the over-the-horizon-distance effect on the direct and reflected waves is to reduce the effective heights of the antennas. That, in turn, changes the locations and the amount of variation in the ideal field strength curve.

Ground imperfections, roughness, and deviations from an ideal smooth earth also affect the FM signal's field strength by changing the reflected wave's phase shift and amplitude. And, the normal earth constants (conductivity and dielectric) cause the reflection coefficient to be less than unity and the reflected wave's phase shift to differ from 180 degrees, so that the received field strength (a vector sum of the direct and reflected waves) has lower variations in the signal strength as a function of distance.

Even in the case where the distance involved is less than line-of-sight—when it's an optical path and the wave can pass directly from the transmitting antenna to the receiving antenna—there are things that affect the signal strength. The optimum optical path must extend, so that the ground and all obstructions lie outside it, to at least the first Fresnel zone. Fresnel zones are imaginary cylindrical surfaces that surround the direct path and have it as its axis. The first one is defined as the point on this imaginary cylindrical surface where the distance from the transmitting antenna to this point added to the distance to the receiving antenna is one half-wavelength greater than the direct path.

How the FCC does it

The customary way to predict FM signal field strength is by the

The Abekas A53-D Digital Special Effects System adds WARP option. The hottest digital 3-D effects system in the video universe is now even hotter with its new WARP option.

WARP lets you turn the page all-the-way-over picture borders, cleanly and smoothly. Bend and warp the picture to make a circle, cylinder, wave, roll, twist, zigzag, split, slide and much more. Add perspective, rotation, multi-pictures and other standard effects to WARP shapes to create the most dazzling transitions.

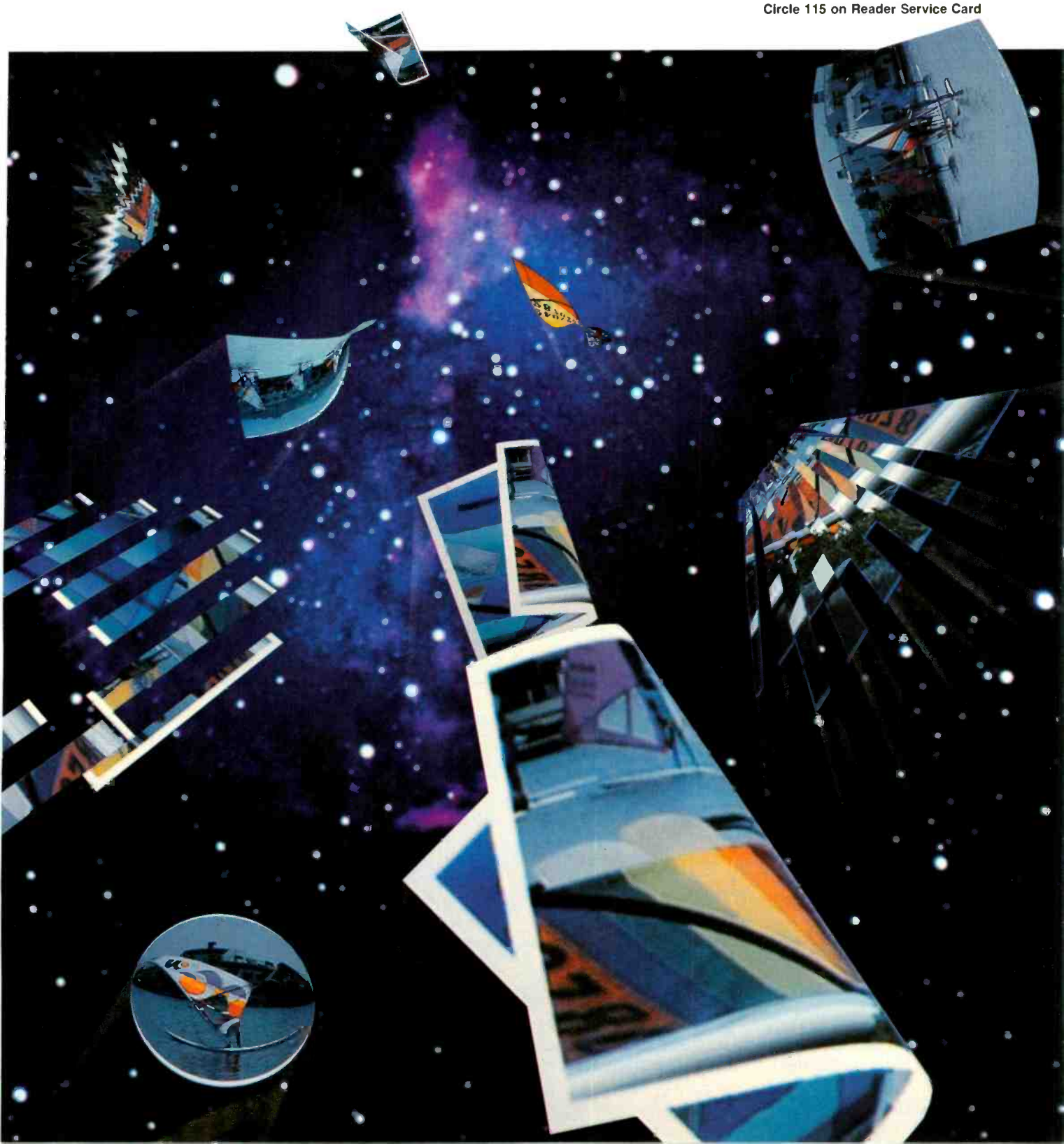
The A53-D comes in composite or component digital versions. The A53-D can be configured as a single- or dual-channel system with up to four control panels. The dual-channel version with WARP gives you live page-turn with a different picture on each side.

Throttle on up to WARP speed. And leave the competition in your wake. For details, contact Abekas Video Systems, Inc., 101 Galveston Drive, Redwood City, CA 94063 (415) 369-5111.

Move on up to WARP speed

Abekas
Video Systems Inc.
Now Anything is Possible.

Circle 115 on Reader Service Card



FCC FM field strength charts, 73.333. They take into account all the fuzzy aspects of things affecting FM propagation and give statistically qualified estimates. The F(50,50) chart, gives an estimated field strength expected to be exceeded at 50 percent of the potential receiver locations for at least 50 percent of the time at a receiving antenna height of 9 meters (about 30 feet), and the F(50,10), gives the same except for only 10 percent of the receiver locations.

Determination by the charts, however, is not the only way the FCC has for computing FM field strength. They also do it with a Fortran program called CURVES. The program is based on an earlier one called TVFMFS, which was given in an FCC Report, *Field Strength Calculations for TV and FM Broadcasting*, by Gary S. Kalagian, No. RS 76-01, January 1976.

The algorithm

For my uses, and for my kind of small computer, the FCC method is a very complex procedure. More suitable to my needs is the method devised by Ed Westenhaver and distributed, as a technical report, by Harris Broadcast Products as *Coverage Predictions Using Programmable Calculators*.

His method is to use a long power series equation to calculate an approximation to the data on the FCC field intensity charts. The formula was developed using an extension of "least squares" curve-fitting techniques for mathematical relationships between two variables. In Figure 1—FMFLD.BAS—Ed Westenhaver's 25-term power series equation is coded as two nested FOR NEXT loops (lines 400 to 455). The inner loop reads in the formula's coefficients, coded as data statements (lines 500 to 550), and the outer one sums the exponential series of

```
0    'FMFLD.BAS    COMPUTE [50:50] FM FIELD
5  RUN 20:'---BY R.F. BALONIS 8/30/86--
10 '************************************
15 '* BASED ON METHOD AND FORMULA OF  *
20 '* ED WESTENHAVER/HARRIS CORP 1979 *
25 TLE$="    ++ FM [50:50] Field Contours ++"
30 HI=100:LO=.01:'-------KILOWATTS ERP
35 '
40 CLS:PRINT TLE$:PRINT:K=4.3429
50 INPUT  "ERP IN   <KW/DBK> ";ERP$
55 IF ERP$="" THEN STOP
60  IF ERP$<>"KW" AND ERP$<>"DBK" THEN 0
65   IF ERP$="DBK" THEN HI=20:LO=-20
70    INPUT "ERP          <##>  ";ERP
75     IF ERP<LO OR ERP>HI THEN 0
80      PWR=INT(ERP*100)/100
85    INPUT "HAAT IN    <FT/M> ";HAAT$
90     IF HAAT$<>"FT" AND HAAT$<>"M" THEN 0
95    INPUT "HAAT         <###> ";HAAT
100    IF HAAT=<0 THEN 0
110   INPUT "TERRAIN ROUGH (M) ";TRUF
115    IF TRUF=0 THEN 135
120   INPUT "FM CHANNEL  <MHZ> ";FM
125    IF FM<92.1 OR FM>108 THEN 0
130 '
135   IF HAAT$<>"FT" THEN 155
140    DIST$="MI":M=1:KM=1:GOTO 175
155   IF HAAT$<>"M"  THEN 0
160    DIST$="KM":M=3.280833:KM=1.609344
170 '
175   IF ERP$="DBK" THEN ERP=EXP(ERP/K)
180    LERP=K*LOG(ERP):XHAT=LOG(HAAT*M)
185    IF TRUF=0 THEN 200
190     TRUF=1.9-.03*TRUF*(1+FM/300)
195 '
200 CLS:PRINT TLE$;PRINT
205 PRINT"ERP              :"PWR; ERP$
210 PRINT"HAAT             :"HAAT;HAAT$
215 PRINT"70DBU (3.16MV)   :";
220  DBU=70:GOSUB 400:PRINT DIST;DIST$
225 PRINT"60DBU (1.0 MV)   :";
230  DBU=60:GOSUB 400:PRINT DIST;DIST$
235 PRINT"34DBU (50  uv)   :";
240  DBU=34:GOSUB 400:PRINT DIST;DIST$;
245  INPUT "  <ENTER>";X:RUN 0
300 '
400 '--USING ED WESTENHAVER'S FORMULA--
405 '--COMPUTE DISTANCE FOR A CONTOUR--
410 RESTORE:YDBU=DBU-LERP-TRUF:Z=0
415  FOR I=0 TO 4
420   M=0:FOR J=0 TO 4
430        READ A:M=M+A*XHAT^J
440       NEXT J
445   Z=Z+M*YDBU^I
450  NEXT I
455 DIST=INT(EXP(Z)*10*KM)/10:RETURN
470 '
500 '-CONSTANTS FOR THE CONTOUR FORMULA
510 DATA  3.68,       5.3680E-1,-9.4540E-2, 6.2570E-3, 0.0
520 DATA  1.1654,    -7.2486E-1, 1.6038E-1,-1.5565E-2, 5.6445E-4
530 DATA -9.2989E-2, 5.5882E-2,-1.2486E-2, 1.2408E-3,-4.6425E-5
540 DATA  1.8513E-3,-1.1238E-3, 2.5306E-4,-2.5340E-5, 9.5651E-7
550 DATA -1.1158E-5, 6.8286E-6,-1.5485E-6, 1.5598E-7,-5.9243E-9
560 '----------END OF PROGRAM----------
```

```
    +  FM [50:50] Field Countours +

ERP IN    <KW/DBK> ? DBK
ERP          <##>  ? 4.5
HAAT IN    <FT/M>  ? FT
HAAT         <###> ? 150
TERRAIN ROUGH (M)  ? 0


    +  FM [50:50] Field Countours +

ERP                : 4.5 DBK
HAAT               : 150 FT
70DBU (3.16MV)     : 5.6 MI
60DBU (1.0 MV)     : 10.1 MI
34DBU (50  uv)     : 37.3 MI   <ENTER>?


    +  FM [50:50] Field Countours +

ERP IN    <KW/DBK> ? KW
ERP          <##>  ? 27.5
HAAT IN    <FT/M>  ? M
HAAT         <###> ? 195
TERRAIN ROUGH (M)  ? 0


    +  FM [50:50] Field Countours +

ERP                : 27..5 KW
HAAT               : 195 M
70DBU (3.16MV)     : 32.2 KM
60DBU (1.0 MV)     : 50.6 KM
34DBU (50  uv)     : 118.1 KM   <ENTER>?
```

Figure 1: FMFLD.BAS field strength program with its demo screen.

Triple Play

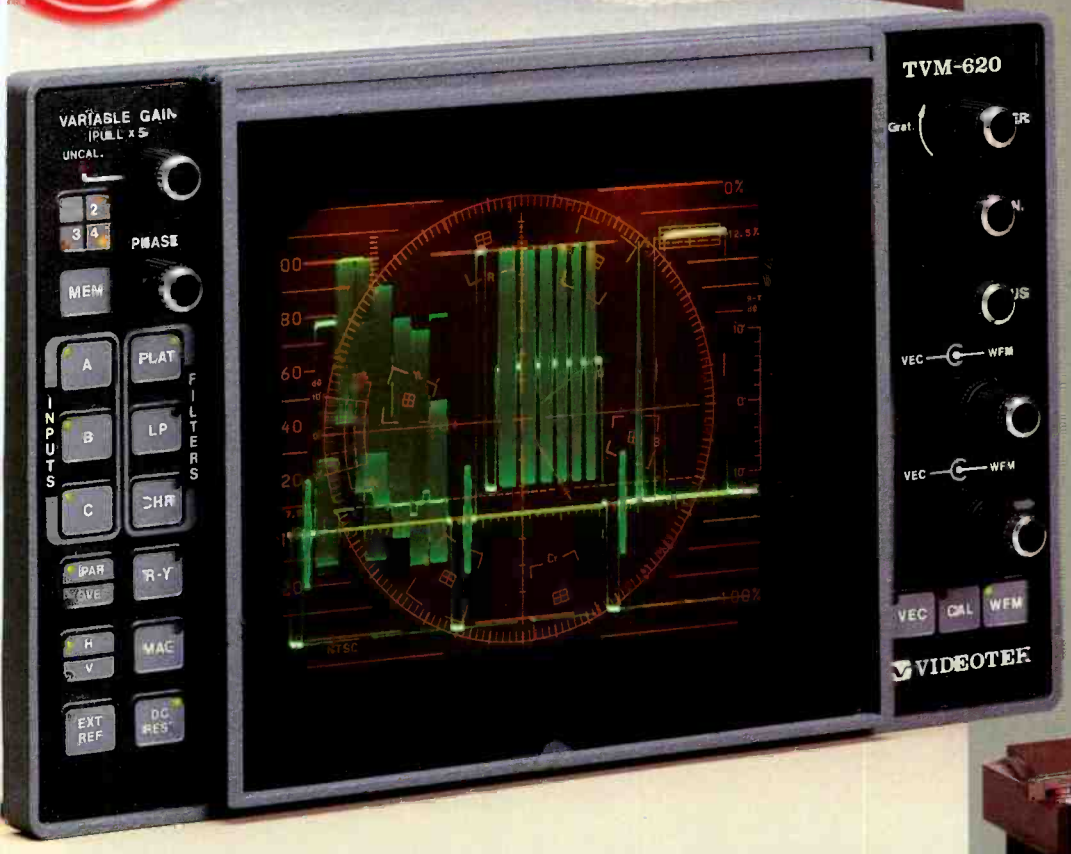
Videotek's new combo monitor gives you more inputs, more output and more memory for less money.

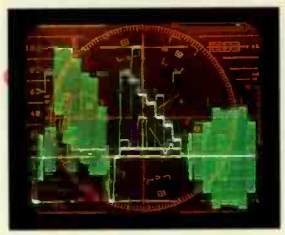
Only Videotek's TVM-620 waveform monitor/vectorscope gives you three selectable inputs for multiple viewing combinations, a roster of other winning features *and* the economy of a two-in-one unit.

Parade or overlay modes let you view any combination of up to three inputs simultaneously with one touch of our new membrane control panel. And ours is the only combo monitor that currently offers user-defined, one-button memory recall.

For those who need absolute SCH phase monitoring, our new VPH-360 can be added to provide that capability inexpensively. This unit interfaces with any vectorscope.

Engineers look to Videotek for thoughtfully-designed equipment that's built to be reliable and priced to be in your ballpark. See your Videotek dealer today about the TVM-620 plus our full line-up of test equipment.





Triple Filter Parade— 1 H each of Flat, Low Pass and Chroma Filters

Triple Vector Overlay— SMPTE Bars on A, B and C inputs delayed by 6° and 12° to demonstrate phase error

Combination Display— Simultaneous waveform and vector displays of a single input

VIDEOTEK INC.
Designed for real needs.
Priced for real budgets.

243 Shoemaker Road,
Pottstown, Pennsylvania 19464
(215) 327-2292
TWX 710-653-0125 FAX (215) 327-9295

Circle 116 on Reader Service Card

terms. The equation, coded as a subroutine, is called for each contour calculation but with different values of DBK.

Coverage Predictions Using Programmable Calculators was issued and distributed by Harris Broadcast Products a few years ago, circa 1980, and I don't know if it's still available, but I'm sure they'll do their best to help anyone wanting to see it. The report includes a similar set of constants for the TV channels 7 to 13 and an extensive analysis on the accuracies of the power series formula's calculations compared to the actual chart values. For the FM ([50:50]) chart, the formula gives a mean error of 0.5 percent with a standard deviation of 1.9 percent, which, I think, is good enough for what-if applications.

How FMFLD.BAS works

Entry data for ERP, depending on unit type (KW or DBK), is limited in Line 75 to values set either in Line 30 or 65. Selection of the HAAT units (FT/M) also determines the distance units—miles or kilometers. For details on the terrain roughness factor, see the FCC rules Section 73.313 (i) and (j) and charts 73.333, Figure 4, "Definition of the Terrain Roughness Factor," and 73.333, Figure 5, "Terrain Roughness Correction." The FM field strength charts were developed assuming a terrain roughness factor of 50 meters, representing average terrain in the U. S. So for normal, or average, propagation paths enter 0 at the program's prompt for it.

The Demo Screen shows the program sequence:

1. ENTER KW or DBK to tell it the units of ERP that you are thinking in (KW = kilowatts, DBK = decibel above one kilowatt).
2. ENTER ERP (Effective radiated power, -20 to 20 DBK or .01 to 100 KW).
3. ENTER FT or M for the HAAT units (FT = feet, M = meters).
4. ENTER HAAT (Height Above Average Terrain).
5. ENTER TERRAIN ROUGHNESS in meters.

Now wait 3 or 4 seconds for the calculated distance to the 70dbu (3.16mv), 60dbu (1.0mv), and 34dbu (50uv) contours to display. To do another calculation, just hit Enter at the last prompt.

Finally, the words of qualification: FMFLD.BAS is not intented for official FCC filings or to do away with the need for a consultant. Its sole purpose and intended use is only for "unofficial" calculations.

The program is written in what I call a "generic" PC Basic. And, to anyone needing help or having trouble with it, or wanting to know more about it, I can be reached at WILK-FM, 88 N. Franklin St., Wilkes-Barre, PA 18711; (717) 824-4666.

WE'VE MADE A TON OF IMPROVEMENTS ON THE WORLD'S MOST POPULAR SNG® VEHICLE

Over a ton, in fact. Because our new SNG® 230 has a 2100-lb. greater weight capacity. With the same height (10'), size and economy of our most popular SNG® vehicle.

And we didn't stop there. Our new cutaway feature allows easy access from the cab to the work area. There's plenty of storage space: 155 cubic feet. A GVW of 16,900 lbs. Even a generator compartment that accommodates up to 20 KW.

The newest addition to the HUBCOM fleet has been improved from the inside out. And it's destined to become an industry standard in satellite news gathering transmission.

There's lots more we could tell you about the 230. (Like its highly advanced technology and equipment.) And a lot more we could say about HUBCOM. (The fact we've got more SNG®'s on the road than anyone else, for example.)

But with a whole ton of improvements to consider, now's the time to call your HUBCOM representative. So you can start weighing the differences for yourself.

HUBCOM

HUBBARD COMMUNICATIONS, INC.

The last word in technology from the first name in the industry

A subsidiary of Hubbard Broadcasting Inc.

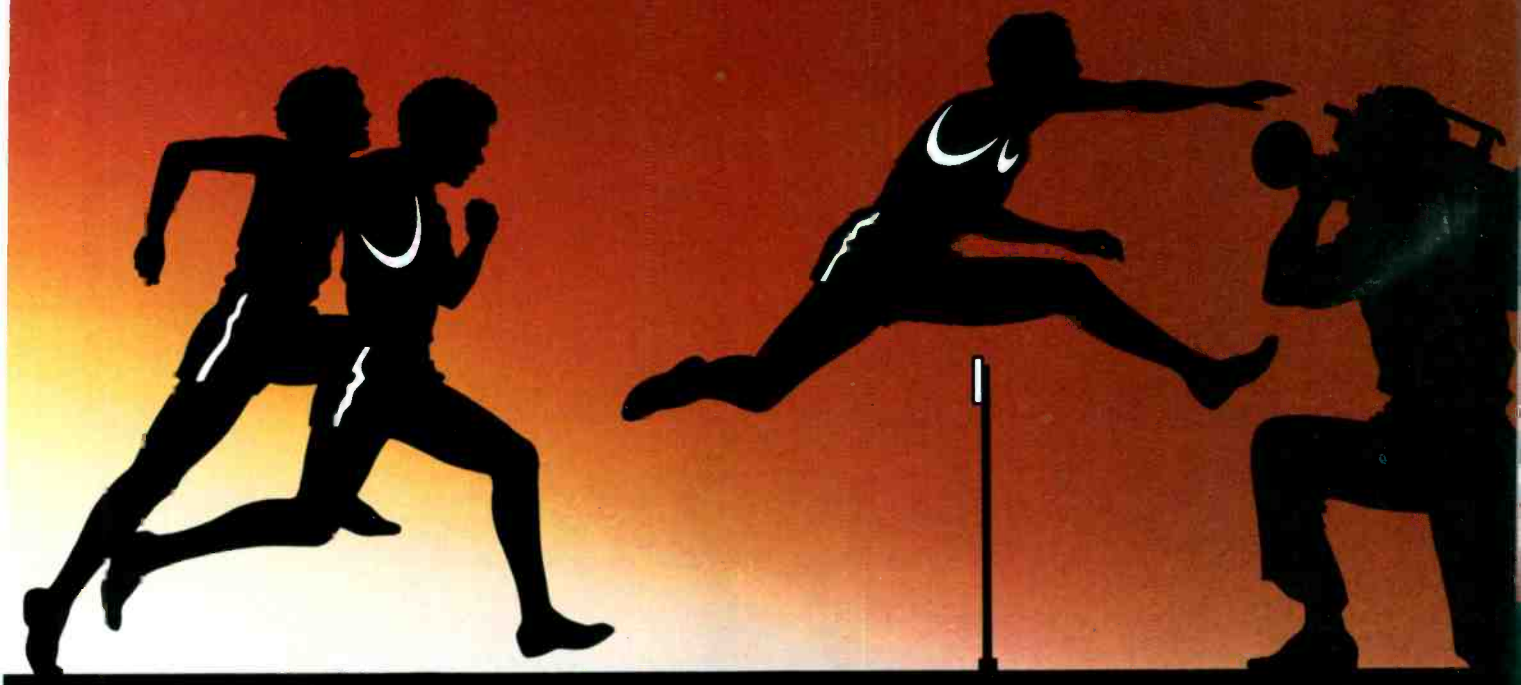
12495 34th Street North, Ste. D, St. Petersburg, FL 33716
(813) 577-7759 (outside Florida) 1-800-523-2397
Easylink 62985215 International Easylink 8108630417

Circle 118 on Reader Service Card.

One Tape for a True Picture.

When you have one chance to get a story, you can't take any chances with your tape. So the tape you take is the 3M ½" Broadcast Videocassette. With our exclusive Anti-Stat™ System–to reduce its static charge and help prevent the dust buildup that causes dropouts. To give you broadcast quality in a ½" format–the true test of a true picture.

TO THOSE WHO HAVE ONE CHANCE TO GET A STORY, ONE TAPE IS TRUE.



One Tape Stands True.

When you have one chance to get a story, we aim to be the one name you take with you. Just as we've been since we invented videotape 30 years ago.

That's why we stand by you–with the largest support force in the field.

And we stand behind you–with some of the most advanced research in the industry. All to keep our standing as–number one in the world of the pro. See your authorized 3M distributor for more information.

NUMBER ONE IN THE WORLD OF THE PRO

3M

Worldwide Sponsor
1988 Olympic Games

At eight o'clock it was just another dull day. By nine o'clock I was working on Paradise

Quantel's Digital Production Center has that effect on editors.

A unity of Harry, Paintbox and Encore, the DPC is a complete creative editing suite which totally rewrites all the rules for post production.

The DPC not only does everything a conventional suite can do, it does a whole lot more – all without the traditional bank of VTRs, edit controller or switcher. All with total, one-man control over every aspect of editing; all at the speed of creativity.

Try it. You will fall in love with the power, speed and simplicity of its operation. Its graphics and effects possibilities will blow your mind; the DPC makes possible creative ideas you could only have dreamt of in the past. And its film-style editing display, with totally random access, is as easy as sitting in the sun.

If all that sounds too good to be true, that's not all: just check out the economics. You not only have a lower entry cost into digital quality, you can also get a faster return on your initial investment.

There is far too much to tell you about in this advertisement. Just come and see the Quantel Digital Production Center; get a glimpse of Paradise.

DIGITAL PRODUCTION CENTER

Why wasn't it always done this way?

QUANTEL

Quantel Inc., 655 Washington Boulevard,
Stamford, Connecticut 06901, USA.
Tel: (203) 348-4104 Fax:(203) 356-9021

Circle 119 on Reader Service Card

BM/E's 1st Annual Excellence In Engineering Awards

This is our first official recognition, in an issue dedicated to the purpose, of excellence in engineering. We have covered the engineering efforts that have gone toward making our industry a vital and exciting entity in today's communications complex. But never before has there been, in a special forum, a detailing of the contributions of individuals in the technical and engineering management ranks. And let us not forget those groups of people and institutions devoted to the advancement of technology and systems that serve as examples to members of the broadcasting and production community.

The outstanding achievements represented here are unique in many ways. Some of the honorees were chosen because of personal contributions not just in the past, but today as well. Yves Faroudja certainly has done more to sustain the life of NTSC video than any other single person, and his efforts continue today. Much of the significant inroads being made in extended definition television have received support from Faroudja. His work has not gone unnoticed.

Perhaps of equal note, though in the audio domain, is Ray Dolby's historical contribution. His innovative approach and unique impact on audio technologies, not to mention his membership in the seminal group of videotape recorder pioneers, remain unparalleled to this day. Other engineering feats of note combine individual effort with a team, resulting in exceptional facilities. Gene Wright's leadership in conceiving, designing and moving the CNN plant into new headquarters at the CNN Center shows the engineering manager interacting with a solid team to produce truly exceptional results.

In radio, WDUV/WBRD, an AM/FM, has demonstrated how a station of that type should be designed and upgraded in order to compete in today's broadcast industry, doing it intelligently and with style. While on the west coast, KNX-AM has demonstrated great vision with its mix of computers, automation, and standard operating equipment in a plant that shows a station looking toward the future.

Let us not forget the state-of-the-art teleproduction facility, Charlex, whose technical leadership showed how to solve problems that are universal among engineering management whether they occur in a post house, production facility, or television station. At the opposite end of the financial spectrum, though identical in spirit is the small television station from Pittsburgh, WQEX-TV, that incorporated some advanced thinking into its small budget and managed to create a sophisticated plant.

Invading new turf is often the sign of pioneers, and WSYT-TV in Syracuse is the first independent to break that market, previously dominated by affiliates. It was able to do this with some unusual problem solving techniques that engineering people will find refreshing.

Perhaps one of the greatest gifts the NRSC has given the industry is its ability and willingness to make a courageous effort to improve AM broadcasting. Nevertheless, beyond this significant influence, the committee's technical pre-eminence was established by its proposal of an AM broadcast standard and its petitioning of the FCC.

And, to top off the list, the Sarnoff Research Center, now a separate entity from RCA and GE, has a history of clever solutions to difficult problems but has not rested on previous accomplishments. Its recent contribution to advanced definition television and continuing efforts in devising extraordinary methods of technical problem solving speak well for its efforts, demanding that it be recognized among the engineering leadership of our age. A salute, then, to Excellence in Engineering!

CNN Center is the Wright Place

On the floor of the expansive CNN Newsroom, the Writers' Pod shows employment of the new computer system.

Atlanta, July 13, 1987. CNN and CNN Headline News go on the air from the Omni Center in Atlanta. Except now it's called the CNN Center. Ted Turner bought it. And, like WTBS, CNN and almost every other maverick project he has undertaken, this dramatic move to a new facility attracted much attention. It attracted our attention, however, not so much because of Turner, but because of the magnitude of the engineering hurdles involved and the finesse with which these problems were approached by Gene Wright and the rest of the CNN team.

Moving from the Techwood facility outside of the city, where WTBS and the satellite antenna farm are still located, CNN accomplished complete switchover, from concept to completion, in less than one year. And in the meantime Gene Wright, vice president of engineering for Turner Broadcasting, and his staff managed to embrace much of the new technology available today. Complete conversion to half-inch Betacam became the standard; upgrade and expansion of a Basys newsroom computer system including 280 devices became the center of the operation; and modular layout physically separating, yet maintaining relationships of the satellite, assignment, script, and air functions was achieved. In one plant sector after another, unique implementations of hardware, software, and systems design were employed.

The largest newsroom in the world, the CNN Center now coordinates the activities of nine domestic bureaus, 12 foreign bureaus, and hundreds of other news sources throughout the world. Dedicated computer graphics suites adjacent to the newsgathering desks and the studio incorporate Aurora and Abekas systems at the core of the creative plant. Occupying several floors of the 1.3 million square foot shopping and office complex, the new CNN Center is the heart of the 24-hour news operations for CNN, Headline News, and CNN Radio, which now has over 150 affiliates.. Next door to the center, later this year, will be the site of the Democratic National Convention.

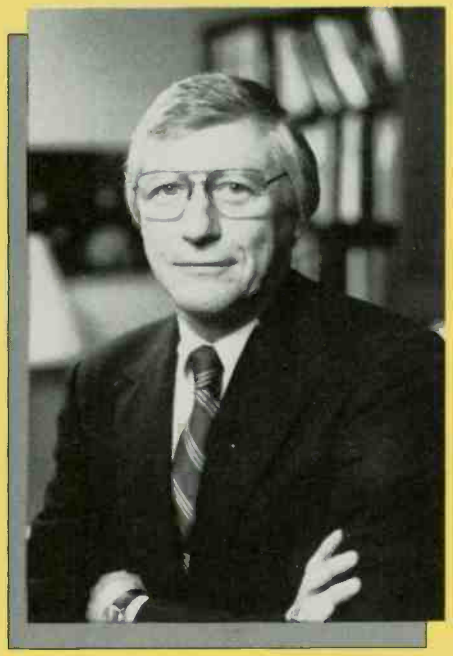
More than 12 million dollars was spent on new equipment for the expanded facility. Yet, it would be foolish to think that Wright and TBS are solving a problem simply by throwing money at it. At the heart of the innovations are not necessarily the glittering new jewels of equipment but the system concept and planning for the future that warrant attention. Besides, it is estimated that, while producing 24 hours worth of news, CNN spends less than half the money spent by any of the other networks, which produce far less programming. No, it is not necessarily the accumulation of advanced hardware that makes the facility exceptional, but the embracing of new ideas and technologies that speaks to the contribution made by Wright and the CNN team.

Wright, who directed the amazingly efficient transfer without missing a beat in the programming, has been with Turner since 1972 when he joined what was then known as WTCG as its chief engineer. Subsequently named WTBS, the station saw him rise to director of engineering in 1979 and become a major force behind the facilities development of the fledgling Cable News Network. Prior to his years at TBS, Wright spent seven years at WXIA-TV in Atlanta as an engineer. Starting out in radio, Wright saw duty as an engineer at WGST in Atlanta

Another area of the CNN Newsroom floor exhibits frantic organization of satellite feeds.

and WTOC, an AM/FM/TV combo in Savannah, GA.

Also, Wright has not always had the resources now at his disposal. In the beginning there were only two engineers at TBS, one in maintenance and one in operations. So he grew into the situation making equipment do much more than it was "supposed" to do, using innovative concepts to fill the void in the budget. Although, this time around, the budget was considerably larger, intelligent engineering solutions were no less in demand.



Gene Wright, VP Engineering; the mastermind behind the move.

One such example involved linking the studios with the lifeline to the rest of the world. Leaving the satellite facilities at the Techwood plant provided the obstacle of how to get information in from, and how to get the feed out to, the antennas. Rather than use video lines or microwave, Wright realized modern and future broadcasting required fiber optics to handle the volume, speed, and quality signal to compete. So, he installed 54 video and 54 audio channels with another 54 second audio channels available. The fiber is maintained under a standard tariff with Southern Bell and terminates at Pirelli terminals in the new TOC at Techwood.

Remote control for switching from the CNN Center was planned in as well. Due to Wright's requiring so many redundant channels, microwave was ruled out as not cost effective for the three-mile trek between facilities. So the fiber was chosen. Still, not all the exciting developments are in the switching and control. Some 200 of the previously mentioned Betacam units have been installed and, further reaching for the latest in technological offerings, CNN has mixed in CCDs with its field cameras.

As for the computers, CNN had them when they first went on the air in June of 1980. Upon moving to the new building, they bought a whole new Basys system with greater capability. The center houses three main computers tied together with an Ethernet link, communicating to 214 terminals, 280 devices, essentially doubling the former capacity. Further, all CNN bureaus have newsroom computers hooked up to Atlanta. All TBS networks are on the same database in the new facility, offering shared access among CNN, Headline News, and the European bureaus.

The new system also employs fiber optics to transmit computer information between the terminals and the main computers. It is based on the AT&T information systems network and multiplexers and can handle 36 channels on each routing. This was implemented, according to Fred Tasse, senior technical support at TBS, due to the great distance between the computers and the terminals in the newsroom.

Now, with the technical plant in place, and the news bureaus humming across the world, Wright can look out at the multimillion dollar, multimillion square foot facility and recall the days when TBS was two engineers frantically gluing things together to make them work on an almost nonexistent budget. What he now sees is perhaps the most technologically advanced news network producing the largest volume of news programming in the world. Maybe *this* is America's team.

Surprisingly Affordable.

How much would you expect to pay for a full-color, full-frame TBC that corrects timebase errors from both 1/2" and 3/4" VTRs, and produces a standard NTSC signal output from both V-lock and non-V-lock type VTRs?

What if it also offered automatic/manual field or frame freeze functions along with built-in RS-170A gen-lock sync generator—all in a compact, lightweight unit?

So why consider lesser alternatives or bargain offers that may not deliver what they promise?

FA-200 performance and reliability is backed by our two-year parts and labor warranty. Just what you expect in a TBC from FOR-A. The only surprise is the surprisingly affordable price.

FA-200
DIGITAL TIME BASE CORRECTOR
$3,950

To see a demo or place an order, call your FOR-A Dealer or FOR-A Regional Office today.

FOR-A®
INNOVATIONS IN VIDEO and AUDIO TECHNOLOGY

FOR-A CORPORATION OF AMERICA Nonantum Office Park, 320 Nevada Street, Newton, MA 02160
Boston (617) 244-3223 / Chicago (312) 250-8833 / Los Angeles (213) 402-5391

Circle 120 on Reader Service Card

Yves Faroudja's goal is an NTSC that approaches HDTV in subjective quality.

Yves Faroudja: Champion of NTSC

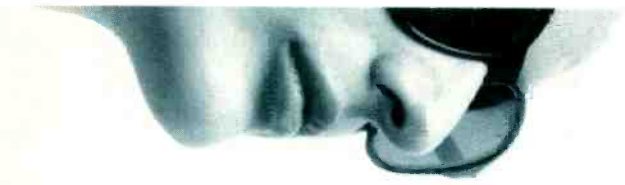
The glitz and glamor that surround the hard engineering work of advanced television make it easy to slight NTSC. Once the cutting edge of television technology, NTSC today often plays the role of the shabby stepchild, surrounded by such favored siblings as component analog video and HDTV. Its inherent artifacts and tendency to break down under processing have made it a source of frustration and the butt of jokes for generations of engineers.

Underneath its rags, however, the stepchild is ready to blossom, asserts Yves Faroudja, whose innovative decoding and encoding processes are doing much to put NTSC back on the cutting edge where it started. Faroudja's company, Faroudja Laboratories of Sunnyvale, CA, has done intensive work on getting the most out of NTSC while staying always within the signal parameters of the format.

Faroudja's work on behalf of NTSC has received wide recognition in the television industry. His honors include a David Sarnoff Gold Medal from the Society of Motion Picture and Television Engineers and a Monitor Award. He is a Fellow of the SMPTE and sits on the Advanced Television Systems Committee.

"The major motto of the company is, 'We try to do the best with NTSC,'" Faroudja states. "We try to use all the possibilities of NTSC; we are not involved in non-

Sachtler Camera Support Systems Always...



...meet or exceed your shooting demands and expand your creative abilities by giving you the smoothest, most stable and dependable operation in every shooting situation.

Sachtler's permanently sealed leak-proof fluid modules, dial-in steps of drag, and built-in dynamic counterbalancing, assure you of really smooth shots everytime and everywhere, at any speed, indoors or out, even under extreme shooting conditions.

Sachtler is unique and the best. It has extended its normal usage warranty from **1** to **3** years and guarantees its leak-proof fluid modules for **5** years. It's the best warranty in the business and comes only with the best camera support systems in the world.

Call Sachtler for a hands-on demonstration or for more information and the location of the Sachtler dealer nearest to you.

sachtler®
corporation of america

55 North Main Street
Freeport, NY 11520
Phone: (516) 867-4900

On the West coast:
3316 West Victory Blvd.
Burbank, CA 91595
Phone: (818) 845-4446

Circle 121 on Reader Service Card

NTSC schemes." Faroudja believes that with the proper handling, NTSC can produce pictures surprisingly close to HDTV in subjective quality. His confidence in the format's potential led him to announce what Faroudja Labs has dubbed "Super NTSC" (the term is trademarked by Faroudja) at the recent SMPTE Convention.

Born and educated in France, where he received a Master's degree in electrical engineering, Faroudja arrived on these shores 20 years ago and immediately started working in video. His first employers were Memorex and IVC.

About a decade ago, Faroudja began licensing various video processes he had developed to such companies as Microtime, Fortel, and Conrac. By his own estimation, he holds about 20 U.S. and foreign patents and has applications for "maybe seven or eight" on file.

Licensing (primarily in the consumer area) continues to be one of Faroudja Lab's main activities, along with manufacturing of broadcast equipment. Current licensees include Sony, Mitsubishi, Matsushita, JVC, Hitachi, Sharp, Ikegami, and a host of U.S. companies, "too many to mention."

The recently announced Super NTSC combines Faroudja's decoding and encoding technology with line doubling, which gives the illusion of a 1050-line picture on a 525-line system, and the new Faroudja detail processor, a "bandwidth expansion" device that makes picture detail more visible, creating an image that appears to have a bandwidth of 7 MHz while in reality actual bandwidth remains at 4.2 MHz.

The detail processor establishes a level of details as high as if you had a wider bandwidth, and corrects some of the errors caused by the nonadherence of NTSC to the constant luminance principle," Faroudja continues. The constant luminance principle, one of the foundations of NTSC in theory, states that luminance is independent of chroma level. In the real world, however, "it doesn't quite work like that" because of nonlinearities in matrixing and dematrixing and chrominance transition errors. "More progress should be made on that," Faroudja asserts. "If the committees could agree on a common technique, it would be very significant."

Progress also remains to be made on the line doubling concept. "It would be very good if NTSC was starting at 1050 lines and could then be processed to have a very clean 525 lines," he suggests. "We don't have the means to do that at this time, however." Faroudja's line doubling process does not add any enhancement in decoding side, but rather relies on a technique called multiplicative enhancement which is usable television receivers.

"There's still a lot to be done," Faroudja admits. "A lot of it now is a work of coordination between manufacturers of broadcast equipment and manufacturers of home equipment. There are errors of colorimetry, errors of definition of gamma. If there were some order being put in that, it would be absolutely splendid." He adds that the gray scale is very often damaged, depending on the type of receiver and camera in use. "We're working on that, too."

Faroudja's ideas for improving NTSC go back more than a decade. It was the influence of HDTV, however, that prompted him to go ahead with them.

"I had had the idea for 12 or 15 years, and had known for 12 years how to eliminate rainbow patterns and dot crawl," he recalls. "But I was busy doing noise reduction and enhancement systems, so I never built those devices. There were other things that were wrong with NTSC that required attention. But I saw HDTV about four years ago at NHK and again about two years ago. I liked the picture quality, and I thought if the same high-quality camera and VTR technology that is being used for HDTV were utilized for NTSC, and I was removing the cross color and cross luminance, it would look pretty good." He credits his "excellent engineers and assistants and very good marketing help" with aiding him in bringing his ideas to fruition.

The key, Faroudja continues, is to respect the "implied rules" of NTSC and to take advantage of the technology boosts that have been prompted by HDTV. "When you put these two things together it looks very good," he asserts. "It looks very close to high definition. It's not high definintion, it's not wide aspect ratio, but if you look at the film transfers I have done, you would never know it's NTSC."

In Faroudja's view, compatibility is an essential ingredient of any scheme to improve the quality of television.

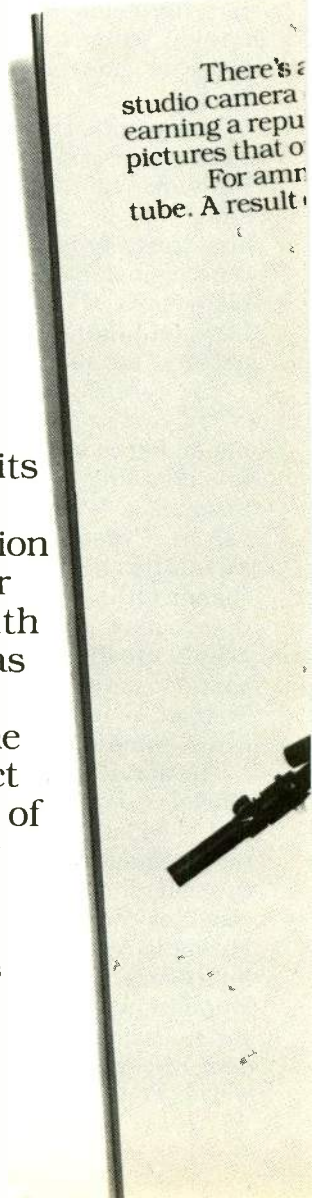
"We do not want to change the standard, we do not want to modify the existing bandwidth, we do not want the people at home to buy new television sets," he insists. "But by using the best encoder at the station you can make the best possible picture. In fact, if you use our encoder with regular home TV sets, you will see a significant difference."

The basic operating philosophy behind Faroudja's work is that "it is much better to give a little better picture to everybody than an excellent picture to a few." He notes that the NTSC aspect ratio "is one element we have not solved that we do not intend to.

"There is nothing we can do about it," he states. "This is by definition a noncompatible change... I think it's a very commendable goal to go to HDTV, but I believe any HDTV system shoud be NTSC compatible. NTSC or NTSC-derivative schemes are going to be, for another 10 years at least, the main choice in the United States, so anything we develop has to talk easily to NTSC."

That doesn't mean settling for an inferior picture, however. "Our goal is to have the picture look as if it were film," he adds. "I think that NTSC is not quite capable of doing that, but it can come pretty close."

The sho
'round th



Recently, we really stuck our necks out. We claimed that the Sony BVP-360 could outshoot anything on three legs or a pedestal.

Well, it did. And you bought it. In fact, hundreds have been bought worldwide.

Most people marvelled at its balance of sophisticated features and thoughtful ergonomics. Still more were floored by its outstanding picture quality.

Now, BVP-360 cameras are shooting in TV stations, production houses and mobile trucks from as far west as California to as far east as Kyoto. From the deep south of the U.S. to the deeper south of Australia. In Illinois, Ohio and New York as well as Britain, Italy and France. We could go on and on.

Do owners have good things to say about the BVP-360? They could go on and on too. Contact your Sony Broadcast representative for names of BVP-360 customers in your area. Or call Sony at 800-635-SONY.

SONY.

Broadcast Products

t heard
e world.

un in town. A highly automated, cutting edge
he Sony BVP-360. In shootouts, it's fast
as a giant killer. Because it makes razor-sharp
meras can't seem to beat.
n, it uses the remarkable Sony 2/3" Mixed Field
's industry-leading research in High Definition

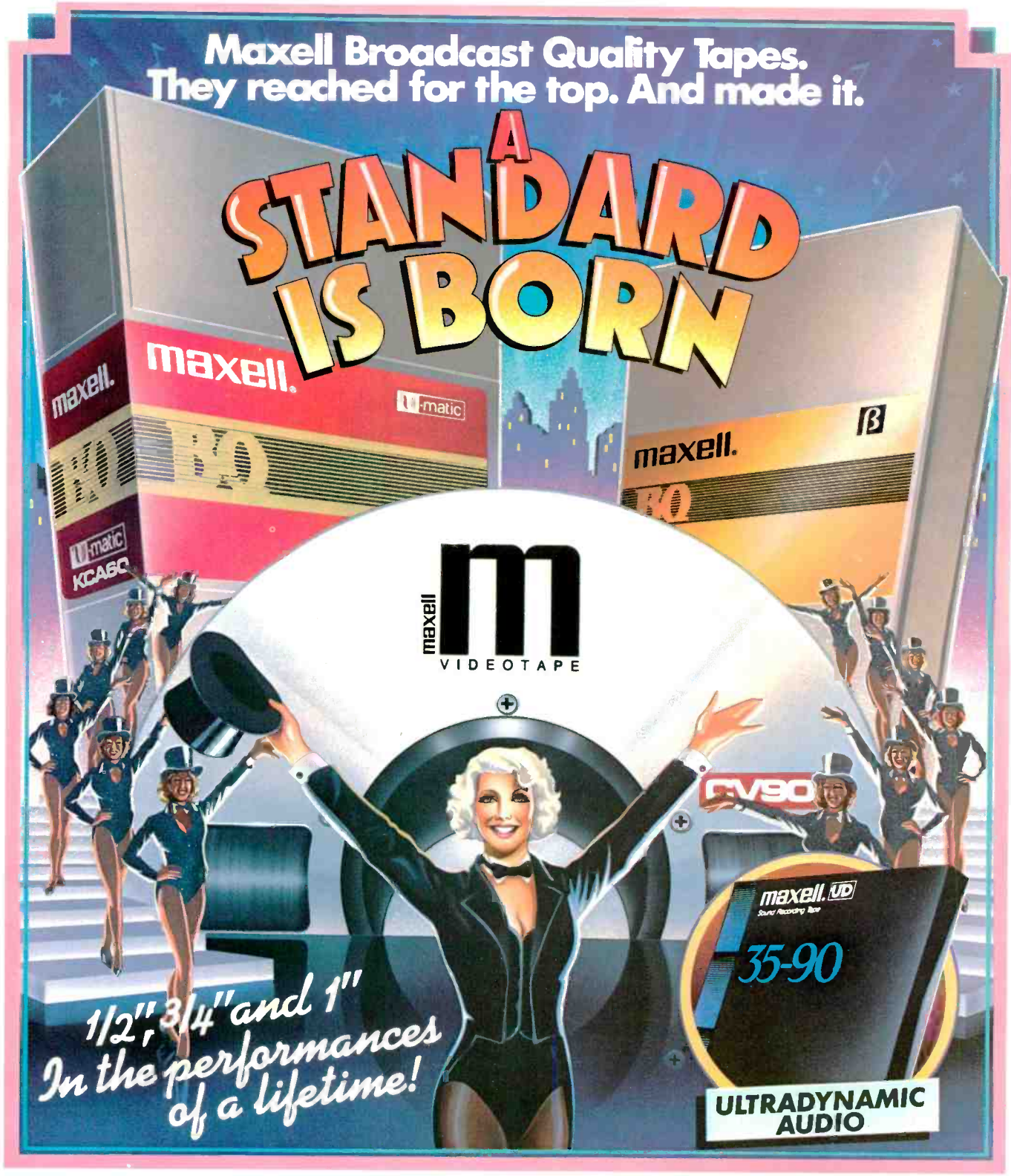
Video Systems. A tube that delivers superior resolution, registration, and signal-to-noise ratios for the best picture quality in history.

For a look at the BVP-360, or better, a thorough evaluation, or better yet, an all-out shootout, contact your Sony Broadcast representative.

THE SONY STANDARD

SONY
Broadcast Products

Bang.



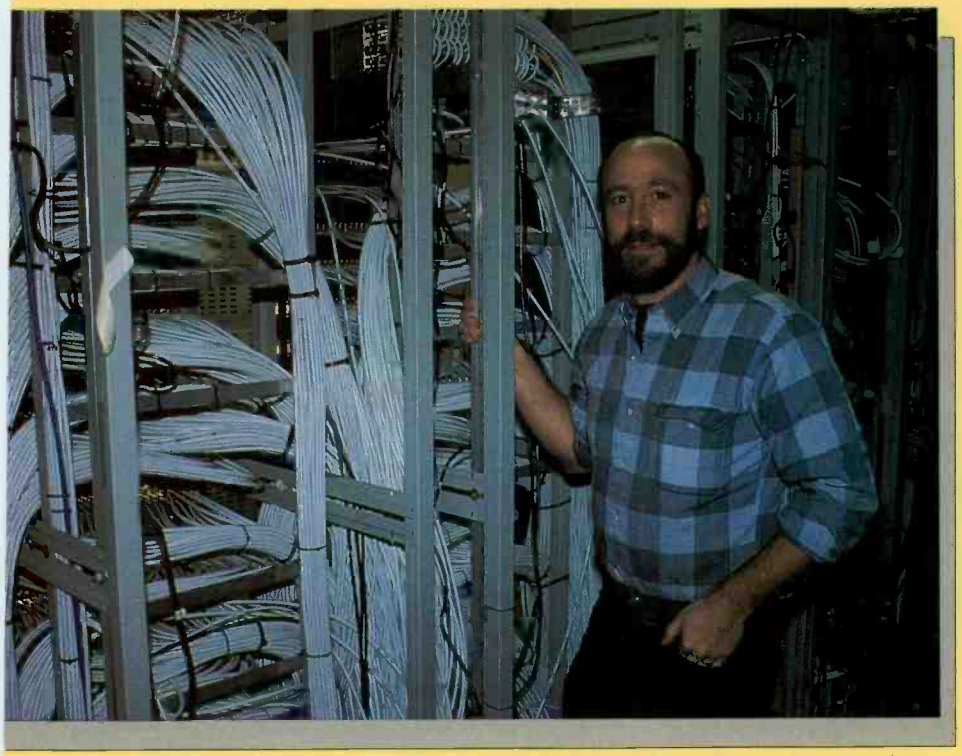
STARRING A FULL LINE OF **PROFESSIONAL AUDIO** AND **VIDEO TAPE FORMATS** TO ENTERTAIN YOUR EVERY NEED. INTRODUCING THE **NEWEST STARS** IN **TAPE TECHNOLOGY,** INCLUDING **DAT, PCM** AUDIO TAPE, **S-VHS** VIDEO TAPE, **8MM** VIDEO TAPE, AND **BETACAM** TAPES!

FOR SIZES AND FORMATS, CALL A MAXELL DISTRIBUTOR NEAR YOU.

ANOTHER MAJOR STUDIO RELEASE FROM **maxell**

PROFESSIONAL/INDUSTRIAL DIVISION

Maxell Corporation of America, 60 Oxford Drive, Moonachie, NJ 07074 201-641-8600



Charlex chief engineer Paul Mitchell stands next to the racks showing massive cable bundles. Planning for a profitable future dictated the plant be prewired for expansion.

Charlex: A Rational Solution for Chaos

As with most large post-production facilities, there are two sides to New York City's Charlex. One, seen by clients, written about in the national press, is its brilliant use of multilevel graphics and effects for TV commercial clients the likes of Coca-Cola and Crest toothpaste, and TV programs such as *Saturday Night Live*.

The other side, more or less relegated to the back room, is composed of racks and racks of electronics and machines that make all the images come into being. At Charlex one of the main activities in the back room used to be the simultaneous starting and stopping of up to a dozen one-inch VTRs at once to produce the company's famous layered look—a technique achieved now through the use of an Abekas A62.

At Charlex, however, there is yet another level besides the edit suite and the unseen machinery—burried beneath the floors of the back room. There, over 11 miles of interconnected cabling, providing the facility with both the flexibility and adaptive power that allow it to not only create award-winning pieces, but to do it profitably.

"We started out seven years ago with a few decks and a smallish patch bay," explains chief engineer Paul Mitchell. "But we just kept growing and growing. Finally, the patching system just got out of hand, and we knew we had to do something."

The problem wasn't size alone. One of Mitchell's and Charlex president Charlie Levy's design principles in setting up the facility had been to keep all its graphics equipment as flexible as possible; rather than dedicating Abekas disk recorders, special effects boxes, painting, and animation equipment to a particular editing suite (Charlex now has three), all the devices were kept outboarded.

Practically the only dedicated equipment are two Central Dynamics switchers and one Grass Valley Model 300, and the CMX editors, kept wired into their respective suites.

Everything else needs to be able to be used throughout the operation on a project-by-project basis. If a client wants all four cahnnels of ADO plus the Grass Valley Kaleidoscope, as well as Paintbox and Harry, all in the same session, it can be arranged. Or, the devices can be distributed throughout the three edit suites. The total equipment available at the facility includes four channels of ADO with combiner, Kalidoscope, an A62, three Quantel Paintboxes interfaced with two Harrys, several remotely-controlled animation stands (Warren Smith and IMC), the switchers, approximately one dozen Ampex VPR-3s, and now a brand-new Sony digital recorder.

"For a while, I was keeping all the patching configurations in my head," Mitchell recalls. "It wasn't a problem—I knew the system inside and out. The same was true if we had a problem. I would rig up something temporarily, then come back to fix it when we had a quiet moment."

Mitchell had to spend more time explaining to other people how to do things than it took to do the work himself, and yet he could only do so much. Besides, if he got sick, doing a special patch job to set up a client used to working in a certain way became extremely difficult.

"You can't imagine the general aura of chaos at a busy post-production house in the middle of New York City where three major

clients can be working at once, and no one has a moment to breathe let alone think, and dozens of people are scurrying around at the same time and you just have to be able to get a new VTR on-line and add animation stand graphics but there's never quite enough people-power," Levy explains.

"We had to do something. And when we began an upgrading of one of our edit suites, we decided to bite the bullet and completely redo our technical operation."

The solution to the apparent chaos, and Charlex's very overworked patch bay system, was a brand-new Grass Valley Group Horizon routing switcher. The switcher is currently configured in a 128 x 128 array. The first 16 x 24 crosspoints set up with three levels to carry the R,G,B components produced by much of the facility's graphics equipment, while the rest of the switcher is a single level of NTSC.

The new switching system required a complete new cabling job, and yet the whole project had to be done without taking the facility off-line for a moment. Thus, while Mitchell and staff engineers Al Cohen and Dave Colte kept the existing patch system up and running, East Coast Video was hired to install the 11 miles of new wiring. To prevent confusion, all new cable that was being installed was white, while existing plant cabling was black.

Buried beneath the computer flooring is over 11 miles of cabling.

Thus, when the job was completed, the East Coast technicians were able to simply yank out any black cable in sight.

Fortunately the job had just been completed in late May when the ad agency for Crest walked in the door to complete one of the most complex jobs Charlex has ever undertaken—new "Crest for Kids" TV campaign.

Routing video throughout the plant is only one part of Charlex's massive signal distribution plan, however. Paralleling the video, but carried through a separate wiring system, are both distributed TBC/processing functions and machine control commands (there is one system for distributing GPIB pulses for triggering older types of equipment, while another handles controls for RS-422 machines including both ports on the VPR-3s).

The net result is that once machines are delegated to a particular suite through a simple patch in the control room, virtually all functions required by the editor can be remotely controlled.

Ampex one-inch tape machines line the walls of the Charlex Machine room. A new Sony digital recorder is also now in place.

"We think there will be a totally integrated CCIR 601 edit suite in five to six years," Mitchell says. "But we're also looking at the possibility of being able to convert some of our VPRs to D-2 machines when they become available."

Also being examined "very closely" is the possible addition of a 3D modeling and animation system.

As for the router, "It should last us through at least one more edit suite and the addition of a film-to-tape transfer room," Levy explains. "Beyond that we don't know. Some of it depends on the manufacturers. As we get more and more digital equipment, we're going to have to start looking at routing all over again. My biggest wish is that someone would come up with a single routing switcher and control panel that would handle R,G,B and digital 601 at the same time. That would be a real blessing."

DATATEK

A BLEND OF PRIDE, CRAFTSMANSHIP AND TECHNOLOGY

Datatek's D-4325 Video/Stereo Audio Switcher Features:

- Program line quality video and audio performance
- Two Video and two full performance audio outputs per channel
- HDTV (30 MHz) compatible; high audio output level capability
- Video cable equalizing and vertical interval video switching
- Only two rack units utilize optimum space
- Local or remote control panels provide unsurpassed flexibility—remote control over coax line
- RS-232/422 control standard
- Wire per crosspoint and binary parallel port control available
- All control arrangements are fully operable in parallel
- Expansion provisions are included

25 x 1
Video/Stereo Audio Switcher

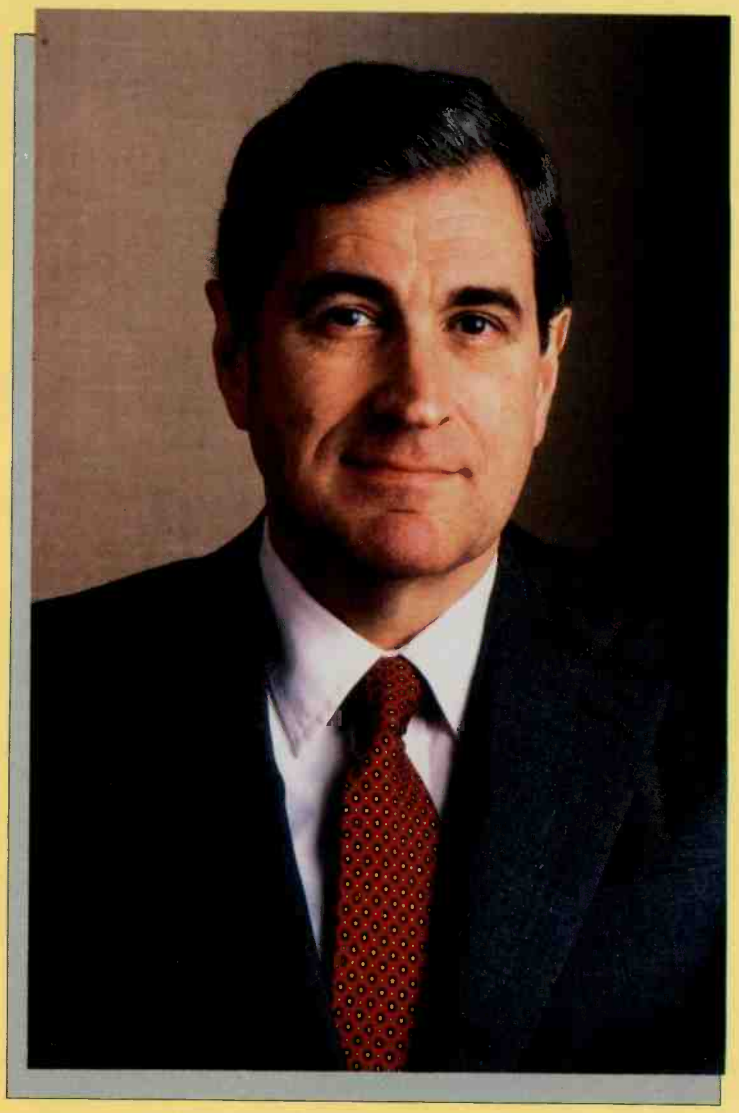
For a descriptive brochure and further information call or write:

DATATEK CORP

1121 Bristol Road, Mountainside, NJ 07092 • 1-800-882-9100 • 201-654-8100 • FAX 201-232-6381 • TELEX 833-541

Circle 122 on Reader Service Card

Ray Dolby: Engineer in the Stratosphere



Ray Dolby, engineer, inventor, entrepreneur, doctor of physics, founder of Dolby Laboratories.

Everybody on earth knows who Ray Dolby is. That is, everybody who has ever used an audio or videotape recorder. Or listened to almost any classical or pop recording in the last 20 years. Or listened to FM radio. Or watched a movie in the last 12 years.

The proof: more than 6.5 million VHS video cassette machines have been manufactured with Dolby B-type noise reduction; more than 6 million headphone portable cassette players with Dolby have been manufactured; more than 160 licensees in 20 countries have produced hundreds of millions of consumer products incorporating Dolby B, with more than 20 million being produced annually.

More important: there are close to 100 thousand tracks of Dolby A noise reduction in use in the professional segment; close to 5000 channels of Dolby SR (Spectral Recording) have already been ordered; Dolby has developed a new digital processing technique incorporating adaptive delta modulation for satellite broadcasting.

These achievements are exemplary. Ray Dolby has the ability to persevere. Not only to continue (he has been involved in significant industry developments since his work at Ampex in 1952) to contribute and to do so at levels that, each time, appear to exceed prior accomplishments, but to contribute technologies and methods of approaching problems that open doors for others participating in the industry.

A case in point is the recent introduction of Spectral Recording. It was widely accepted that digital audio recorders were easing analog machines quietly out the back door. Of course, there were many quality analog machines still on the market, but even the venerable champions of quality analog recording, Studer and Otari, recently introduced digital recorders. The die apparently was cast. Ray Dolby comes along with Spectral Recording and flips the general consensus on its ear. Though he is too modest to make the claim, he essentially rescued multitrack analog recording in the professional environment from an early death. With SR there can no longer be a legitimate claim for digital superiority. At least for a while.

True enough, he had a talented staff of engineers to implement the technology and a qualified corporate structure that allowed the product to be brought to market. But it was his design. His vision. His energy that brought, once again, a quiet revolution to the professional audio industry. This achievement, as already noted, is only part of a long list of innovations the man has provided.

As a perspicacious youth of 18, Dolby was, along with Charlie Ginsburg, responsible for laying the groundwork for the first successful videotape recorder at Ampex. In the well-documented story he returned from a short

stint in the Army and rejoined the team that, in April 1956, introduced the machine to the world. By 1957 it was being prepared for production while Dolby was preparing to finish at Stanford University and go to Cambridge, England, where he ultimately received his PhD in Physics.

After finishing his degree, in 1961, with a thesis on the characteristic properties of x-ray microscopy in the 10 to 100 Angstrom range, Dolby consulted for the United Kingdom Atomic Energy Authority and, from 1963-65 was a member of a United Nations advisory team to India on scientific instruments. "Though it was a wonderful experience, I found India to be somewhat frustrating since they did not have the infrastructure to support technical development and the bureaucracy was difficult," Dolby relates. Upon returning to England in 1965 he established Dolby Laboratories.

San Francisco headquarters of Dolby Labs is based in a renovated 1910 brick building.

The official formation of Dolby Laboratories, which was originally intended to be a wide-ranging physical research facility, but which turned out to be an advanced audio technology development laboratory, was marked in May 1965. He then proceeded to investigate products based on his research as a student into the inadequacies of tape-based recording systems.

In 1966, 10 years after the introduction of the Ampex videotape machine, Dolby Laboratories introduced its A-type noise reduction process for professional recording. Decca Records in London received the first nine units of the A301 in April of that year, and in May the first commercial recording session employing the technology took place. It was Vladimir Ashkenazy playing Mozart piano concertos. Just two years later, in 1968, B-type noise reduction for consumer tape decks debuted.

One should not labor under the misapprehension that Ray Dolby was involved strictly in tape-based technologies. The stereo optical soundtrack for 35 mm film was introduced in 1975, and in 1976 the company moved its headquarters, R&D, and licensing activities to San Francisco. This is not a point to pass over lightly. Fully 20 years after his contribution to the invention of the videotape recorder, and 10 years after launching his audio tape noise reduction system, Dolby moved his operation to the United States to further expand its capabilities. Not the sign of someone resting on one's laurels.

And now, an additional 10 years after the move, there are new surround sound techniques for film, spectral recording is becoming commonplace in the high-end audio recording world, and Soundlink has been introduced. This new use of advanced technology moves Dolby into the digital domain in processing satellite transmitted audio channels.

Dolby's London offices house international sales and manufacturing.

Spectral recording, as it begins to work into the professional fabric of audio production, will widen its influence. The effect of Soundlink on the satellite segment is yet to be determined, but its enhancement of the previously available system for audio channel processing is obviously an improvement. Only the commerical viability remains a question. If it goes the way of the rest of Ray Dolby's projects, you might as well mark it up right now as a success.

If it does prove to be a success, Dolby's influence will have gone beyond the borders of this earth. So, even people not living on this earth, those soon to be inhabiting manned space centers, will also know who Ray Dolby is.

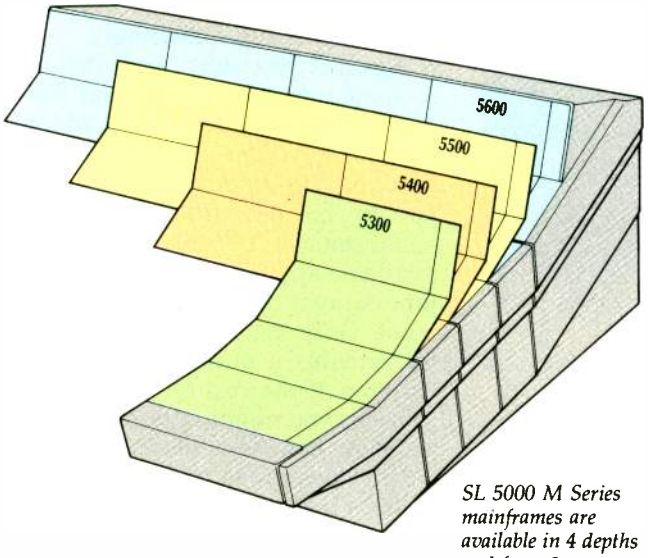
The SL 5000 M Series

The World's Most Advanced Stereo Broadcast Consoles

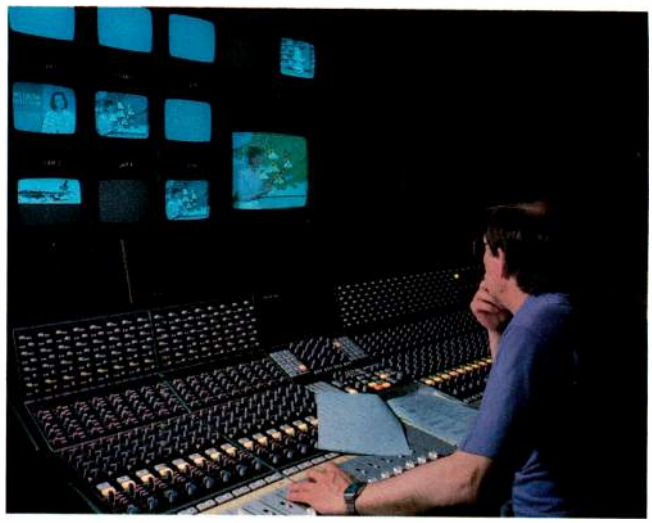
The SL 5000 M Series is designed to meet the demands of today's broadcasters – offering a new level of operational and creative flexibility in a practical format.

Built from a wide range of audio and control cassettes housed in a variety of mainframe sizes, the SL 5000 M Series offers all the advantages of customised functions and layouts, even for the smallest consoles. Larger organisations will also benefit from common operating procedures, parts stock and maintenance routines.

The SL 5000 M Series is designed for a wide diversity of applications – live radio, continuity, outside broadcasts, film and video post. It will satisfy your requirements for many years to come.



SL 5000 M Series mainframes are available in 4 depths and from 8 to 72 channels wide, allowing consoles of almost any size and capacity.



HTV – Bristol △

Film Australia – New South Wales ▽

Whether you are looking for an eight input on-air console, or a 72 input multitrack desk, call us now and join the growing number of broadcasters equipped for the 1990s.

Solid State Logic

Oxford • Paris • Milan • New York • Los Angeles

Begbroke, Oxford, England OX5 1RU • (08675) 4353
1 rue Michael Faraday, 78180 Montigny le Bretonneaux, France • (1) 34 60 46 66
Via Cesare Cantu' 1, 20092 Cinisello Balsamo, Milan • (2) 612 62 81
320 West 46th Street, New York, NY 10036 • (212) 315-1111
6255 Sunset Boulevard • Los Angeles, California 90028 • (213) 463-4444

WBRD-AM WDUV-FM Florida Stations Shine with Engineering Concept

Director of engineering Robert J. Lankton inside the facility's master control studio.

While some broadcast operations celebrate their anniversaries with cake and candles, the Sunshine State Broadcasting Company of Sarasota, FL, marked its 30th year on the air with a technological upgrade that included relocating its AM/FM operation to a newly built, custom-designed facility. The move to the new 6500-square-foot headquarters was the first in the company's history and required nearly two years to complete.

According to Robert Lankton, director of engineering for the company's two radio stations, WBRD-AM and WDUV-FM, all planning for the new facility—from the mathematical calculations for sound room dimensions to the complex underground wiring arrangement—was handled in-house. The building itself was constructed by the Sun Contracting Company of Bradenton, FL.

"Quality workmanship and careful attention to budgetary guidelines were two major considerations on the project," Lankton notes. "We looked at a few package deals and prewired installations, but after some price checking it soon became apparent that they were totally out of the question. So we decided that if it was going to be done right, we would have to do it ourselves." He adds that since both stations continued operating out of the old studios during the transition, there was no specific timetable to meet—which allowed the technicians to carefully plot out everything in advance.

This was especially useful when it came to planning the facility's underground wiring scheme. Lankton points out that the wiring for each room was intricately laid out prior to construction. Instead of running wires through walls and behind racks, the engineering department opted to place wire troughs under the floor of each room with easy accessability provided by 12-inch square boxes and pull ropes. Each room was further designed for maximum audio routing flexibility with Bantam-type tip-ring sleeve patch panels that were especially constructed in house.

"We found it to be an extremely logical approach," he adds. "We're arranged for total flexibility with every studio routed through the engineering office. For instance, from my desk, I can send any source in any room to any other room or on the air." Furthermore, by similarly configuring all of the studios' patch systems, consoles, tape machines, turntables, and other hardware, all operations personnel are easily familiarized with the equipment and both stations are provided with maximum flexibility and redundancy.

The company selected 14-channel Auditronics 200 Series audio consoles for the master control, master production, production 1, and news production studios. Lankton explains that the console was selected for its "exacting audio specifications, and ease of operation coupled with reliability." He goes on to note that all studio cabinetry and woodwork was custom designed and configured in house to meet the stations' specific requirements and to support future equipment purchases.

The stations also rely on a heavy compliment of open-reel tape machines. WDUV-FM, which has the highest listening

share rating of any beautiful music station in the country (according to Arbitron), has used Otari ARS-1000 reproducers in its automated facility for some time. The high reliability of those decks prompted the company to use Otari recording gear exclusively. The stations are currently stocked with ten MX5050BII two-track recorders and four MkIII machines.

Lankton in the terminal gear room, which houses the station's processing equipment, STLs, and sat receivers.

Automation at WDUV is supplied by an updated Harris System 90 controller (actually a hybrid between the System 90 and 9000) and four 48-tray IGM Instacart cartridge machines. Meanwhile, ITC single-deck and triple-deck cart machines are used throughout the facility.

At the same time, a 24-channel Ramsa 8824 console was selected for the facility's multitrack production room, which also features an Otari MkIII-4 four-track and MCI JH110C two-track recorder, a full rack of Orban's "Blue Chip" processing gear, and an Eventide Harmonizer. The room is designed to be easily reconfigured to accommodate the production department's needs for multiple voice track work, music bed construction, and mixdowns. Furthermore, equipment can be easily removed for remote recording assignments or to supply audio feeds to local TV stations.

Besides such functional considerations, the facility—which went into operation on January 5, 1987—was designed with careful attention to environmental concerns, such as hurricane survivability and, especially, lightning control. (Lankton wryly notes that the stations serve the nation's lightning capital.) Thus, lightning strike prevention and surge protection were number-one priorities. The second goal was to assure proper powering and grounding to meet the stations' critical audio specifications.

To handle these requirements, a bonding system was constructed that bonded the facility's 120-foot, free-standing STL tower into twenty 20-foot copper ground rods. The system was joined by one continuous ought-guage conductor brazed at each contact point and then tied back to the facility's electrical ground system. The building is also served by a carefully planned network of star grounds, which are individually isolated and tied back to a single star point.

The heart of the electrical distribution system consists of Lightning Elimination Associates' surge elimination, an Onan power generator, and an on-line uninterruptible power supply from Emerson Electric Company—all of which provide the facility with 100 percent uninterruptible power. Furthermore, Lankton notes that "the carefully coordinated segregation of distribution circuits into different load centers promotes a high level of user friendliness and expandability."

Meanwhile, all of the satellite downlinking gear, STLs, air conditioning distribution, and telco equipment is housed in the terminal equipment room. It is also equipped with fully redundant satellite receivers and demodulators required for handling SCPC and digital formats (as needed for reception of sporting events and feeds from ABC Talkradio and ABC and Mutual News).

Lankton adds: "Because we have a completely redundant transmitter site for both the AM and the FM, we house all of the associated composite STLs, audio processing, remote control, and return telemetry gear in this room as well. The unique construction of wiring troughs and rack pedestals—coupled with the extensive use of panduct and plugmold—made for an extra neat installation."

Lastly, the transmitter remote control system was custom designed in house around a TFT 7610 remote control system and an IBM PC-compatible computer. Station personnel have found that the configuration greatly simplifies operation while freeing operators from monitoring errors on metering logs.

"Our goal was to design an efficient, state-of-the-art facility," Lankton says, "one that is attractive, functional, flexible, and able to house all foreseeable ability for redundancy and growth accommodation. And that is what we feel we have accomplished."

NRSC Stands for Advancement

AM Improvement Committee meets on the issues. From left to right: Art Michael Rau, NAB; Charlie Morgan, Susquehanna Broadcasting; and Ken

A difficult entity to define, the National Radio Systems Committee is nevertheless one of the most dynamic organizations in broadcasting today. At a time when, seemingly, an entire industry had thrown up its hands at the debacle that was known as AM broadcasting, the NRSC rolled up its collective sleeve and set to work. And in what was undoubtedly record-setting time, the committee came up with a standard within a year. Though the members of the committee seem to vary, there is a core unit whose contribution to the radio industry is in no way diminished by the fluctuation.

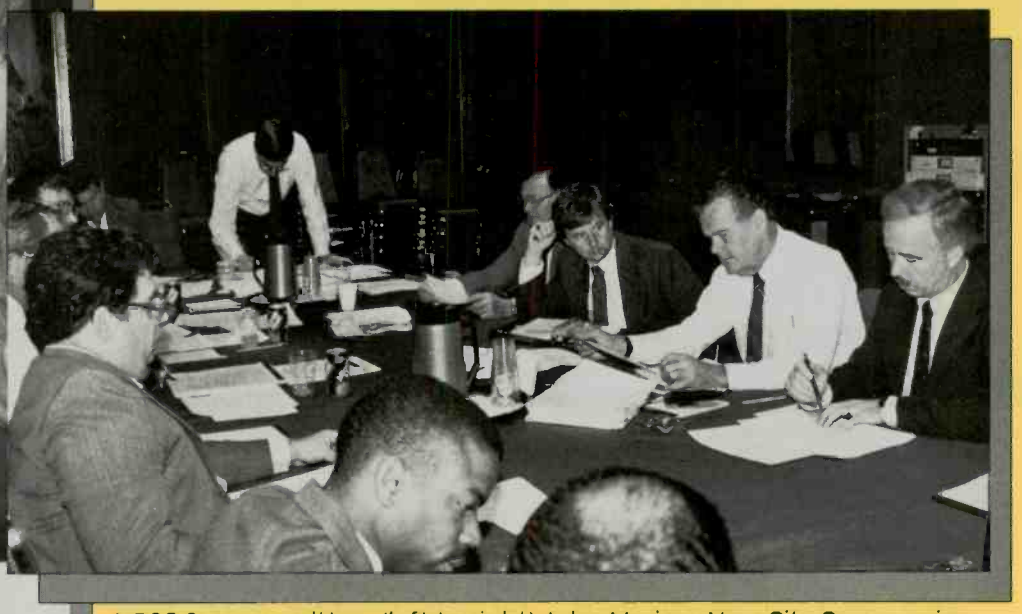
The NRSC has existed for a long time, but was reconstituted in the early 1980s to take a fresh look at AM stereo. Then, two and a half years ago, in 1985, the committee began the work of setting standards for transmission and reception of the AM stereo signal. The AM Improvement Subcommittee was formed under the aegis of the NAB Engineering Advisory Committee with "a mandate to study ways that new technology, industry efforts, and/or FCC regulation (or deregulation) can improve the technical quality of AM transmission and reception." Further stating its charter, the subcommittee's technical document relates that "The subcommittee's formation was prompted by the need to meet the technical challenges facing today's AM broadcasters."

The group was to consist of representatives from broadcast equipment manufacturers, broadcasters, and receiver manufacturers. Two divisions within the subgroup are the receiver manufacturers, represented by Bill Gilbert of Delco Electronics, and the broadcasters represented by John Marino of New City Communications. Given such a diverse mix of factions and such a weighty obligation to fulfill under its charter, the odds of success seemed dim. Yet, with characteristic clarity, the committee saw the obstacles. "We have examined some of the most vexing challenges of AM transmission and reception during our meetings and conversations with industry experts. Many of these issues are enormously complex and in some cases highly technical; often generating controversy among even the most experienced and objective engineers."

The first meeting was convened by the two sponsoring institutions, the EIA and NAB, in the persons of, respectively, Eb Tingley and Michael Rau. It was held in conjunction with the Consumer Electronics Show in 1985. At this time, it was agreed that something had to be done about the AM stereo problem quickly or it might reach the point where it would be too late to do anything.

The committee fully realized the depth of the problems surrounding the AM industry and laid a plan for correcting the situation. "In response to the current state of AM transmission and reception, the Subcommittee urges our industry to (1) commence an industry-wide AM promotion campaign; (2) establish a "Technical Reference Center" at NAB

Suberbeille, president/GM KANE-AM; Brown, Cap Cities/ABC.



NRSC Subcommittee: (left to right) John Marino, New City Communications; Michael Rau, NAB; Paul Stewart WOR; Glynn Walden, KYW News Radio; Charlie Morgan, Susquehanna Broadcasting; Chris Payne, Motorola.

to collect and disseminate available AM technical information; (3) limit the boost of transmitting audio frequencies above 12 kHz; (4) improve AM broadcast antenna performance through broadbanding; (5) undertake research of supplementary antenna designs that offer the potential to significantly attenuate skywave in chosen, specified directions; (6) undertake research of Transmitter Transient Distortion, which can cause interference with no apparent compensating benefit; (7) encourage, and consider underwriting, the development of a high-quality, useful, and inexpensive integrated circuit (chip) for use in AM radios; and (8) work to mitigate existing and potential interference from radio frequency electrical equipment."

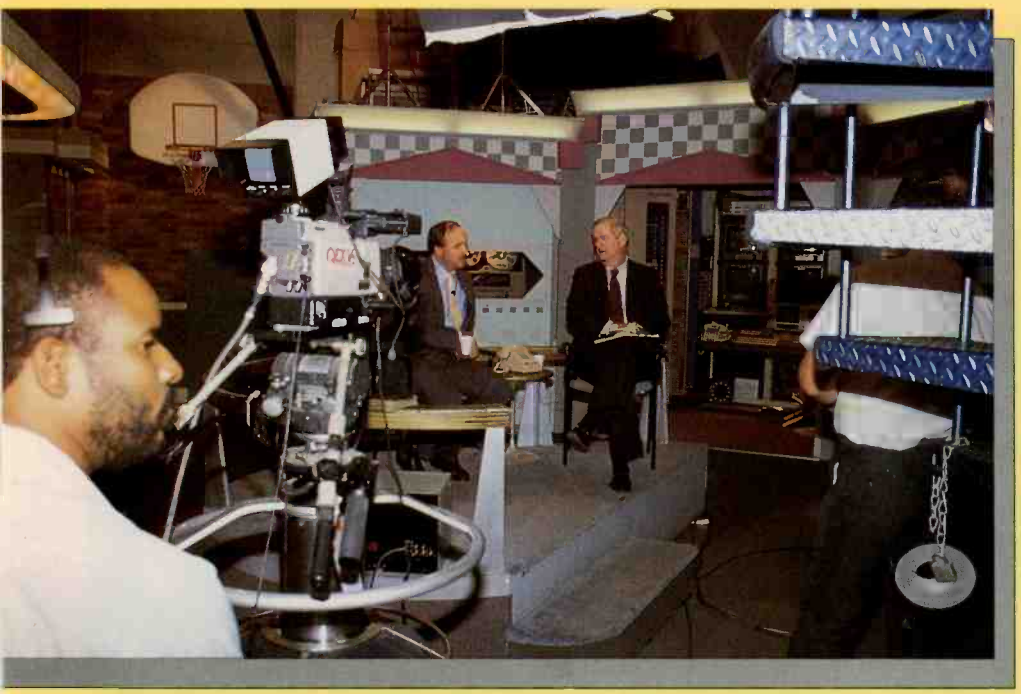
Out of the early and subsequent meetings grew the draft of parameters that successfully became the interim standard for AM stereo. By the committee's rules, if an interim standard remains in effect for one year without being altered, it automatically becomes an active, voluntary standard of the EIA. Also, the term *interim* is applied to those standards that have determined parameters and are awaiting approval by the American National Standards Institute. In this case, the standard was then petitioned to the FCC by the NAB so that it would become a mandatory standard for all AM broadcasters by 1990. "And," states NRSC Chairman Charles Morgan, with confidence, "we fully expect that the FCC will accept and enforce the standard."

It has been argued, on the other hand, that AM's woes are not fully attributable to its technical inferiority as measured against the FM band. The position states that with more image conscious, commercially-oriented music programming and less news and talk, AM would fare much better than it now does. The subcommittee also recognized this but realized that without technical improvement any programming improvement would be throwing good money after bad. Thus the evolution of the technical standard.

As presented, the standard called for use of a modified 75 microsecond AM preemphasis, while the AM receiver would use a complementary deemphasis and a 10 kHz limit on audio bandwidth prior to modulation. The bandwidth specification evolved from NRSC deliberation on the causes and cures of AM interference, and ways to technically encourage the production of higher fidelity AM recievers. It should be noted that the standard applies to AM monophonic and AM stereo L+R transmissions, and to dual bandwidth and single bandwidth AM receivers.

That accomplished, the NRSC has turned its sights on the RF Mask standard. The goal the subcommittee has set for this area is to keep nonoriginating sounds and artifacts within the proper bandpass.

Much activity in this and other aspects of AM Improvement can be expected from the NRSC as it continues to do its part in advancing the industry.



Shooting on the modular set/studio/control room and basketball court of WQEX. The spiral staircase on the right leads to the mezzanine where office and storage space is located.

WQEX: Score One for the Little Guy

In today's broadcast world the engineering plants of the best facilities are massive, multimillion dollar affairs containing huge ENG departments, multiple edit bays, endless machine rooms, and several hundred thousand dollars worth of computer graphics equipment. And let us not forget the all-digital studios that are becoming a must for stations to compete; and there are the post-production suites, 4:2:2 from top to bottom. These are the things that some contend are becoming necessary for a station to become a giant.

Well, Goliath, meet David. WQEX-TV, a new public television station in Pittsburgh has designed an automated, component Betacam facility housing a Cubicomp computer graphics system, two half-inch edit suites, the manager's office, the barcoding station, space for six staff people, and the studio island for on-camera announcers—all in a 28- by 32-foot space! Oh yes, they also found room for a basketball hoop. That's competition.

A mezzanine, reached by a spiral metal staircase, houses more staff and the videotape library. WQEX found itself in such close quarters when its big sister, WQED-TV, bought a separate transmitter and wanted to give the new station its own identity. Lloyd Kaiser, president of Metropolitan Pittsburgh Public Broadcasting, which holds the licenses for the stations, approved the plan giving WQEX its own identity as a standalone technical and operational facility, commandeering what was formerly the bigger station's Studio C for the past 16 years.

Most broadcasters are aware of the national production center status of WQED, producing such programs as *Mr. Rogers Neighborhood* and other nationally released material. Most, however are not aware of WQEX, the little guy, a "purpose-built" station with its only ambition being to achieve recognition as America's most unusual noncommercial station. And Kaiser, after buying the new transmitter, gave them a budget similar in scale to the space in which it was to fit.

Given such restrictions, the achievement of former director of engineering, Fred Majewski and station manager Kenneth Tiven is all the more noteworthy. The choice to wrap the station in an automated environment, with high levels of computerization, was dictated by the dearth both in floor space and available money. To accomplish this, Myles H. Marks was hired away from a local station because his technical and computer experience would facilitate translating the dream into a reality.

The station programs 15 hours of programming per day, 14.5 of which originates on tape, the remaining half hour consisting of a live, studio sports talk show. QEX airs no PBS programming direct from satellite, choosing instead to record everything and playback from its Betacart. All satellite feeds are recorded in the same facility, with the dubbing of one-inch tape handled by a single Sony BVH-2500. Any quad tape requires renting facilities from big sister. While non-Beta tape can be played back through the master switcher, the ease of automated operation and the desire for a single-format tape library justifies the expense of the initial dub.

From the beginning, everything was conceived with the philosophy of doing double duty. Sometimes equipment is forced to do things above and beyond the call of duty. The heart of the operation is the Sony Betacart, which plays back all the underwriter and promotional messages. Also,

WHAT HAS 5 VTR'S, 2 ROBOTS, 3 ROTARY LIBRARIES, 1,184 CASSETTES, A COMPUTER, THE ABILITY TO PLAY 15-SECOND SPOTS BACK TO BACK CONTINUOUSLY, IS AVAILABLE NOW,

AND IS SURE TO TURN THE BROADCAST INDUSTRY UPSIDE DOWN?

The staff of QEX-16 celebrates in the studio on opening night.

all programs originate from the Betacart, with its internal computer serving as the station's on-air computer.

Everything either originates or is transferred to the half-inch format and for those programs that exceed 30 minutes (the maximum length for material on Betacart) sequential tapes are needed. To ensure invisible transitions during the switch between cassettes, sufficient overlap. For example, with a 59-minute program, the first 30 minutes are recorded on the first cassette and the final 30 minutes are recorded on the second cassette. This method provides an overlap.

Subsequently, a convenient scene change can be selected to cue the "outpoint" of the expiring cassette while the identical frame is chosen as the "inpoint" on the succeeding cassette. For further convenience of selecting the same frame on both cassettes, identical time code is usually recorded on both cassettes. The Sony system has allowed the station to switch cassettes on the exact frame it was programmed for with as little as a three-second pre-roll.

The station's database is configured with the Lotus Symphony software package, simultaneously generating the daily videotape recording schedule, the Betacam cassette labels, the daily program schedule/log, the daily list of cassettes to be erased, and the playlist for the Betacart. All data regarding each program or announcement is stored within the database. Further automation is provided with the system capability of automatically purging all corresponding records from the database after each daily "erase list" has been printed.

Extending the "double duty" philosophy further, the station has a main editing area with a Grass Valley 100 switcher, Ramsa audio console, and Sony BVW-10 player and BVW-40 recorder interfaced to a BVE-800 editor, all of which doubles as the on-air control room. The spare side-load player for the Betacart is used as a player for a second machine-to-machine edit station and doubles as the slo-mo/freeze-frame device.

Moreover, thanks to an RS-422 patch panel designed by Marks, he is able to configure the two editing stations as either separate and independent two-machine operations or, with a patch swap, the BVE-800 editor can control any one of the second edit room's machines for a three-machine edit station. This is truly an example of the innovation and vision provided by the station designers since, with such seemingly limited facilities, the station is capable of complete interformat editing among one-inch, U-matic, and Betacam tape. All this while the BVH-2500 allows direct interface with the Cubicomp PictureMaker for frame-by-frame animation sequences without any prerolling while assembling animation sequences.

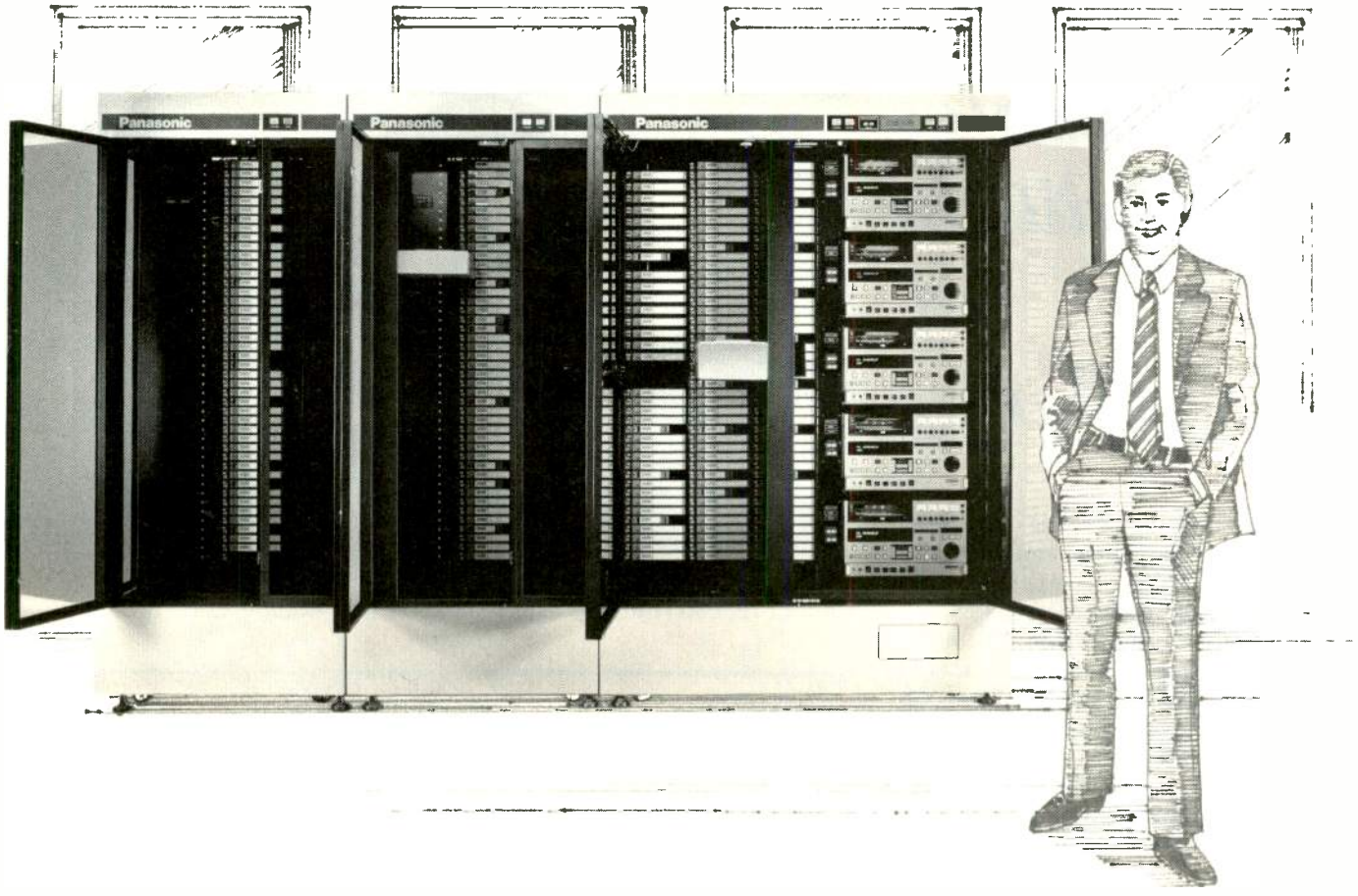
Nor does the equipment workload stop there. Even the station's time base corrector wears two hats. Instead of using a telecine/slide chain for lower-third IDs or program bumpers, QEX installed a Sony Pro-Mavica still-store device using 3.5-inch floppies as the storage medium. Up to fifty individual television pictures can be stored on a single microfloppy, and the unit shares the TBC with a Sony U-matic SP recorder. A custom-installed switch, replacing the bypass switch, allows for operator selection of inputs. Finally, the Chyron VP-1 video printer serves multiple functions too. It operates, of course, as a standard character generator and, in addition, acts as the video display of a database printout for classified listings.

It is only fitting that the programming at QEX is as unique as the rest of the station. As the second PBS station in the Pittsburgh ADI, they have the luxury of experimenting with station breaks, replacing spot announcements with a human VJ (video jock). The studio uses to great effect every 1300 square foot in its possession to house a VJ island, two cameras, two edit suites, a master control room, a computerized graphics/compose room, 11 workstations, an office/conference room, and sufficient storage space for thousands of video cassettes.

WQEX, armed only with a bag of stones and a slingshot, has walked into the fray and aimed directly at the brain of the giant facilities and the thinkers who say you have to be big to be best. Sometimes, being smart is better than being big.

ANSWER:

THE MII M.A.R.C. SYSTEM CART MACHINE.



It's probably the most technologically advanced cart machine ever created. So advanced, we doubt the competition will have anything like it for a long while to come.

But the really impressive thing is: **it's available now.**

So give us a call if you'd like a demonstration, or to be put on our priority delivery program.

Remember, if you're looking for high broadcast quality, overall cost reductions and the finest support programs in the industry, look into MII from Panasonic.

The broadcast system that makes business sense.

MII Panasonic
Broadcast Systems Company

For more information, call 1-201-348-7671.

Circle 125 on Reader Service Card

Sarnoff Research Continues Tradition of Excellence

SRC's Princeton, NJ, facility houses some of the country's most advanced research in television systems and equipment.

Impressive as it is on its own merits, the development of a practical, compatible extended-definition television system is only the latest in a decades-long series of achievements for the David Sarnoff Research Center. Since its founding in 1942 as RCA Laboratories, the center has been at the forefront of research in television signal, transmission, and reception technology.

In fact, U.S. television broadcasting is deeply indebted to Sarnoff Research Center (SRC) for its pivotal role in the development and eventual acceptance of the NTSC color broadcasting standard.

Today, the Television Research Laboratory at SRC is focusing much of its energies on ACTV, or Advanced Compatible Television, as the proposed new system is called. Publicly announced only on October 1 of last year, the project already had been underway for five years in the SRC labs, occupying 20 researchers full-time for the last two years.

The silence that until recently surrounded the ACTV research is characteristic of projects at Sarnoff—even more so now that the center has gone independent. In April 1987, SRC's then-owner, General Electric, donated the operation and its facility to SRI International, a nonprofit research center (itself formerly affiliated with Stanford University).

General Electric remains one of SRC's major clients (ACTV is a GE project), but other clients now demand SRC's time, effort, and silence. "Most of our clients want their work to be proprietary," notes Jack S. Fuhrer, director of the Television Research Laboratory.

In developing ACTV, SRC researchers faced the challenge of designing a widescreen, higher-definition signal that would be compatible with present-day NTSC receivers and transmissable over a standard 6 MHz NTSC channel. The goal also included a picture that was optimally viewable from a distance equivalent to three picture heights—in contrast to NTSC, which must be viewed from a distance of five picture heights to be acceptable. (The ultimate goal is a full HDTV-quality system that would be viewable with optimum quality from a distance of as little as one picture height.)

SRC designed ACTV to allow two-stage adoption of advanced television in the U.S. The first stage would consist of an enhanced, NTSC-compatible widescreen picture transmitted on a single 6 MHz channel, with two side panels compressed 6:1. The second stage would bring the signal up to full NTSC quality with the addition of an augmentation signal requiring 3 or 6 MHz of additional bandwidth, possibly on a noncontiguous channel. As presently described, the system would require only upgrade or replacement of existing exciters at the transmission end.

The complexity of the ACTV project is such that, even five years into its development, a working prototype has yet to be built. (Fuhrer projects that prototypes for both transmission and receiving equipment will be viewable by mid-1988.) The ACTV demonstrations SRC has so far conducted have relied upon elaborate computer simulations developed in SRC's own digital research facility. According to Fuhrer, the digital research facility combines "some purchased

computer equipment from DEC and some homemade additions to it with some very special software we wrote for the DEC equipment and our equipment. The result is that we can simulate television receivers and all the different portions of television receivers on that computer."

Original material for the ACTV demos was produced on 1125-line HDTV at 1125 Productions in New York City, and then converted to simulated 1050-line ACTV at the SRC facility. The conversion took eight hours for each second of original video.

"The crucial thing was that we could invent ACTV and make lots of mistakes and changes [because of the digital research facility]," Fuhrer explains. "Every day we could correct a nuance until we had something good enough to put in that demo. If we were making changes in hardware, it could be three months between changes."

He continues, "The computer's benefit is very quick trial-and-error learning...You can't build as many 'what-ifs' into hardware. It has taught us the kinds of things we're going to have to still try when we get to hardware. The demonstration was only 12 unique seconds of video. When we build the hardware, more things will come out when you watch 10 hours of unique video. But the changes we'll have to make will be subtle."

Fuhrer admits, "Other television research organizations have simulation capabilities akin to ours. We believe ours was the first one; we've had it for five years now. We're hoping it might still be the best, but it's no longer unique."

The ACTV signal consists of four components. The main compatible signal includes a time-expanded center panel and side panels compressed 6:1. While the side panels encroach slightly on viewable picture area, SRC's research indicates that 98 percent of viewers will not see the stripes at all.

The time-expanded high-frequency information for the two side panels will be encoded on component two of the ACTV signal. Components one and two are each 1.2 MHz bandwidth. Component three contains horizontal luma detail between 5.0 and 6.2 MHz, while component four is a vertical-temporal luma "helper" signal.

Widescreen ACTV image (left) shows greatly increased resolution and reduced artifacts over standard NTSC image (right).

ACTV draws on much previous research into advanced television systems, including a discovery by Dr. William Glenn that high-frequency information doesn't need to be sent as often as low-frequency information. Clever processing also hides characteristics that might otherwise become unacceptable artifacts. For example, the side panels contain high frequencies and extra horizontal detail that is transmitted in the chroma part of the signal, causing what Fuhrer called "gruesome color blobs all over the picture." The "blobs" are not visible, however, because opposite colors alternate 60 times per second, causing the eye to cancel them out.

ACTV still faces a number of technical and regulatory hurdles in its quest for acceptance. Not the least of these is adoption by the FCC, which has instituted an inquiry on advanced television systems. SRC has been joined in its proposal of ACTV by GE, the project's sponsor, and by NBC, which has already committed itself to adopt the system if it becomes a standard.

Implementation of the ACTV augmentation signal would also require relaxation of the UHF taboos currently in effect, which sharply limit the availability of UHF channels in any one locality due to close-channel interference. According to Dr. James E. Carnes, vice president, consumer electronics and information services, SRC, new developments in receiver technology could eliminate much of the current problem.

Another hurdle also involves receiver technology. Current HDTV receivers are not bright enough to be viewed comfortably in a lighted room. The problem is not insurmountable, but SRC officials view its solution as several years off. An affordably, acceptably bright ACTV receiver could be built much sooner, however.

While technology remains the cornerstone of SRC's work, the center's new independence has led to a certain change in outlook, Fuhrer comments.

"We're very much business- and marketing-oriented," he notes. "But until a few months ago, we never had a marketing department at all." With the new outlook has also come a broader horizon.

"It used to be that we could look forward to inventing things that would support the business of RCA," Fuhrer adds. "The world is our limit now, and that makes it much more exciting."

No Surprises In This Package.

New EASTMAN EB-950 Broadcast Video Cassettes.

You expect outstanding quality in EASTMAN Professional Video Tape Products. So it's no surprise that our new ¾-inch video cassettes are made to the same uncompromising standards.

They are also designed to match the potential of sophisticated U-matic hardware. The dropout rate is typically only 3 per minute—even under heavy use. Color is sharp and clean; audio crisp and clear.

Physical characteristics are equally impressive. The surface is smooth and flexible, yet very tough. The result is reduced modulation noise and increased editing durability.

These and other advantages make our new video cassettes outstanding for ENG and EFP applications. Standard and mini U-matic cassettes are both available.

And, as with all EASTMAN Professional Video Tape Products, they're backed by in-depth engineering support as well as a firm commitment to a dependable supply.

For more information, call 1 800 44KODAK (1 800 445-6325), Ext 850.

Kodak

Eastman
Broadcast Video Tapes

Oldest Station Uses Newest Concepts

The new on-air console at KNX-AM brings everything—including the automated news system—within arms reach for combo operation.

As the oldest continuously operating radio station in Los Angeles, KNX-AM is steeped in tradition. For more than 60 years, part of that tradition at this all-news CBS Radio O&O required broadcasters to work on one side the glass while technicians handled matters on the other side. That time-honored method of radio production came to a halt last year when changing market conditions and the economic realities of broadcasting in the 1980s led CBS to institute combo operation (i.e., on-air talent working their own boards) at all of its owned-and-operated facilities.

In order to accommodate the new policy and to facilitate a smooth transition for its staff, the station's technical operations department opted to completely renovate the on-air studio and control room. The project took approximately six months to complete with a budget that ran into the six-figure range. One of the main priorities was to install as many computer assists as possible. Hence, a new addition was a custom-designed live assist system from IGM Communications consisting of an automated controller and three 48-tray Instacart cartridge machines, which had been specified by CBS management to simplify playback of commercials, promos, and PSAs. A Moseley DRS-1A remote control unit was also ordered for transmitter control and auto logging needs.

Meanwhile, a Dynatech NewStar electronic newsroom computer system had been installed in the facility in 1985 and was extended to include a terminal in the new combo studio. The system was further enhanced by the insertion of a custom panel in the center of the Wheatstone A-500 on-air audio console (also specified by CBS for use in all of its combo operations) to hold the NewStar keyboard, providing on-air personnel with immediate random access and editing capability of news stories and updates supplied by the various news services. An Apple IIc was also added for direct communications between the news editor and the broadcasters.

The implementation of combo at KNX similarly required significant structural renovations. The station hired the services of freelance interior design consultant Jerry Braude to coordinate the construction of the equipment cabinets and to work with KNX's general manager George Nicholaw on the design of the room, while all woodworking was done by CBS carpenters on-site.

Originally built in 1937, the studio was designed with a wall that separated the on-air booth from the control room. Under the new arrangement, the wall was removed and the original control room was turned into a master control or terminal room. "The original studio is where the new audio console and table are now located," says Erik Disen, director of technical operations for CBS Radio, West Coast. "The rooms are connected, making for a very open and airy feel while lowering the resonant frequency of the room."

The interior design of the studio also called for the JBL 4301 speaker monitors to be hidden behind the ceiling. However, Disen notes that this unusual speaker placement does not inhibit high frequency response. "We removed the speaker grilles and adjusted the tweeter controls to compensate for any high frequency loss," he says. "Since we're not using the room for production work, it's not a major factor and most people

really can't hear any difference."

One of the most critical elements in the studio's renovation was the on-air console desk. Because of studio's spacial and personnel limitations, it was decided that the desk should be utilized for reader auxiliary functions in addition to its primary combo application. Thus, a shelf was designed above the console that holds the two computer terminals and five ITC Delta I cart machines in the anchor position, as well as one Delta III triple-tray cart deck on either side that permit sports persons and auxiliary broadcasters to play their own actualities without assistance from the anchor person.

An overview of the renovated on-air studio and terminal room showing the IGM live-assist system on right.

Flashback: Eric J. Disen in the then-newly renovated KNX studio in 1983

"We worked many hours designing that overbridge," says Disen. "We used mock tables and boxes in various configurations in order to achieve the most ergonomic design."

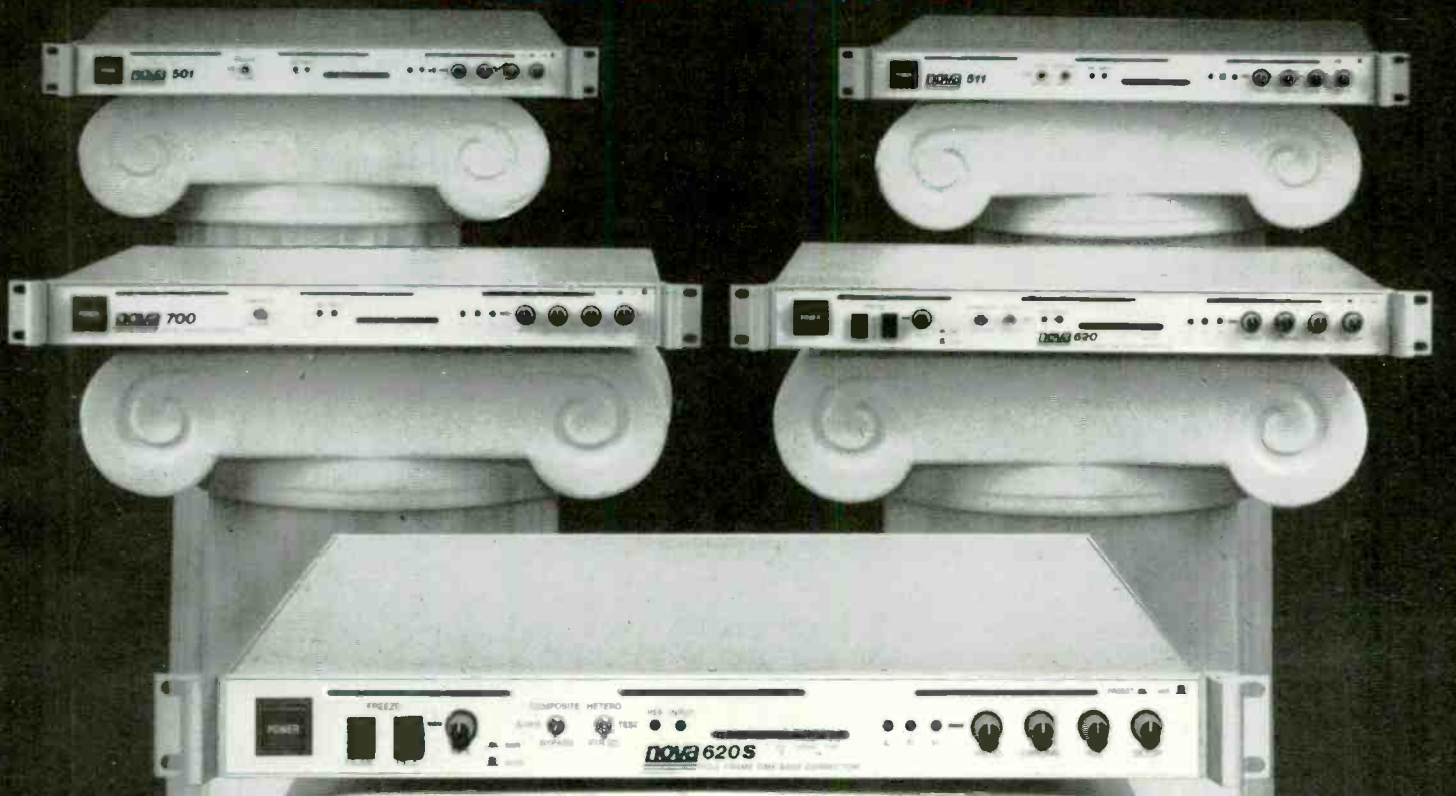
Elsewhere, a separate rack in the terminal room contains two five-tray 5500 cartridge decks from Broadcast Electronics (used primarily for playing station jingles) that can be started and stopped from the console. Other equipment found in the studio includes Gentner telephone hybrids, Crown monitor amplifiers, two Tascam 32 reel-to-reel decks for playing back an occasional taped long-form program, and UREI, Orban, and Aphex audio processing gear. However, one of the things that has remained from the "precombo" days is the station's trophy case, which displays 15 years' worth of Golden Mike awards for best news.

Disen points out that the station was the first CBS O&O to use Sennheiser HMD-414 headsets rather than standard microphones. These allow on-air personnel to move around with greater flexibility and are now found at several other CBS-owned stations. "There is a compromise insofar that the quality of the mic is not equivalent to studio models," he notes. "They require a generous amount of preprocessing in order to sound warm and clean."

All was prepared by the time the station inaugurated its combo operation on February 23, 1987. Although Disen notes that there were a few initial errors made by broadcasters as they learned to work their own boards, he points out that after the first week or so, "everyone settled down and not even the most sophisticated listener could tell that a very basic way of doing business had changed.

"Combo radio is and has been done routinely for years outside the top 10 markets," he adds. "The lessons learned there were quite valuable in planning for combo at KNX. Ultimately though, the implementation of the system at this station turned out to be a complex assignment that required unique bits of innovation. But the most important thing is that it works."

GOOD BREEDING SHOWS.



nova 620S S-VHS TBC.

NOVA's 620S TBC with S-VHS processing is the latest in a long line of high-quality time base correctors. It inherits all the fine features of the NOVA 620 . . . and it's the first TBC to interface with S-VHS VCRs. That means you maintain the quality of video, every generation. And if you own a NOVA 620, you can also exercise your "S" option, which upgrades your unit to a 620S.

From the first one-rack, low-cost TBC in 1983 to the 620S, each addition to the NOVA family clearly demonstrates our commitment to excellence. And if a problem ever develops, we stand behind our TBC family by offering quick, 24-hour turn-around service. It's a heritage we're proud of . . . and a heritage you can rely on.

Call us, or ask your professional video dealer about our fine family of TBCs, including the NOVA 501, 511, 620 and low-cost 700.

nova . . . the clear leader in TBC technology.

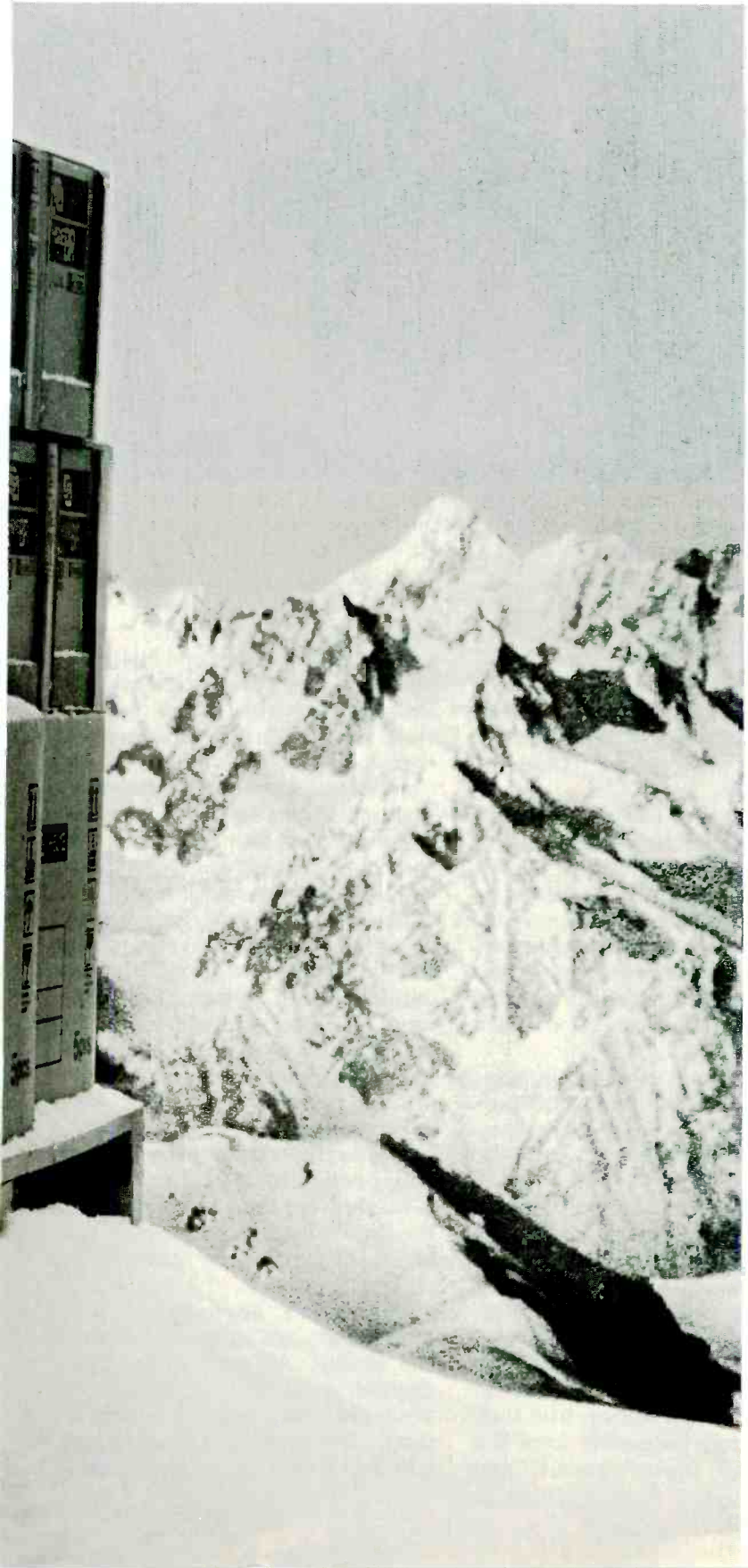
nova

SYSTEMS, INC.

50 Albany Turnpike Canton, CT 06019 (203) 693-0238

Circle 27 on Reader Service Card

ONLY ONE COMPETITOR IS ENTERED IN EVERY EVENT IN THE '88 WINTER GAMES.



When ABC-TV broadcasts the 1988 Winter Games, they'll need a videotape that's a tough competitor. That's why ABC chose Fuji H621E 1-inch videotape and H521EBR ¾-inch videocassettes.

Fuji tape is tough enough to survive extreme weather conditions. It's also reliable, pass after pass.

And with Fuji, ABC will not only get a reliable tape, they'll get a team of service professionals who will be right there when they need them.

It's the same kind of service you can expect when you select Fuji as your videotape.

Because we know that to win in this business, you've got to be on top of your game.

Northeast Region: 800-526-9030
In NJ: 201-507-2500
Southeast Region: 800-241-6005
In GA: 404-441-2222
Midwest Region: 800-323-4826
In IL: 312-569-3500
Southwest Region: 800-527-0804
In TX: 214-242-0662
Western Region: 800-241-7695
In CA: 213-636-0101

FUJI PROFESSIONAL VIDEOTAPE

Circle 128 on Reader Service Card

Breaking New Ground in Television

All programming and commercials air from WSYT's Lakart II automation system, which controls a mix of VTRs and ties in directly to the Columbine traffic computer.

It's rare that a new station gets the opportunity to break new ground in an established television market. In becoming Syracuse, NY's first independent station, and the market's first new local television signal in 25 years, WSYT-TV, Ch. 68, used that rare opportuntity to build a first-class plant.

WSYT is the second television station to be acquired by The Flatley Company, a large New England real estate developer. (Flatley's first station, WNHT in Concord, NH, was profiled in the November 1984 issue of *BM/E*.) Thomas Disinger, WSYT's station manager, was working at WNHT when he learned of the Syracuse opportunity.

"I'm a native of Syracuse," Disinger explains. "Through the broadcast grapevine, I was informed of an attempt to put Ch. 68 on the air in Syracuse that had faltered financially. I made some contacts, and within a very short time it became evident that this was a unique opportunity. Syracuse was one of the only markets in the top 100 with three affiliates and no independent."

Flatley moved quickly to acquire the station, whose physical plant at that time consisted only of a 500-foot tower and transmitter building. One of the first orders of business was to find a suitable building and construct offices and studios.

Again, WSYT found opportunity on its side. A two-story building, the former home of a computer leasing firm, was for sale on Syracuse's "Broadcast Row," James St., in between the studios of the local CBS and NBC affiliates.

The decision to buy the James Street building "was primarily based on its location," Disinger comments.

"We felt that logistically, purchasing a building close to the other stations would have a good effect," he explains. "It makes us look like one of the players instead of 'the new independent guy.' The commitment to a professional look and a quality facility was a commitment to a more hasty success."

The building, which had been housed offices, had an open "bullpen" area in the center. The open areas were transformed into the station's control rooms, studio, film storage area, and traffic area. The existing freight elevator opens directly to the studio and control rooms for easy delivery of equipment and supplies. Such attention to ergonomics and convenience is the facility's signature. Control rooms are adjacent to each other, tape storage and traffic are easily accessible from the studio and control rooms, and traffic connects directly with sales, programming, and business offices. In addition, the staff offices around the perimiter are clustered in functional groups, with public offices (administration, sales, programming, community affairs) toward the front of the building and production and promotion toward the rear, near the control rooms and studio.

The plant's infrastructure was thought out with equal care. Both studio and master control have redundant HVAC systems for maximum efficiency and reliability. In addition, all electrical circuits in the control room areas have computer-style wired grounds taken to a common point, eliminating any video hum from conventional metal conduit.

Master control has computer flooring raised six inches off the original floor for easy access to all wiring.

The WSYT engineering staff took great care in soundproofing the studio. All the walls were treated with Conwed Silent 95 acoustical wall panels, an inch-thick fabric-covered insulation, which Disinger describes as "very

attractive yet very sound absorbent." The material's noise reduction coefficient (NRC) is rated in the 0.90 to 1.0 dB range. Because the panels are available in a variety of colors, they did dual duty as a decorating aid. Three of the four studio walls were covered in mauve, with a foot-wide beige stripe about three feet from the floor. The fourth wall was covered in solid beige and can function as a background for camera shots. The studio ceilings were treated with spray acoustical insulation.

The heart of master control is a LaKart II semi-automated playback system. Commercials and 30-minute programs run off six Sony BVW-10 Betacam players, while longer programs play back on two Sony BVH-1180 one-inch machines. Two additional 1180s are available for recording satellite feeds and dubbing movies. The three-hour capacity of the

A Sony MXP-2000 console runs the audio in WSYT's production control suite.

1180s allows complete movies and features to be recorded on single reels. External sources are routed through an ADDA VW-2 synchronizer, and all video and audio sources are automatically switched by LaKart through a Grass Valley Ten-XL router.

"Virtually everything" plays from the LaKart system, Disinger asserts. "Most of the program material is shipped to us either on tape or film and then dubbed to our format if necessary," he continues. "There's also some satellite-fed programming that is taped. Then time code is applied to the tape, which activates the LaKart system."

The system's efficiency is further optimized by direct interface with the station's Columbine traffic system, which runs off an IBM System 36 computer. An automation interface downloads each day's program log from the System 36 directly into the LaKart II, eliminating the manual programming that otherwise would be needed on a daily basis.

WSYT broadcasts in full stereo, and a Shure stereo mixer controls audio levels and runs voice-over audio carts. Audio is processed through Aphex Compellor and Dominator series processors and goes out via a Broadcast Electronics stereo generator. Any material that originates in mono is processed through the Orban 275A stereo synthesizer.

The production control room has Sony Betacam editing with two BVW-10s and one BVW-40 recorder. The video sources are switched through Grass Valley a 100 switcher, and production stereo audio is run through a Sony MXP-2000 console. An NEC E-Flex provides special video effects. At present, however, the station has not invested in electronic graphics equipment.

"What we wanted to do first and foremost was put a good product on the air," Disinger states. "Then we'll explore other opportunities based on what the market needs."

The two control rooms are interconnected with a Bosch/BTS TVS/TAS 2000 routing system configured for 30x20 video. It has one video channel and two audio channels, plus a third audio channel in a 20x10 configuration. The router, which has redundant power supplies, can be reprogrammed by station personnel using a personal computer.

The studio site is connected to the Phillips Pye TVT 60 kW transmitter via a Harris Microstar STL-TSL system. Signals from two Scientific-Atlanta satel-

A Bosch/BTS TVS/TAS 2000 routing system interconnects master control (shown) with production control.

lite dishes are transmitted back to the studio along with remote telemetry.

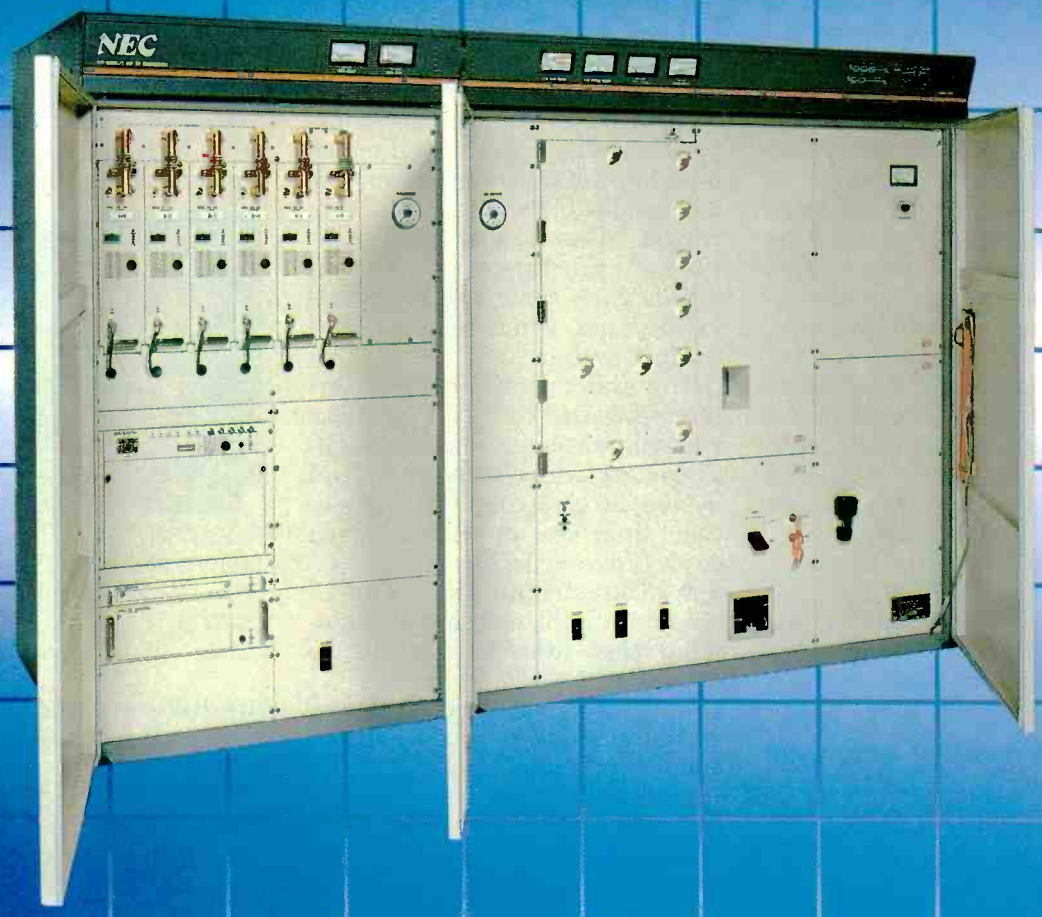
Of course, the technical facilities would be meaningless without a strong product to put on the air. WSYT scored a major coup in its first year by winning the rights to the highly popular Syracuse University basketball games, which for years had been owned by the local ABC affiliate.

"It was another signal of our commitment to becoming a real player," Disinger asserts. "It attracted a tremendous amount of media attention, and the advertiser attention has been overwhelming. It's already sold out."

WSYT's April 5, 1987 signon was without a hitch. "I've been through three other startup stations from scratch," Disinger recalls, "and I can say without hesitation that it's been the smoothest situation I've been through in 20 years of broadcasting."

He adds, "One of the nice things about putting a new station on the air is that you can go with all the latest technology. That's one of the niceties of doing it from scratch. You can do everything right."

The new standard of dependability: VHF TV transmitters from NEC.



35kW high-band and 30kW low-band models meet your needs for the next decade.

High power transmitters are a major investment. You have to work with them, maintain them, and profit from them over the years. Our PCN-1400 Series transmitters reward your investment. Because they give you over a decade's worth of daily dependability, easy maintainability and superior performance.

SINGLE-UNIT, HIGH-PERFORMANCE EXCITER.

Our hybrid IC technology slashes component count by 30%—thereby boosting reliability, making it possible to build all modules into a single unit. Design refinements include sophisticated circuits to correct linearity, and stereo capability without modification.

HIGH-POWER TRANSISTOR PA.

The solid state PA uses high-power, high-gain transistors newly developed by NEC.

The aural section is 100% solid state. There's only one tetrode in the final video amp.

The PCN-1400 Series gives you a wide choice of models from 500W to 35kW, high or low channels. And all models up to 10kW are 100% solid state.

30 YEARS EXPERIENCE, 1,600 INSTALLATIONS.

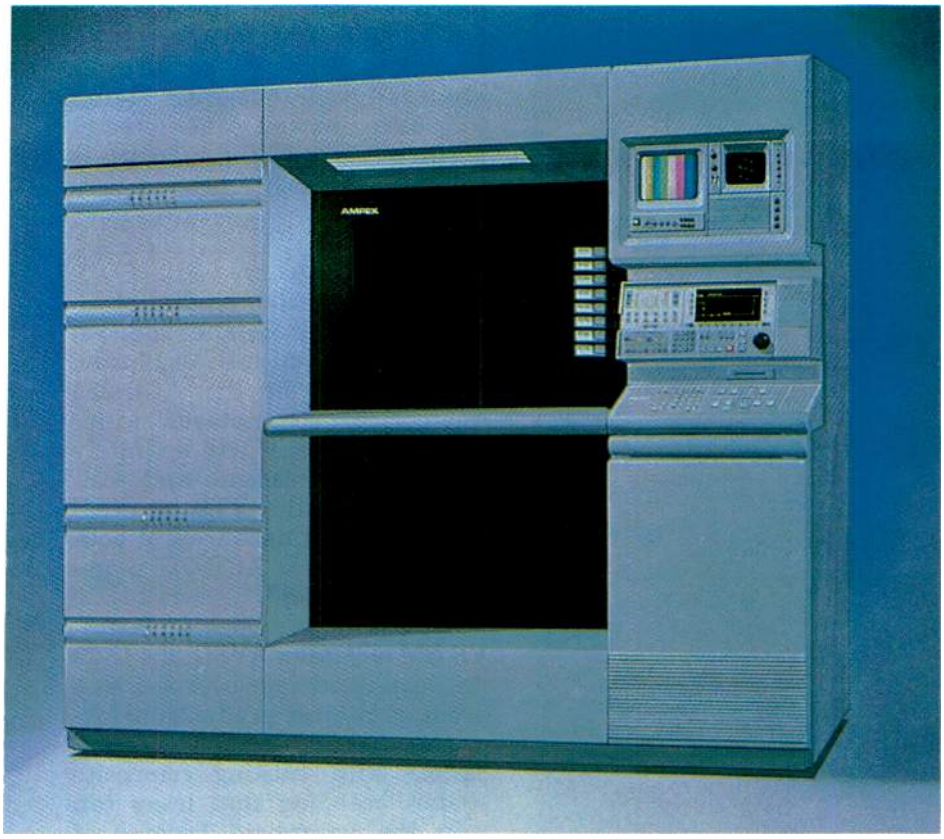
NEC has installed over 1,600 transmitters in 30 years. We back our customers with 24-hour service. So take the risk out of your next investment. Call NEC and find out about the new standard of dependability in TV transmitters.

NEC America, Inc.
Broadcast Equipment Division,
1255 Michael Drive, Wood Dale, Illinois 60191
Tel:312-860-7600.

C&C
Computers and Communications

NEC

Circle 129 on Reader Service Card



Ampex's ACR-225 presently represents the only production model of composite digital technology.

D-Day in the Format Wars

The advent of the D-2 (digital composite) VTR format raises new questions in the digital recording dilemma.

By Robert Rivlin

Many broadcast and teleproduction engineers will remember the almost mystical sense of worldwide harmony that arose following the adoption first of CCIR 601, the worldwide digital sampling frequency establishing the 13.5 MHz, 4:2:2 sampling scheme, as well as the D-1 19 mm digital component recording format standard that followed.

It seemed, for a few short months anyhow, that all of the woes of NTSC would one day disappear, to be replaced by the wonder of digital component recording with its promise of untold generations of post-production capability with no degradation in picture quality.

Sony showed prototypes of both the new digital recorder and the new cassette format in a private suite at NAB '85—not a finished product because the digital recording format had not been set yet, but close enough to be a working reality. Then, at NAB 1986, Sony began writing orders for its DTR-1000 D-1 DVTR—90 orders, in fact, primarily from post-production houses anxious to be the first on their block to take delivery of the new wonder machines.

Then the roof began falling in. First, many of the companies that had ordered digital machines or were about to take the plunge realized that you couldn't simply take a D-1 recorder and swap it with an existing Type C machine. Indeed, to record D-1's component digital signal, the entire plant had to be rewired for component rather than composite processing. Even more importantly, virtually every piece of equipment in the signal chain—from production switcher to special effects box to graphics camera to paint system to time base correctors and frame synchronizers—would have to be capable of digital component signal processing, or the benefits of digital component recording would be lost. Some began to reevaluate their position on D-1.

The second pinprick to the digital bubble came from Ampex at SMPTE 1986, when it announced that rather than developing a D-1 machine, it was pursuing development of a digital composite recording system that came to be known as D-2. Citing the huge cost of digital component recording in terms of both the digital recorder and the attendant plant modifications, it explained that, at least in limited situations such as an on-air playback system where compatibility with other systems was not a big issue, digital composite could prove to be a handy technology.

The Ampex announcement threw the industry into turmoil. Some took Ampex to task for not supporting the SMPTE-approved D-1 component standard. (A

As the current state-of-the-art machine, the Sony DVR-1000 seems to have secured a solid niche in the high-end video production business.

SMPTE working group has been formed subsequently to draft a standard for the D-2 format.) Ampex rejoindered by claiming it wasn't withdrawing its support from D-1, merely advancing on yet another new front. For others, the Ampex move threw already-thought-out plans for converting to digital into confusion. Would composite or component mark the future course for recording? Would there be more than one supplier of digital component and digital composite? Were Ampex's claims about the cost benefits of digital composite really justified, and what would be the real sacrifice in terms of image quality?

Sony joined the fight prior to 1987 NAB with the announcement that it would join Ampex in the development of digital composite recording, and would license Ampex's technology.

Now, at the most recent SMPTE, digital recording has been dealt yet another blow by the revelation that Ampex views D-2 as not only a format for limited applications such as an on-air playback system, but also as a production/post-production recording format. Ampex's suggestion is that although D-1 may find limited applications in some post-production applications requiring extensive multigeneration processing and effects, it is putting its efforts into what it considers will become the general-purpose digital machine of the future, D-2.

D-1 or D-2? The choice is leaving the industry with some profound, unanswered questions about the future of digital recording. And the dilemma is more widespread than the quality versus cost question being faced by TV stations and production/post-production facilities. As one manufacturer confided, "We were planning to come out at NAB this year with a component digital special effects/processing system, to be integrated with the other pieces of CCIR 601 gear that are beginning to show up on the market. Now we're not so sure we shouldn't come out with digital composite instead. The forecast about which way the industry is going has suddenly become very unsettled."

Lower costs

Ampex's position on digital recording is quite clear. In addition to whatever future expansion plans it has for the ACR-225 commerical spot player introduced last year, it will definitely show a D-2 broadcast and post-production studio VTR at NAB this year, with deliveries of both that VTR and the ACR-225 promised for late 1988.

According to Donald Bogue, VP/GM of Ampex AVSD, the D-2's principal advantage over D-1 as a production/post-production format is that it is completely compatible with existing composite studios, meaning that users can gain the immediate benefits of degredation-free multigeneration copying and processing (to at least 20 generations) without additional plant rewiring or equipment purchases. The Ampex machine will also come with four high-quality digital audio channels. Operational features are the same or better than Type C, and the format has the advantage of easy-handling tape cassettes in 32-, 94-, and 108-minute lengths.

Noting that the VTR will be priced competitively with current Type C machines that incorporate TBCs (the VPR-3 rather than the VPR-80), Ampex thus believes that the new digital recorder will eventually replace Type C in almost all of its current applications over the next 10 years (although the company will, of course, continue to aggressively support the current worldwide installed base of some 35,000 one-inch machines).

According to Bland McCartha, director of marketing for Ampex AVSD, D-2 is going to become a workhorse product in the industry, the general-purpose machine for dozens of broadcast and post-

production applications from standard two- and three-machine editing situations to dubbing and duplicating to network delay to master time coding. In the Ampex scenario, a broadcaster or production company would originate its footage using either Type C in the studio or a component analog video (CAV) format such as Betacam/Betacam SP for field use. Material would then be dubbed over to the digital component recorder for post-production and eventual airing or distribution.

"There will still be some instances where a component digital recorder will be useful," McCartha admits, "such as in a situation where extensive special effects and graphics must be added. But they're relatively rare compared with the large number of applications where digital composite will be quite adequate. That's the market Ampex is after. For every component island, there are likely to be dozens of composite applications"

Some other viewpoints

While Ampex has at least temporarily abandoned development of a D-1 component digital machine, feeling that the market for the full-quality recorder will be small, others are not quite so ready to concede the market. And given that the use of graphics and special effects is still growing by leaps and bounds at both broadcast and post-production facilities—an application where much equipment is already available in the CCIR 601 domain and where work in analog or digital composite yields poor results at best—the market for D-1 machines may be a good deal larger than the 20 percent projected by Ampex. In many of these applications the increased price of going to the D-1 recorder, projected at perhaps twice that of D-2, is worth the increased quality of component and the elimination of NTSC's artifacts during post-production processing. It was for these applications, indeed, that digital processing and recording held out such promise in the first place.

BTS, for one, is actively pursuing the D-1 market, and used SMPTE '87 as a showcase for its new DCR-100 D-1 recorder. The company's attitude towards digital recording is expressed by Berthold Eiberger, its manager of advanced development of broadband systems: "D-2 is a fine medium for distribution.–But for production applications, we think D-1 is going to be the machine of choice. This will be especially true for companies that are going to be setting up new facilities or those just getting into the business, where maintaining compatibility with existing wiring and equipment is not a concern. If you're already in business then you have to face a decision: do I go with

existing Type C technology, or do I replace some of my Type C machines with D-2? But if you're just starting out, I can't imagine why you wouldn't want to go with D-1's full-bandwidth, ultimate-quality format.

"D-1 represents the future of television, not an extension of its past. It's upward compatible—there's room to grow into higher definition. D-2 doesn't allow you to grow anywhere." The BTS recorder will be available in two versions, one designed primarily for applications where it will be remote controlled, the other in applications where a full-functioned control panel would be required.

Striking a balance

While Ampex and BTS line up on opposite sides of the digital recording issue, Sony continues to show evidence that it intends to create product in both the D-1 and D-2 formats. In addition to having written "real" (deposit accepted) orders for 225 of its $120,000 DVR-1000s, the company will come to NAB this year with a new composite digital machine. Sony won't reveal at this point whether it plans the new product introduction as a commercial playback system or a production/post-production unit; it had announced at NAB last year, however, that its commercial/program library management system, demonstrated with Betacam decks, could be adapted to D-2 transports.

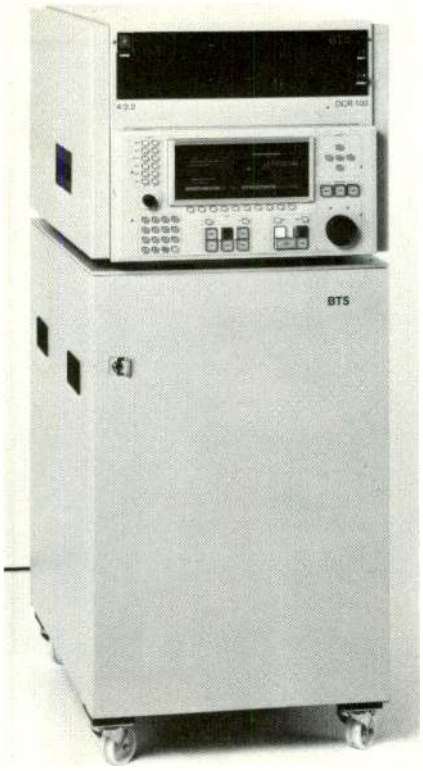
"We think there is going to be a substantial market for D-1 recorders," a Sony spokesperson claims. "We're still back-ordering machines from what we consider to be the tip of the iceberg—the larger post-production facilities such as The Post Group, Post Perfect, Grace and Wild, and the like. Within time, we have no doubt that D-1 will become the major machine at post-production facilities where they not only need component's superior ability to handle multigeneration effects and editing but where they can also afford to simply pass on D-1's costs to their clients. Cost itself isn't the object at most post-production companies—just how to sell the equipment."

On the other hand, Sony recognizes that for most broadcast applications, not only is there generally no need for elaborate multigeneration work (complex projects are almost always taken out-of-house), but capitalization is different. Equipment costs can't simply be billed out and must be amortized. For these reasons, the D-2 machine will find a place in the broadcast environment for both on-air playback and as a general workhorse machine.

"We see no reason to disagree with Ampex's projection that D-2 will replace Type C within 10 years," the Sony spokesperson says, "especially in broadcast applications."

Differing views of market

Just how large the market will be for D-2 is a matter of great concern in manufacturing circles these days. Given the strong committment being made by Sony and BTS to D-1, Sony's sale of over 220 machines in their first outing, and the worldwide trend towards component digital, some are asking whether Ampex may have missed the mark in not developing a D-1 machine and putting all its eggs in the D-2 basket.



The BTS DCR-100, unveiled at SMPTE '87, is the second entry in the digital market.

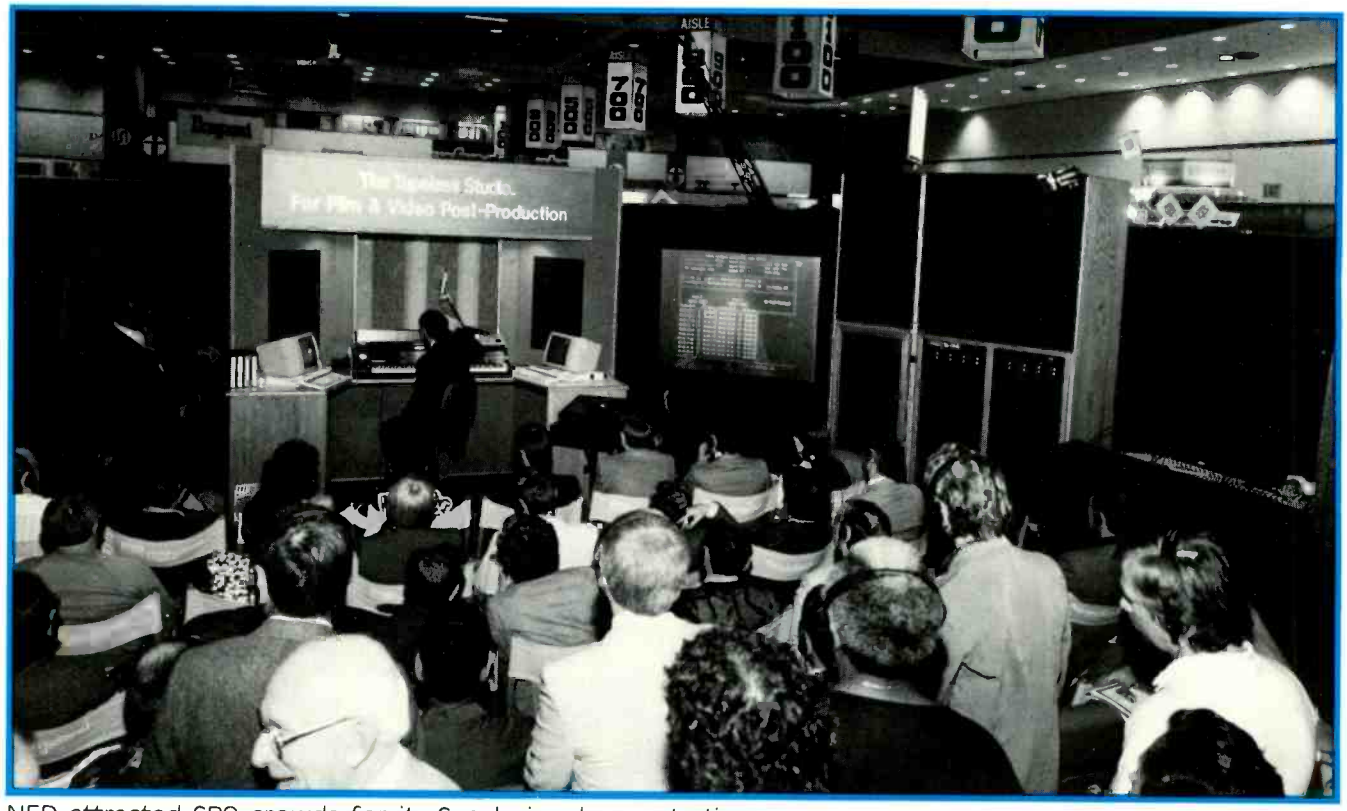
This may be born out in market research figures released by Sheer and Chaskelson Research in its Broadcast Equipment Marketplace (BEM) and Professional Video Marketplace (PVM) studies. According to Douglas Sheer, of the total current installed base of Type C machines in the U.S., only some 17 percent are owned by broadcast stations while nearly 30 percent are owned by the approximately 5,000 teleproduction/post-production facilities covered by the studies. (The remaining machines are in use in applications such as corporate video.)

Further, the studies show that broadcast orders for Type C machines are declining, perhaps anticipating the widespread use of CAV recorders.

There is no doubt in most insiders' minds that the market in broadcast television for D-1 recorders will be very small indeed, and that here the D-2 format, in both its on-air playback and production/post-production forms, stands a real chance of success—a direct replacement for one-inch machines in the broadcast plant, where studio origination and limited post-production are the primary one-inch uses. On the other hand, it seems equally clear that in many post-production facilities, the D-1 format will still emerge victorious. **BM/E**

Digital Audio Steals the Show

By Steven Schwartz



NED attracted SRO crowds for its Synclavier demonstrations.

Numerous hardware and software introductions for digital audio production finds SMPTE is all ears.

Although video technology has quite naturally commanded center stage at most recent SMPTE conventions, this year's gathering in Los Angeles turned out to be something of a surprise. While the much-ballyhoo'ed HDTV screenings reaped mixed reviews, it became increasingly apparent as the show progressed that the real excitement was generated by the number of digital audio products on the exhibition floor. In addition to the expected open-reel digital recorders and audio/video editors, the 129th SMPTE conference saw the introduction of many innovative computer-based digital recording systems and software packages. The age of the digital audio workstation had arrived.

Not surprisingly, R-DAT (rotary digital audio tape) technology also made a strong showing, with new professional decks debuted by Fostex and Tascam. Both units are expected to be priced in the $4000 range and will utilize all three of the format's sampling rates: 44.1 kHz (playback only on the Tascam model), 48 kHz, and 32 kHz for digital input only. Tascam's R-1 is slated for availability later this month and will feature twin D/A and A/D converters, four direct-drive motors, and wireless remote control. The as-of-yet unnamed Fostex machine will be available in midspring and will offer punch-in/out

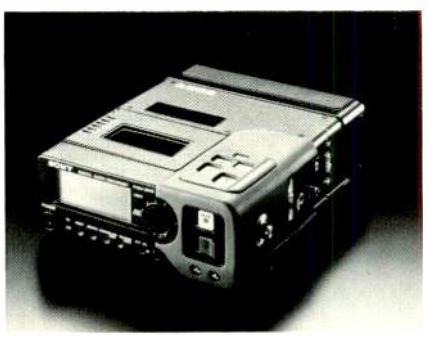
editing capability, balanced I/O, and track indexing. The unit will also be equipped with a SMPTE interface for recording and playback of SMPTE timecode—as well as serial and parallel data ports.

Mark Cohen, Fostex's sales VP recently stated that "DAT has potential for broadcast applications as long as it can be controlled by SMPTE and has a serial port on the back." Cohen went on to note that such an arrangement makes it possible to interface the deck with a personal computer in an automated broadcast facility.

After showing working models of its DAT machines at industry trade shows over the past year, Sony announced that its PCM-2500 studio DAT deck is now available in the U.S. Priced at $4995, the PCM-2500 is loaded with advanced features including double-encoded Reed-Solomon error-correction code with independent processing for both audio channels. The unit also offers selectable 44.1 kHz and 48 kHz sampling rates (as well as 32 kHz for digital inputs), three digital interfaces (AES/EBU, SDIF-2, and S/P DIF), balanced XLR-type I/O, and switchable emphasis for recording analog sources.

It is further outfitted with automatic and manual ID subcode recording capabilities that enable the machine to locate selected tracks at 60 times normal speed. High-speed tape search with fast spooling of up to 180 times normal speed can also be accomplished using the unit's reel-time tape counter. It also comes supplied with both wired and wireless remote control units for added flexibility.

Surprisingly, perhaps out of cautiousness for the continuing anti-DAT lobbying in Washington, the company has put off the U.S. introduction of the "star" of its professional DAT family, the portable PCM-2000 deck. Weighing in at a mere eight pounds, 13 ounces (with the optional NP-1A rechargeable battery), the PCM-2000 is scheduled for delivery in early spring at a list price of $7000. Like its studio counterpart, the PCM-2000 has a number of convenient features, including recording and playback capability of SMPTE/EBU timecode on one of the format's auxiliary longitudinal tracks. Standard recording chores can be done at any of the unit's four sampling rates (the three previously mentioned as well as 44.056 kHz), while a digital I/O is supplied for interface with a variety of digital equipment (digital audio signals can also be synchronized via the word sync input). At the same time, the unit's balanced XLR-type analog I/O can be switched for line or microphone sources.



Sony's professional DAT line. The PCM-2500 studio deck is currently available; its portable counterpart, the PCM-2000, is expected this spring.

While manufacturers and industry observers expect DAT to have a significant impact in the professional audio and broadcast communities, many potential users feel that a remaining obstacle to the format's acceptance in the pro audio market is the current lack of editing capabilities. However, Mike Sekiguchi, DAT product manager for Sony, claims that "there will be an editing system available for DAT in the near future," although he declined to specify when.

Digital production soars

This year's SMPTE also saw the introduction of several new computer-based audio workstations that record, mix, and edit material entirely within the digital domain. In addition to offering superior sound quality and enhanced editing capabilities, the integrated design of many digital audio systems can significantly reduce the amount of time spent on audio post-production for film and video projects. Thus, manufacturers are now touting the cost-effective aspects of these high-tech—and high-end—production centers.

One of the newest arrivals in this category is the AudioFrame digital audio workstation from the Boulder, CO-based WaveFrame Corp. After making an impressive debut at the 83rd AES convention in New York last October, the AudioFrame proved to be just as popular among SMPTE attendees. A compact, single unit fitting into a standard 19-inch rack, the unit employs a proprietary digital audio bus (a 64-channel switching matrix) that accommodates up to ten plug-in modules for sound synthesis, storage and editing, signal processing, and mixing and mastering.

WaveFrame president Glenn T. Edens points out that such an arrangement makes it simple for users to customize their systems for their particular needs. "Because the AudioFrame is modular, redundant subsystems such as power supplies, front panels, D/A and A/D converters, and studio controllers are eliminated," says Edens. "Users buy only the capabilities they need, adding to the system in a cost-effective manner when expansion becomes necessary."

Designed to handle music, sound effects, and dialogue, the AudioFrame employs fixed sample-rate processing to maintain consistent audio quality in sound manipulation and to avoid the noise problems that may be found in variable-rate sampling systems. The sampling synthesis module offers 16 voices and two

megabytes of RAM for 24 seconds of audio data storage at 44.1 kHz; sampler memory may be extended up to 30 Mbytes for six minutes of audio data storage.

An IBM PS/2 (or AT-compatible) computer controls the system, with software functions (including multitasking) performed on Microsoft Windows. It also conforms to a number of industry standards and features an open architecture to permit future software and hardware upgrades as well as to allow easy integration into any existing studio.

The Soundstation II from Digital Audio Research (DAR) in Surrey, England, also made its debut at SMPTE this year. The second-generation system consists of a front-end control console that features a touch screen display (used in editing and selecting sound segments) and a separate processor/storage unit that contains the system hardware, software, and disk drives.

The sleek design of the Soundstation II's control panel has a definite ergonomic appeal while offering a logical approach to the system's powerful audio capabilities, which include instant-access editing, multichannel digital recording, and signal processing. The console also features a locator control that audibly emulates reel-rocking for locating edit points in the program material. It additionally provides nondestructive editing with instant access of audio segments that can be auditioned at normal or variable-speed playback.

The basic system configuration includes four-channel recording and editing (with expandability to eight channels) and two 380 Mbyte 5.25-inch Winchester drives that provide a storage capacity of up to two-track hours. It may also be further modified for more than five-track hours of online storage with removable optical write once, read many (WORM) disk drives.

Fairlight displayed its new MFX hardware/software package for its CMI Series III. The MFX system provides precise triggering of up to 80 channels of music and effects and includes a SMPTE-based cue list sequencer and a graphic event display. Its control panel features a QWERTY keyboard, timecode display, and a jogger wheel that is also used to operate the editing system.

At the same time, Lexicon and New England Digital (NED) were giving full-blown demonstrations of their digital production systems. Lexicon displayed the nondestructive editing capabilities of its Opus digital workstation with dialogue and sound effects on a trailer for the new *Star Trek: The Next Generation* TV show. Meanwhile, NED showed the Synclavier digital audio system in a variety of "real world" applications for music production, sound effects, and dialogue. The 45-minute dem-

Today's tougher audio requirements demand a new choice

Telex Pro Series 6120 XLP

A new duplicator with 8X speed and tougher specs.

Improved frequency response plus less distortion and crosstalk are just a few of the technical gains achieved in the new Telex Pro Series duplicator. This means that you'll make duplicates that are **truer to the master** than with any comparable tape duplicator on the market today.

Yes, here's a system with all the advantages of the famous 6120 high speed duplicator plus enhanced specifications. Features that made the 6120 popular such as compact size, unlimited expandability, track select, audio level monitors and easy one-button operation remain distinct Telex advantages. But, by developing the 6120XLP with 8X speed, Telex gives you the advantage of improvements in many **important professional specifications** such as distortion, frequency response, speed accuracy and crosstalk. And, the new cassette transport speed allows you to duplicate directly from 15 ips open reel masters for the ultimate in quality and convenience.

The Pro Series 6120 uses a newly developed, highly efficient *XL LIFE*™ cassette head featuring ultra-hard physical characteristics for **extra long life** (10X normal) plus a satin smooth surface that resists excessive oxide build-up preventing the need for frequent maintenance. Its advanced engineering, precision design and painstaking manufacturing techniques contribute immensely to the Pro Series improved specs including an **unmatched frequency range** of 50 to 13KHz. For further technical details and the name of your nearest 6120 dealer, call or write Telex Communications, Inc., 9600 Aldrich Ave. So., Minneapolis, MN 55420.

New *XL LIFE* cassette head.

Up to 12 months to pay with no interest!
The entire Telex 6120 duplicator series is available with special *NO INTEREST* financing through participating Telex dealers. Yes, with only 10% down and up to 12 months to pay, you could be eligible for special NO INTEREST financing. Think of it! You could pay for your 6120 out of the savings or income generated.

TELEX

Call Toll Free in U.S. 800-828-6107 • In Minnesota Call (612) 887-5531

Circle 134 on Reader Service Card

onstration included excerpts from a recent McDonald's commercial, Rob Reiner's new movie *The Princess Bride*, and a selection from recording artist Sting's new release, "Nothing Like the Sun," which was composed, performed, and recorded on the Synclavier.

Also shown was the company's new optical disk recorder, which provides an on-line sound effects library that is fully indexed and cross referenced. A 16-track standalone direct-to-disk multitrack recorder was also demonstrated. Available in four-, eight-, 12-, 16-, and 32-track configurations, the system features full random-access editing with on-board mixing capabilities and 75 minutes of continuous recording time at 50 kHz on each track.

Maximizing the Mac

There was also good news for budget-conscious professionals who are eager to explore the realm of digital audio production. A new product shown at SMPTE expands the capabilities of Apple's Macintosh computer family—a leading favorite among MIDI (musical instrument digital interface) users—to handle digital audio recording, editing, and post-production. The Dyaxis digital audio system from Integrated Media Systems (IMS) in San Carlos, CA, interfaces with third-generation Macintosh computers (i.e., the Mac Plus, SE, and Mac II) to create a truly flexible digital production system.

The modular Dyaxis system features mass storage on hard disk and a digital audio processor that is capable of performing stereo or mono direct-to-disk transfers in real time. Meanwhile, IMS's user-friendly MacMix software provides a full complement of recording and mixing options and additionally utilizes the Macintosh's graphic interface to supply a visual reference of the material for editing, splicing, and assembling passages. The program further performs a range of sophisticated audio processing functions via easy-to-follow windows and menus. The Mix Window, for example, emulates traditional console functions; any number of sound files can be called up and mixed together, panned, crossfaded, and replicated for looping or slip-syncing for time manipulation. In post-production applications, the computer can be used as a control interface to sync the audio output from the Dyaxis to video with SMPTE timecode.

Prices range from $6995 for a basic "start-up" system that includes a 110 Mbyte drive, converter box, software, rack driver, and all necessary cables, to $19,500 for a high-end system featuring two 320 Mbyte drives for more than one hour's worth of stereo storage at 44.1 kHz.

Yet another product designed

for the Macintosh allows the computer to operate as a SMPTE-based automation controller for any MIDI device. Digidesign's Q-Sheet software is designed around a user-created cue list of MIDI events. Once a cue list has been created, the Q-Sheet allows the Macintosh to automate keyboards, effects units, and even MIDI mixing consoles (such as Yamaha's digital eight-track DMP7 console, which was used in the demonstration at SMPTE). The Q-Sheet's event sequencer may also be used to cue the Dyaxis.

Audio editing updates

Of course, all the news at SMPTE wasn't limited to hard disk digital recorders and software. Several new introductions for established product lines were equally innovative. For example, Mistubishi introduced its new XE-2 digital audio editor designed for use with the company's X-86

The Dyaxis digital audio system from IMS turns the Macintosh PC into a digital post-production center.

digital two-track recorders. The unit features an 11-second digital memory with search-shuttle function for instant replays and precise location of editpoints. All editing chores are completely electronically controlled, and thus eliminate any need for manual cutting and splicing.

Meanwhile, Adams-Smith has addressed the needs of the audio-for-video market with its new 2600 A/V editor. The system features C: Sound, a newly developed audio editing technique that permits digital sampling of up to one hour of sound on three separate audio channels with simultaneous display of any two channels. The C: Sound display is located on the editor's main screen and has its own dedicated function keys. The system uses color-coded cursors to mark sync points, record-in/-out points, and location points and automatically enters the corresponding addresses on the screen, effectively eliminating the need for working with time-code numbers.

The CD connection

Also shown at the Adams-Smith booth was a new system

from the Chicago-based Chytchen Labs that allows users to dub sound effects, music, and other material directly from a CD onto the master tape without having to first convert the material to synchronizable media (such as analog tape). Designed primarily for audio-for-video applications, the new Chytchen Synch—pronounced "kitchen sink"—system interfaces the Technics SL-P1200 CD player with most SMPTE time code-driven edit-controllers; the SL-P1200X CD player must be modified by Chytchen with a remote-control port on the rear panel.

First demonstrated at this year's AES, the Chytchen Synch enables the edit-controller to operate the CD player as it would any transport with user-selected in-/out-points, offsets, and other SMPTE-related parameters. The system makes all the calculations from SMPTE timecode to CD timecode, translates commands from the edit-controller to the CD player, and provides the same level of synchronization as offered by the edit-control system.

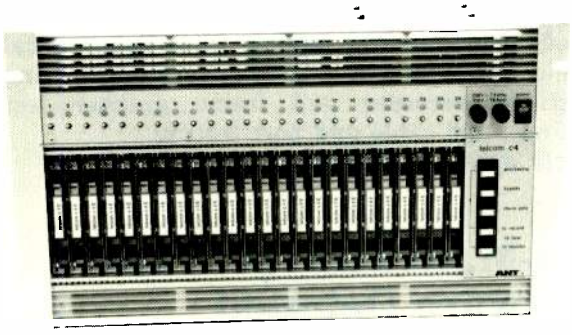
If you're looking for additional proof of the CD's appeal, consider the recent news from Shure Brothers. A name long associated with audiophile-quality phono cartridges (as well as many other products), Shure recently took the wraps off a new professional CD player. Scheduled for delivery in the middle of this month, the new PDP1000 was officially unveiled last October at the NAB Radio '87 convention in Anaheim and shown again in prototype form at SMPTE.

Among the PDP1000's range of features is the ability to wire the unit for control at the studio mixing console or other remote location. It further offers automatic cueing to the first downbeat of the music as well as auto stop at the end of a selected track. Other features include random access cueing with cart machine-style red and green indicators, 15-track programmability, and transformerless, balanced XLR outputs.

Future stock?

What is the significance of the plethora of digital audio hardware at SMPTE? In all likelihood, the availability of the equipment described here will not result in full-scale conversions from analog audio gear in existing facilities. However, the range in price and performance represented does present some interesting possibilities for new post-production suites and studio upgrades.

Digital audio production will probably continue to be viewed as a high-end alternative for several years—particularly in the broadcast environment where its applications are still somewhat limited. Nevertheless, digital technology has come a long way in a relatively short amount of time. And, by the next SMPTE gathering...who knows? **BM/E**



ANT Unveils Noise Reduction System

The E413 multitrack noise reduction system is the newest member of ANT's telcom C4 line of noise reduction systems. Constructed for the American marketplace, the 24-channel E413 is a compact, easy-to-install noise reduction system that provides an overall dynamic range of 118 dB.

Surface-mounted device (SMD) technology and design improvements combine to deliver a high-quality unit based on ANT's C4 E card; a single-channel 70 amp/8 VCA/250 SMD compander board. In addition, the E413's design eliminates the need for cooling fans.

Circle #200 on Reader Service Card

Conrac Displays Monitor/Photometer Package

The Micromatch monitor system from Conrac Display Products Group consists essentially of a 13- or 19-inch 6545 color monitor and digital 6550 photometer unit that can reduce in-studio set-up time by about 20 seconds per monitor. In addition, the monitor features dot-mask, a precision in-line (PIL) CRT with .31 mm dot pitch, digital beam current feedback and comb filter, automatic NTSC sensing, factory preset D6500 color standard, and soft-touch front panel controls.

The handheld 6550 photometer is able to digitally acquire information from the master monitor, process and store that information, and then automatically communicate the master settings to the other monitors in a system simply by pressing the photometer against their screens

The Micromatch system comes in both 13- and 19-inch models, and a variety of cabinet and rackmount options are available. List price is $5295 for the 13-inch version, and $5565 for the 19-inch.

Circle #201 on Reader Service Card

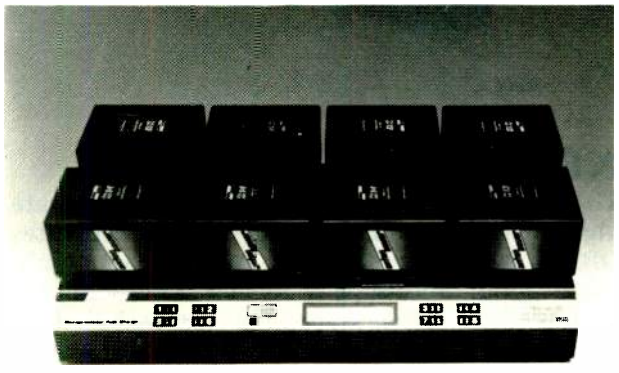
Electro-Voice Pumps New Shotgun

The RE45N/D, a highly directional microphone from Electro-Voice, utilizes a combination of cardioid and distibuted front characteristics to deliver high sensitivity and a functional working distance two to three times greater than most directional mics. High sensitivity, coupled with the inherent low noise of the unit's dynamic transducer ensures a high S/N ratio when working in long-reach applications.

Cardioid-related functions provide uniform frequency characteristics up to 1500 Hz; above that point distributed front openings take over to narrow the mic's directional performance.

The RE45N/D specs include 600 ohm impedance, 5 mV/Pascal output at 1000 Hz, and -50 dB sensitivity at 1000 Hz.

Circle #202 on Reader Service Card



Anton/Bauer Lifesaver Puts Batteries in Charge

New from Anton/Bauer, the Lifesever MP-8 is an eight-channel microprocessor-controlled charger device that expands on previous Lifesaver products in several ways.

In addition to standard Lifeseaver maintenance circuitry, the unit features eight charging positions that accept either Anton/Bauer or ProPac 90 (BPR-90 VTR type) batteries; automatic charge routine and optimum voltage sensing; LED charge status indicators and LCD charge details display; and replaceable PROMs to update the microprocessor as new cell technologies become available.

List price is $2985.

Circle #203 on Reader Service Card

Otari's Compact MX-55

Otari's newest 1/4-inch audio recorder is the MX-55, which, like the MX5050, is designed for use in recording studios and audio post facilities. The

recorder features user-selectable speed pairs of 15/7.5 ips and 7.5/3.75 ips and comes in six custom versions: full-track, twin-track NAB or DIN stereo, twin-track with center-track time code, four-track, and twin-track in a desktop overbridge design.

Other features include a DC quartz PLL capstan motor and a seven-digit tape timer, test tone oscillator, and ±20 percent vari-speed reproduce for overdubbing.

Circle #204 on Reader Service Card

NEC Unveils VSR 10

The new VSR 10 from NEC is a fully solid-state digital video recording device that incorporates DRAM technology for data storage and high-speed signal processing in lieu of traditional tape or film media. Other system features include flexible architecture, frame-by-frame random access, real-time slo-mo record and playback, continuous variable speed record and playback (from 0 to 16x normal), built-in mix keyer interface for near-transparent DVE operations, and zero picture degradation due its digital format.

The basic two-channel VSR 10 system with 34 seconds of recording time can be expanded with a series of four 34-second memory shelves to achieve a system maximum of 136 seconds of video signal storage. In addition, the system can be configured to control up to four channels of input and output in any desired sequence, and the unit conforms to hard- or floppy-based external storage devices.

Circle #205 on Reader Serice Card

Symbolics Offers Animation/Video Link Software

Symbolics Graphics Division has introduced new S-Record system software that allows users of Symbolics paint and animation units to directly control video storage devices. Currently the package works in conjuction with a Lyon Lamb Mini-Vas to control VTRs, disk recorders, and similar devices for unattended output of animation to video. S-Record allows easy user control of animation recording and video image capturing for later processing.

Software functions include Mini-Vas vertical time-code-to-video transferral, overall debugging functions, recorder and frame grabber test routines, and cable and port testing.

Circle #206 on Reader Service Card

Ani-Maker/Image-Maker Software Debuted

Microtime has released Version 4.3 Ani-Maker and Image-maker system software featuring a variety of 3D and graphics enhancements, including scene scripting, velocity profiling, and enhanced texture mapping.

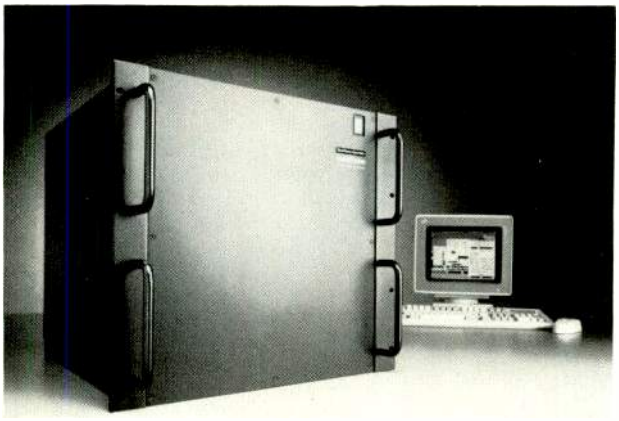
Scene scripting allows users to create complex sequences with multiple models, trajectories, backgrounds, lighting grids, and camera paths. Acceleration and declaration variables can be defined with the software's velocity profiling function. Texture mapping enhancements include four-method shading, four resolution levels, and object transparency preservation.

Circle #207 on Reader Service Card

Enhancement Products for AU/280 Announced

Aurora Systems has announced the availability of several new productivity enhancement tools for the high-end AU/280 videographics system. Software enhancements include color cycle animation, an expanded augmentation of the machine's multiplane animation; a 3D modeling preview function, which allows artists to view a wireframe rendition of an animation in real time; timeline-based animation editing, involving the display of a sequence as portions of a timeline; selective real-time 3D animation; automatic storyboarding; tiling and texture fill functions; and picture browse capabilities. AU/280 system hardware is being upgraded as well, with all new systems featuring a 30-megabyte hard disk as standard equipment.

Circle #208 on Reader Service Card



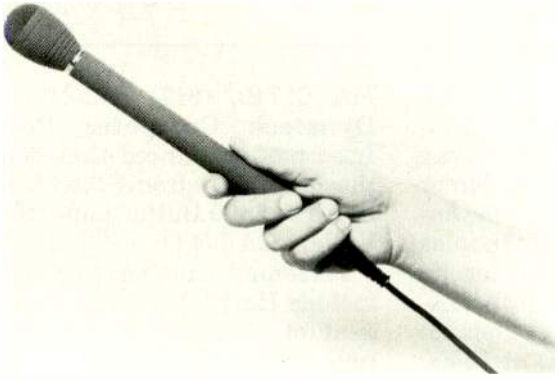
WaveFrame Intros All-Digital Workstation

WaveFrame Corp. has announced the availability of the AudioFrame digital audio workstation. Essentially a complete sound production environment in a single unit, the AudioFrame allows producers to compose finished sound tracks without leaving the digital domain.

A proprietary audio bus is employed in the unit that allows an array of plug-in modules to communicate in the digital domain as well. Modules for digital-to-analog and analog-to-digital conversion, sampling synthesis, studio control processing, and memory expansion are available for the AudioFrame.

The system "heart" is an IBM Personal System/2 PC running the Microsoft Windows multitasking environment.

Circle #209 on Reader Service Card



Beyer Debuts M 58 ENG Mic

A new omnidirectional dynamic microphone, the M 58, is the latest product offering from Beyer Dynamic, U.S. The mic has been designed for use in ENG and EFP applications.

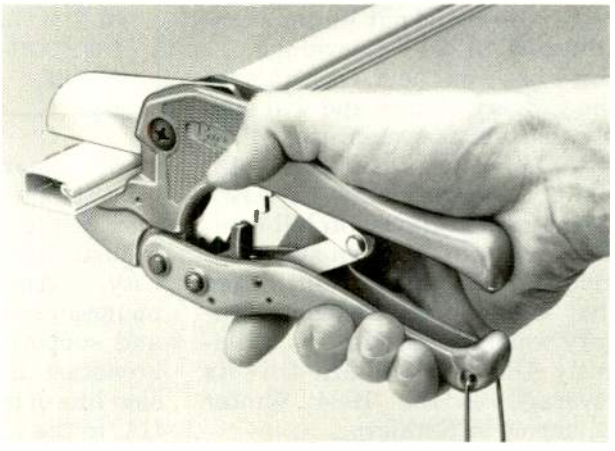
The unit features an internal shock-mount system to reduce handling noise, and the mic's high-output, contoured extended-response enhances vocal and speech clarity, even off-axis. The M 58 represents the first Beyer product designed specifically for hand-held electronic newsgathering and field production.

Circle #210 on Reader Service Card

Alexander Offers 11-Cell Sony Alternative

The BP-1-11 11-cell battery from Alexander Batteries is designed to offer engineers a longer-lasting alternative to the Sony NP-1. The eleventh cell allows cameras and recorders more time than a normal battery, which drops off after it discharges 11 volts. The battery is rated at 13.75 volts with a 1500 mAh fully-charged capacity.

Circle #211 on Reader Service Card



Panduit Cutting Tool Bows

An new cutting tool designed to clip through surface raceway runners has been announced by Panduit Corp. The ratchet-action SRT tool makes a smooth cut without leaving any jagged or uneven edges on the raceway while eliminating the inconvenience of toting a hacksaw. The SRT features easily replaceable blades, and it can also be used to cut plastic conduit.

Circle #212 on Reader Service Card

Business Briefs

FCC Commissioner **Mimi Dawson** was recently nominated by President Reagan for a post as deputy secretary for transportation. Her Senate confirmation is expected to go without a hitch. Dawson's departure from the commission would leave only three of five seats filled—former commissioner Mark Fowler's seat remains open.

As the date for the 1988 Winter Olympics in Calgary draws nearer, more and more manufacturers join the ranks of official Olympic product suppliers. In previous columns we have announced the involvement of **Fuji** and **Ikegami** in the Games (see "Business Briefs," *BM/E*, July 1987, p.80); now add **Ampex**, **Vinten**, **Bose**, and **Harrison**.

Host broadcaster **CTV** of Canada has selected **Ampex** 196 one-inch videotape as its exclusive tape medium for use in its Calgary Broadcast Center during the Games. Also, through Applied Electronics Ltd., **Vinten's** Canadian distributor, CTV will be utilizing several camera-mount and pan-and-tilt devices: Vision 20s, Vision EFP tripods, spreaders, Mk5 and Mk9 pan-and-tilt heads, Tern pedestals, and a Merlin crane arm round out Vinten's contribution to CTV's coverage . . . **Bose** has won the PA contract for the Calgary Games and will supply the sounds systems for all 12 Olympic venues . . . And the official U.S. Olympic network, **ABC**, is putting two **Harrison** MR-4 audio consoles to work in shippable modular production buildings that will be transported to Calgary when events start up. Previously ABC had used MR-4s in its coverage of the 1984 Winter Olympics in Sarajevo.

Expansions and moves dominated business news in the past months, with several major makeovers or outright relocations reported. Celebrating the start of its third year, **Unitel-Hollywood** unveiled its new expanded post-production facilities and remote three-unit teleproduction fleet... The Detroit office of **Victor Duncan** has relocated to an 18,000-square-foot home in the multitenant Studio Center complex in the Farmington Freeway Industrial Park outside the Motor City... **Andrew Corp.** has announced the relocation of the sales and support departments for its broadcast antenna and transmission line of products from Upland, CA, to the company HQ at 10500 W. 153rd St., Orland Park, IL 60462 . . . **Omicron Video** has moved to 21822 Lassen St., Unit L, Chatsworth, CA 91311; (818) 700-0742 . . . **Rank Cintel** has relocated national HQ to 704 Executive Blvd., Valley Cottage, NY 10989; (914) 268-8911 . . . **Artel Communications Corp.** is now operating out of offices in the Kane Industrial Park, Hudson, MA 01749; (617) 562-2100 . . . **Dynatech Computer Power, Inc.,** has announced the completion of its move from Scotts Valley Drive to 5800 Butler Lane, Scotts Valley, CA 95066.

Personnel changes this month include Harry Anderson as president of **Sony Magnetic Products, Inc.** Elsewhere at Sony, in the **Professional Video Division**, James Hansen has been named VP of sales . . . **American Public Radio** has tapped VP of programming Eric Friesen to take over as acting CEO for the network during the interim period following Albert Hulsen's resignation. Bruce Theriault has been named senior VP for operations for the radio network.

NBC's Chicago affiliate, WMAQ-TV, has installed a Comtech 3.5-meter dual-axis Ku-band antenna atop the Windy City's 25-story Merchandise Mart. According to NBC's engineering manager Fred Rodey, the dish will be used to receive all live events from WMAQ's SNV as well for broadcasting some of the station's local programming, including shows like *Warner* and *Our Place*.

The dish installation's reflector design consists of ten close-tolerance panels, and all system components were designed to fit in a standard freight elevator—The WMAQ staff was able to transport and erect the dish without any special tools or cranes.

Why this publication and more than 1,200 others let us go over their books

once a year.

Some publications, we're sorry to say, keep their readers undercover. They steadfastly refuse to let BPA (Business Publications Audit of Circulation, Inc.) or any other independent, not-for-profit organization audit their circulation records.

On the other hand, over 1,200 publications (like this one) belong to BPA. Once a year, BPA auditors examine and verify the accuracy of our circulation records.

The audit makes sure you are who we say you are. The information helps advertisers to determine if they are saying the right thing to the right people in the right place.

It also helps somebody else important: you. Because the more a publication and its advertisers know about you, the better they can provide you with articles and advertisements that meet your information needs.

BPA. For readers it stands for meaningful information. For advertisers it stands for meaningful readers. Business Publications Audit of Circulation, Inc. 360 Park Ave. So., New York, NY 10010.

MEDIA INTELLIGENCE

BPA

ADVERTISERS INDEX

SALES OFFICES

295 Madison Avenue, New York, NY 10017 Telex: 64-4001

Eastern States
295 Madison Avenue
New York, New York 10017
212-685-5320
Telex: 64-4001
Michael Dahle
Denise Lalonde

Central States
33 East Cedar St.
Suite 12F
Chicago, IL 60611
(312) 664-0572
Gene Kinsella

Western States
21777 Ventura Blvd. Suite 237
Woodland Hills, CA 91364
(818) 888-5288
Jay B. Lewin
Robert D. McLean
David M. Adrian

Europe/United Kingdom
33A Station Road
North Harrow
Middlesex HA2 7SU England
(01) 427 9000
Telex: 21289
Ric Bessford

Japan/Far East
2-14-20, Minami-Aoyama,
Minato-Ku, Tokyo 107 Japan
(03) 405 5118
Telex: 2427388
Fax: (03) 401-5864
K. Yamamoto
Y. Yozaki

ONE THING WE DEPEND ON:

QUALITY IS EASY TO IDENTIFY.

The SP6 8-bus radio and television production console

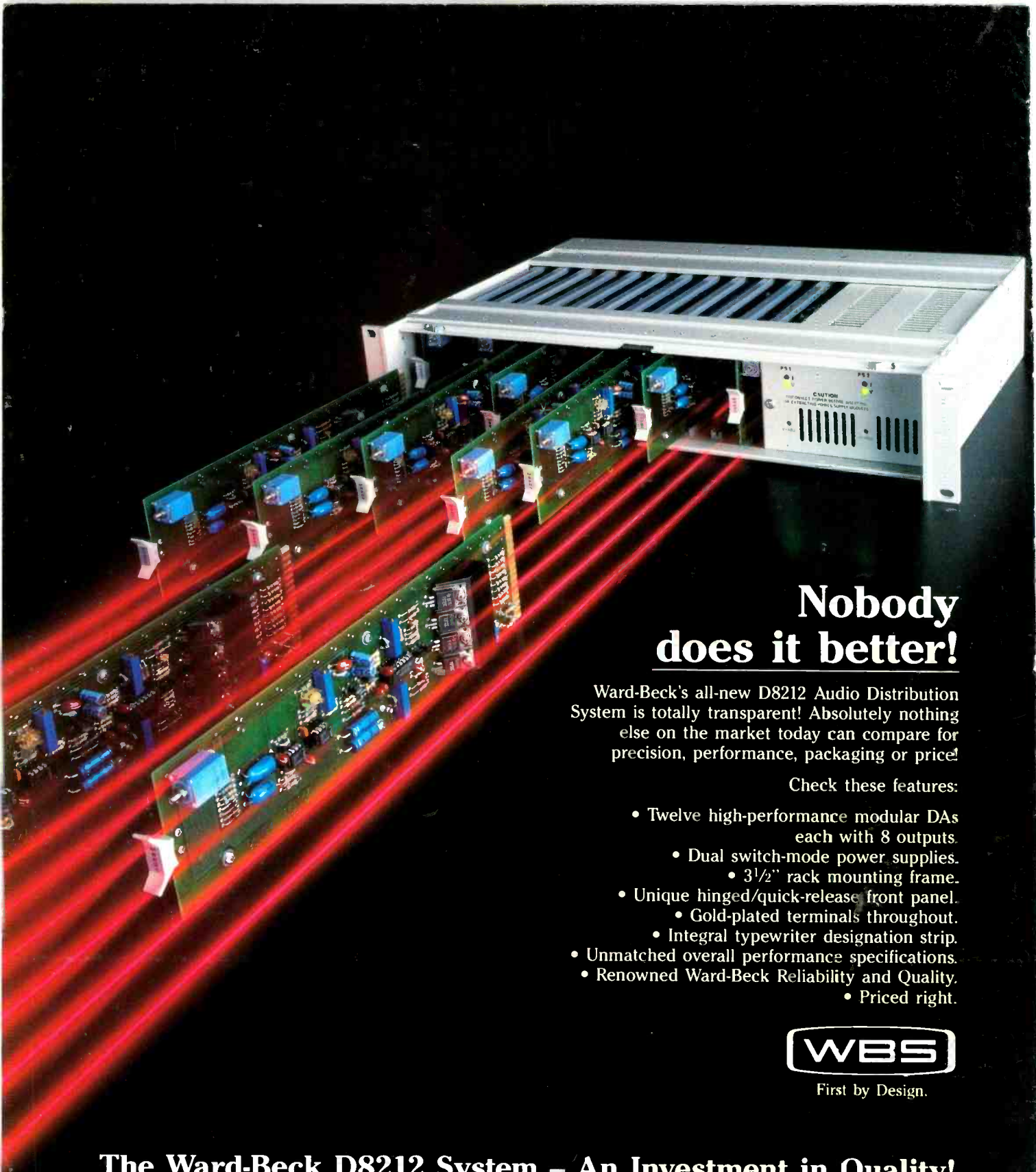
This is the production console that our clients have long had on their wish list. It gives the radio and television production staff the flexibility and power required in today's fast paced facilities. The power of machine control logic and external module control. The power of variable frequency equalizer networks. The flexibility of mono and stereo effects buses. The simplicity of multi-track composition, and the sophistication of its control room and multiple studio communications and monitoring capabilities. A full series of accessory control panels, clocks, timers, turret components and furniture configurations complete the package. The SP6 is compact, comprehensive and dependable.

One thing *you* can depend on is Wheatstone.

Wheatstone® Corporation

6720 V.I.P. Parkway, Syracuse, N.Y. 13211 (315-455-7740)

Circle 151 on Reader Service Card



Nobody does it better!

Ward-Beck's all-new D8212 Audio Distribution System is totally transparent! Absolutely nothing else on the market today can compare for precision, performance, packaging or price!

Check these features:

- Twelve high-performance modular DAs each with 8 outputs.
- Dual switch-mode power supplies.
- 3½" rack mounting frame.
- Unique hinged/quick-release front panel.
- Gold-plated terminals throughout.
- Integral typewriter designation strip.
- Unmatched overall performance specifications.
- Renowned Ward-Beck Reliability and Quality.
- Priced right.

WBS

First by Design.

The Ward-Beck D8212 System – An Investment in Quality!

Ward-Beck Systems Ltd., 841 Progress Avenue, Scarborough, Ontario, Canada M1H 2X4. Tel: (416)438-6550 Tlx: 065-25399