BME

FOR TECHNICAL AND ENGINEERING MANAGEMENT

AN ACT III PUBLICATION

JUNE 1989
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INSIDE: NEW PRODUCTS FROM NAB

THE INDUSTRY AT WORK:

NAB ENGINEERING ROUNDTABLES

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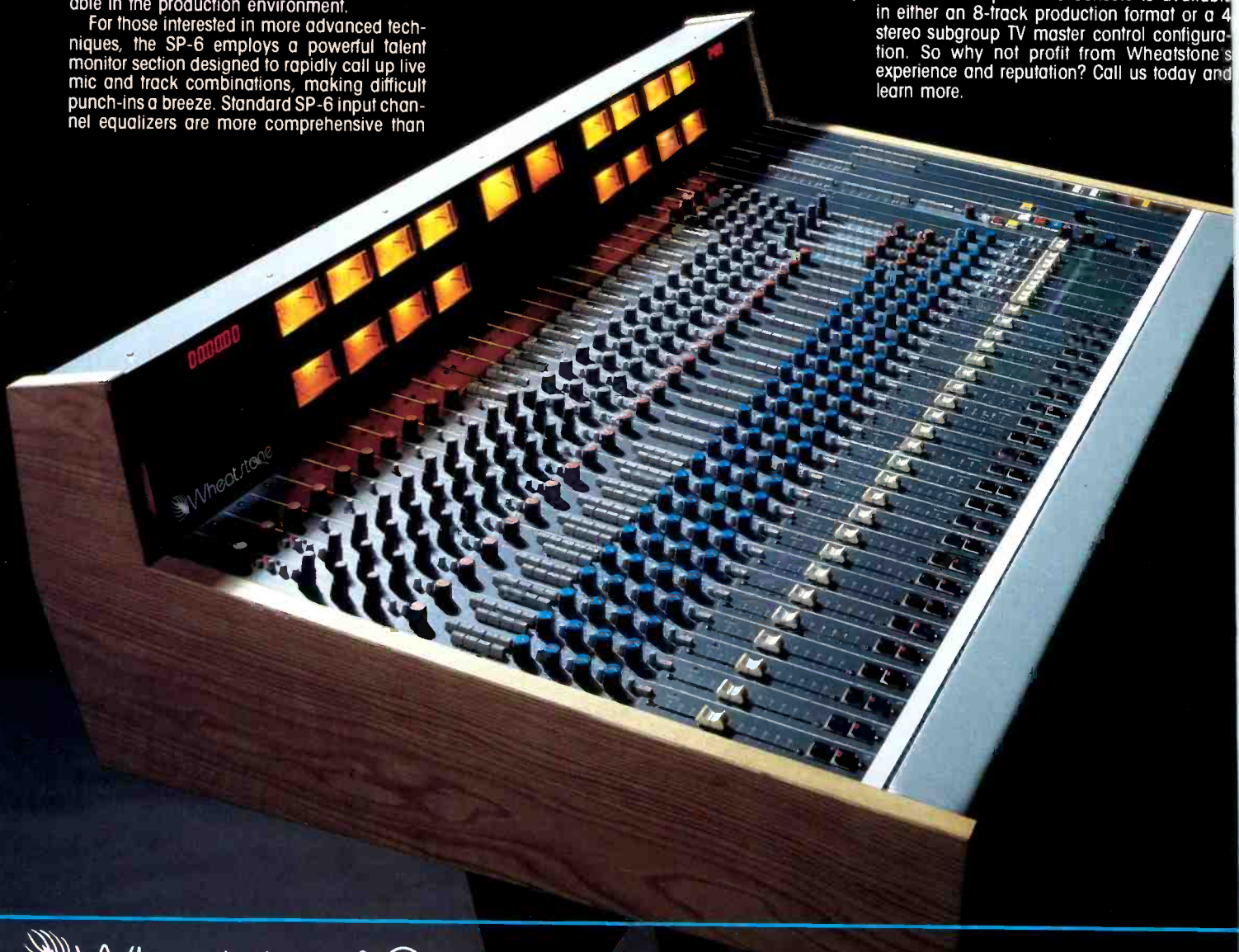

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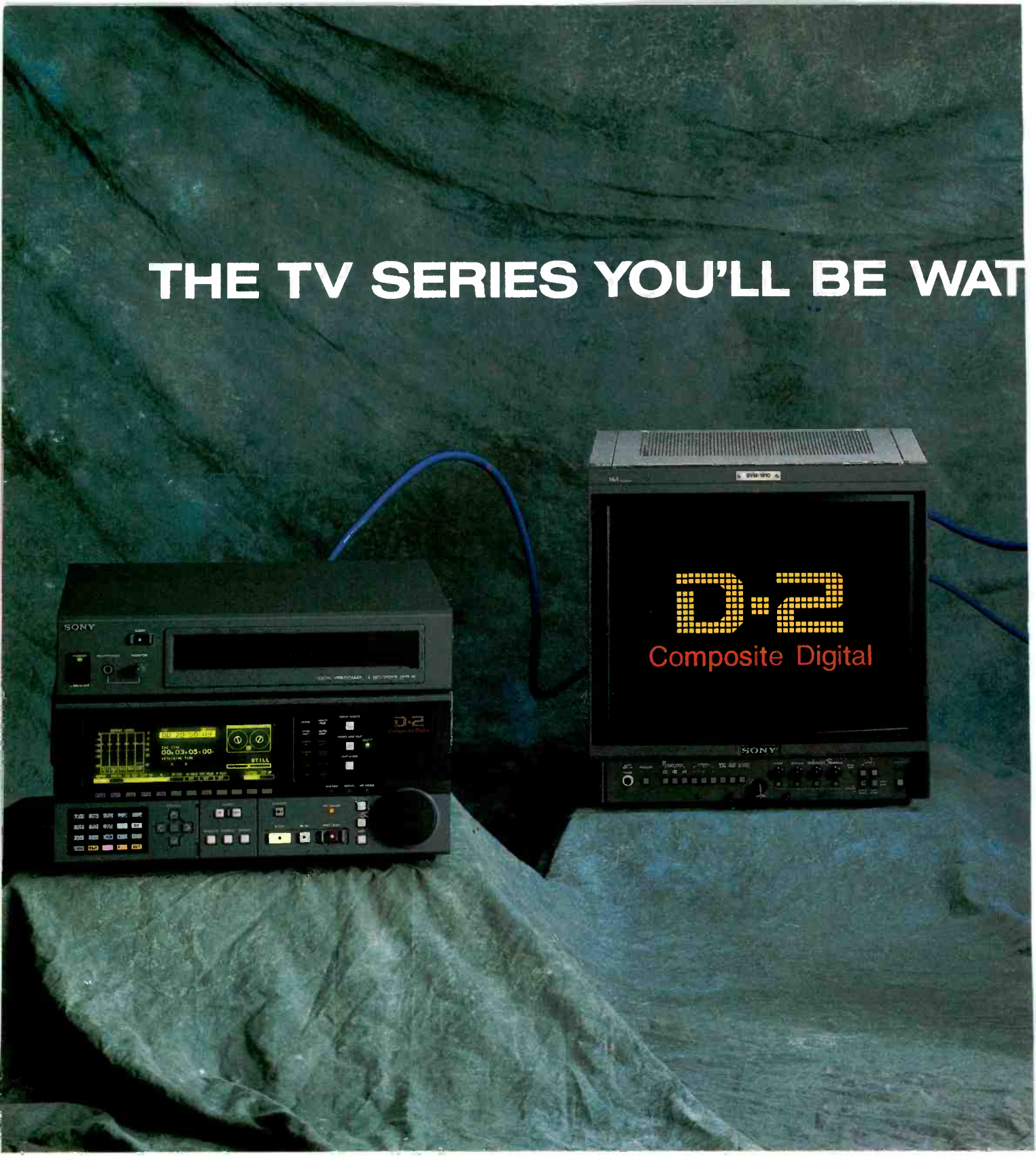

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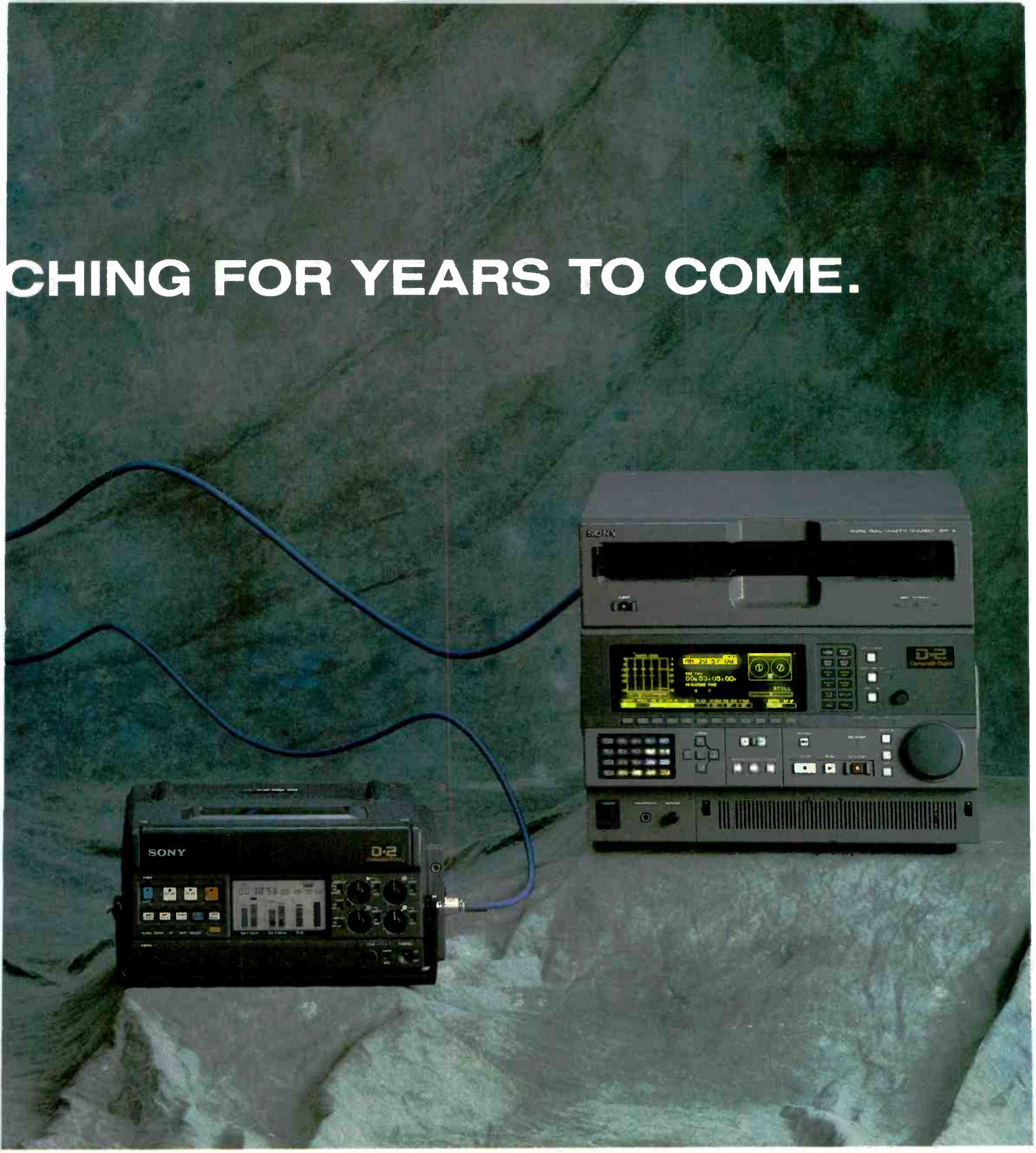

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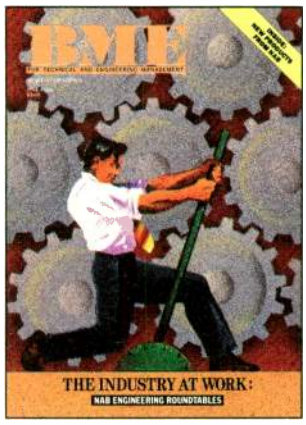

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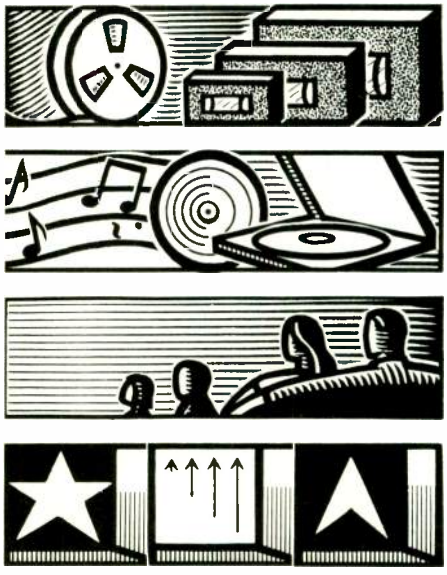

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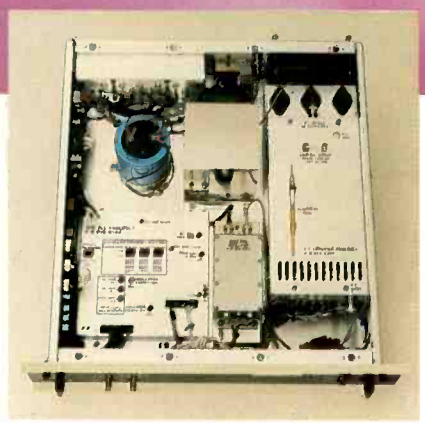
New FX 50 Exciter

Audio Performance That Rivals CD's

THD and IMD 0.003%, 93 dB S/N, 50 Watts



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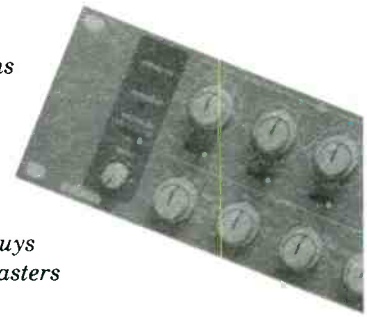

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More and more people are lining up for the Panasonic SVHS Pro Series.

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A·C·E

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STRICTLY BUSINESS

BME begins and ends with your opinions.

On the opening morning of the recent NAB convention, a chief engineer from a major Midwestern TV station pulled me aside. He knew that *BME* was sponsoring the NAB breakfast meeting of the International Teleproduction Society's engineering committee. Because the meeting would address the ITS position on HDTV, he asked if I could arrange for him to attend. I declined his request, pointing out that the content of this closed meeting—at least for now—would be off the record. He asked me to make sure *BME* kept him informed of our interpretation of the vast issues affecting HDTV in general, and the ITS position specifically.

To *BME*, that engineer's request exemplifies the important responsibility that is the basis of our publishing commitment to you. This commitment can only be fulfilled by our total industry involvement, which has resulted in the new *BME* you began seeing months ago.

A year ago, we commissioned a proprietary telephone survey of hundreds of chief engineers to learn what we could do better to serve you. We found that no magazine at that time fully delivered the editorial environment you were looking for. You told us you wanted more new product information and more information on the state of the art in broadcast technologies . . . more management strategies . . . and more perceptive, how-to articles. You asked for stories highlighting new technology from other fields, and to read what your own peers have to say about the trends in this ever-changing field. You asked for it!

The new *BME* refocused itself better to meet the needs of technical and engineering management in TV, radio and teleproduction. And we must be on the right track. The scores of letters and comments you have given us are testimony to our commitment to editorial excellence, which will ultimately help you manage your business more effectively and efficiently. You asked for it!

Our commitment to our advertisers who sell you equipment and services is predicated on the fact that we deliver the highest concentration of technical and engineering management readers. Thus, they are able to realize the most effective and efficient use of their advertising dollars.

As you read the June *BME*, you'll see that we begin and end with *your* opinions: "Feedback," our letters column, and "Currents," our guest editorial. Our "Tech Watch" column continues to keep you abreast of emerging technologies from other fields. Our special NAB coverage gives you the most authoritative overview of the new products and events in Las Vegas. And for the second year in a row, *BME* held exclusive Engineering Roundtables at NAB, in which our editors talked with prominent engineers about the latest advances in technology. The recap of these roundtables begins on page 36.

As always, we need your comments, criticisms and requests. Take another look at the new *BME*. You asked for it! ■

Michael D. Bailenson
Publisher

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Minimum $.

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Effects cost. And more effects cost more.

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FEEDBACK

Computations

In his recent letter [Feedback, April 1989], Tom Osenkowsky makes some good points concerning January's Compute program and article.

It is true that VSWR-PHR.BAS calculates phase rotation using the same phase delay for each frequency. It is also true that in theory and in practice, phase delay is frequency-dependent. To have the program adjust for that, change line 710 to read as follows:

710 CSDEG = COS(DEG*FRQ(I)/FRQ(2))/SIN(DEG*FRQ(I)/FRQ(2))

This will not make the program give the exact same numerical results as Tom's examples—partly because the difference in phase delay, at ±10 kHz, is only one or two percent.

Different computers, different formulas, and different algorithms can and do produce calculated results with different levels of numerical precision. To calculate the results of phase rotation on a complex impedance, the algorithm in VSWR-PHR.BAS (lines 710 to 725) converts from rectangular to polar notation, then back to rectangular. Due to the nature of the mathematical operations, it is not the most precise way of doing it. I chose the algorithm for its relative simplicity, not for its numerical precision.

It is noteworthy that Tom himself points out some of the fallacies of precision. In the real world of radio there are many times and places where theory and practice are very different. For those times and places, an approximate model is much more useful than any other kind.

Ronald F. Balonis
Chief Engineer
WILK-AM, Wilkes-Barre, PA

Audio Amplifications

It was with great interest that I read Skip Pizzi's article in the April 1989 edition of *BME* ["The Digital Audio Workstation Dilemma," p. 45]. Skip and I were both speakers at Radio '88, where we had an opportunity to discuss digital audio workstations.

Although the bulk of the article was quite accurate, I wanted to point out that our Direct-to-Disk and Post-Pro lines can back up 40 track minutes of audio in five minutes, or approximately eight times faster than real time. This is due to New England Digital's unique approach to parallel backup versus the serial approach adopted by AMS, Opus and others. This represents a tremendous time savings for our customers and their customers.

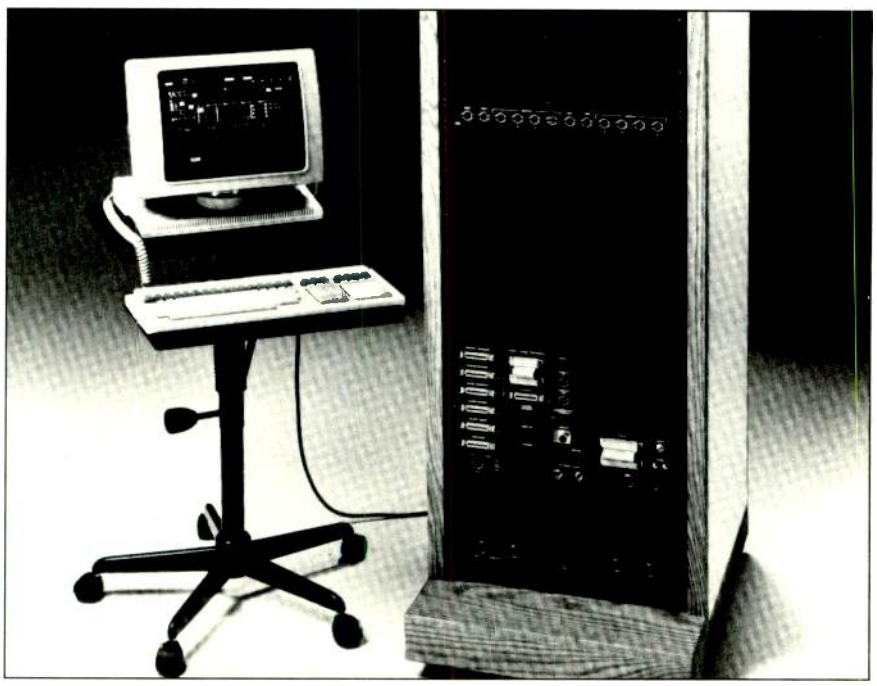
Franklin B. Sullivan
Vice President, Sales and Marketing
New England Digital Corp.

In a recent edition of your magazine [Radio Engineering, March 1989, p. 67] you stated that Motorola Semiconductor Products Sector was a supporter of the FMX system and was in design with an FMX decoder chip. While we find the concept very interesting, we do not now endorse the system nor do we have a chip design in progress or planned. Our engineering and new product planning staff are following both the technical and market issues closely, but no decision to "jump on the bandwagon" has been made. In the future, please refrain from using Motorola's name as a supporter of the system or as a maker of decoder devices until that is a fact established in writing.

Richard Potyka
Manager, Applications Engineering
Motorola Bipolar Analog IC Division

Editor's note: Information about Motorola's alleged interest in FMX came from a fact sheet provided by Broadcast Technology Partners.

BME welcomes your comments and questions. Write to us c/o Feedback, BME Magazine, 401 Park Avenue, South, New York, NY 10016. CompuServe subscribers may write via Easyplex to ID 71350,1377. On MCI Mail, write to MCI ID 326-8115.



New England Digital's PostPro digital audio post-production system.

Ikegami's HK-323P at NBC's automated studio

The NBC television network's automated studio features some of the most sophisticated robotics technology available, complemented by the most flexible, high performance video camera: Ikegami's HK-323P.

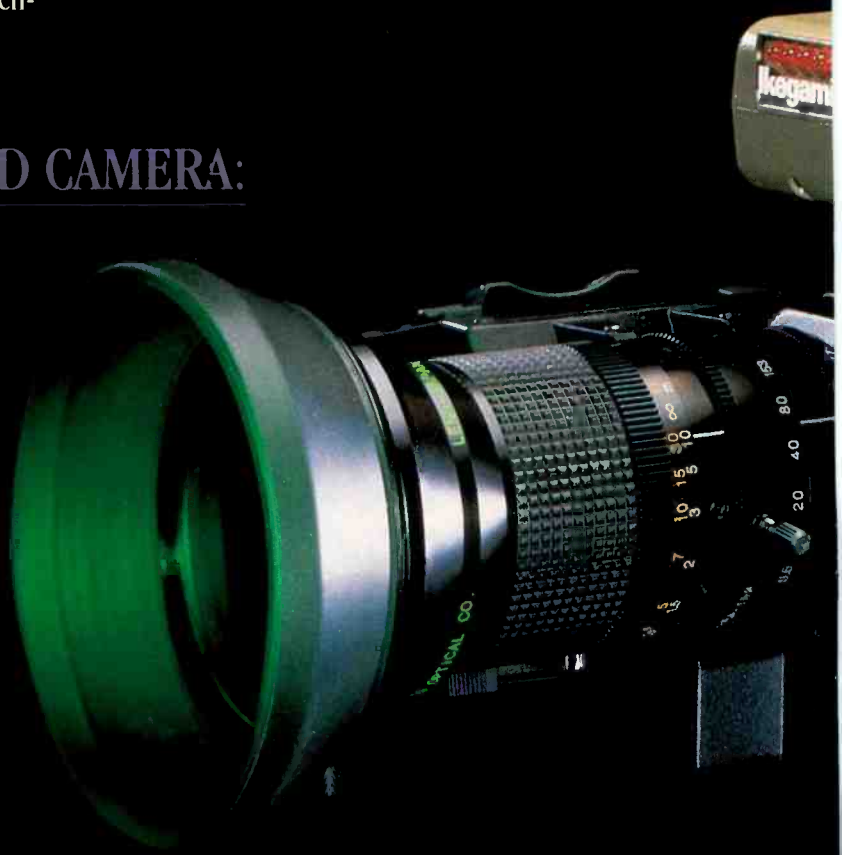
Home Shopping Network thought so much of the camera they purchased more than twenty for remote studio operations.

And to insure state-of-the-art broadcast quality, the pictures transmitted by the Goodyear Blimp, are sent via the HK-323P.

It's not surprising that a camera designed to be the hand-held version of our studio model HK-323, would become such a popular studio camera itself. The HK-323P, which operates off the same base station as the HK-323, is just that good.

THE HK-323P HAND-HELD CAMERA:

DISCOVER WHAT MAJOR NETWORKS AND CABLE SYSTEMS SEE IN IT.



Ikegami

Offering the most control functions of any hand-held ever, the HK-323P features a built-in microprocessor for various software based control functions and fully automatic setup, high performance prism optics, auto-knee circuitry to handle high contrast, scene files with extensive memory, the sharpest picture quality regardless of scene color content or special color lighting, selectable gamma values; 0.45, 0.4, 0.35, two motorized servo filter wheels each with four positions, a back-up memory system, and various adaptors for total system flexibility.

All this in a hand-held camera, critical buyers are looking into.

For more information contact your Regional Ikegami Office.

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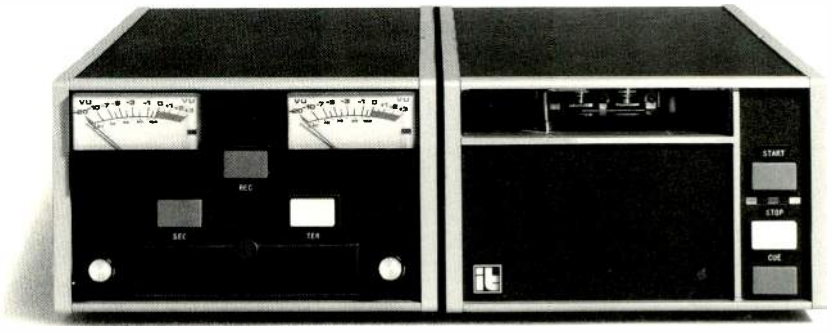

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UPDATE

SuperNTSC Meets First Air Date ... AKG Buys Orban and dbx Pro Division ... U.S. Broadcasters Defend R-DAT ... UEI Moves to Buy Unitel ... This Is Not A Test

SuperNTSC Meets First Air Date

NAB attendees got to see the first over-the-air broadcast of Faroudja Laboratories' SuperNTSC enhanced NTSC transmission system right on the Las Vegas show floor. Special receiver sites at the booths of Television Technology Corp., Dolby Corp. and Faroudja Labs, as well as a fourth at the TTC suite in the Las Vegas Hilton, served as viewing points for the broadcasts.

The broadcasts originated at local UHF station KBLR-TV using a TTC transmitter and Dolby digital audio transmission system. SuperNTSC, which operates over a single 6 MHz channel, combines preprocessing at the transmitter with post-processing at the receiver. Unmodified NTSC receivers experienced no problems with the transmissions, according to Faroudja. In fact, conventional NTSC reception benefited from a reduction in artifacts, spokesmen for Faroudja and TTC stated.

Hitching its horse to the HDTV wagon, Dolby Laboratories participated in the demonstration utilizing a broadcast TV version of a Dolby digital audio system used here and in Australia for network distribution and teleconferencing. The prototype system was built especially for the test, a Dolby spokesman confirmed.

Compared to analog audio transmission systems, digital audio is relatively immune to degradation as it passes through transmission and reception stages, the company said. An audio signal received by a TV set equipped to receive it is therefore virtually identical to the signal which leaves the studio. A conventional audio signal was transmitted simultaneously with the Dolby digital audio signal to ensure full compatibility with all TV sets throughout the test. The Dolby system can be easily implemented by broadcasters, the company said, while receive circuitry in the simple decoding equipment requires components valued at around $10.

Shortly before NAB, Faroudja joined with cable MSO Telecommunications, Inc. in a similar demonstration of SuperNTSC transmission over cable television. ■

AKG Buys Orban and dbx Pro Div.

Stamford, CT-headquartered AKG Acoustics, Inc. has acquired the assets of Orban Associates and issued a letter of intent to purchase the dbx Professional Products Division of beleaguered audio technology conglomerate Carillon Technology. The Orban acquisition was announced at the NAB; Carillon announced it accepted AKG's offer for dbx May 15.

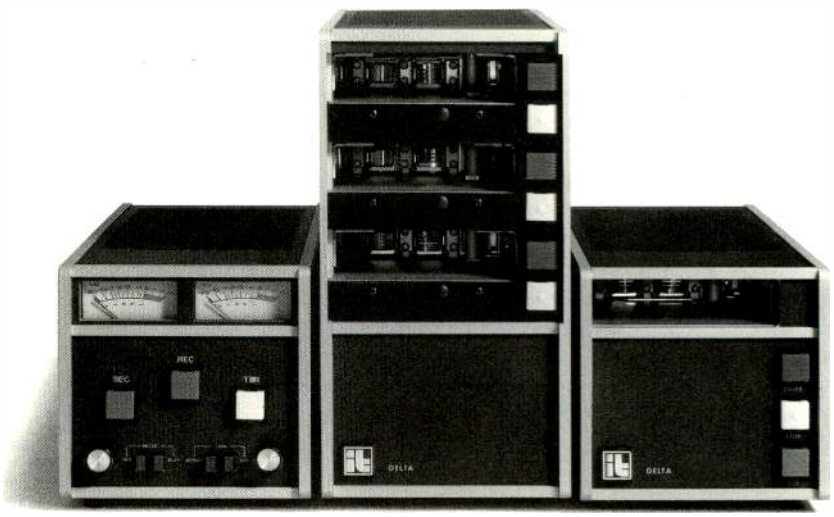
"These acquisitions consolidate our direction in terms of audio processing and broaden our product mix outside our traditional acoustic area," said AKG president S. Richard (Dick) Ravich, explaining the acquisitions both aid diversification in "synergistic" business areas and provide manufacturing capability in the United States. "We are developing digital products in Vienna and at our R&D facility in Boston, and the United States is a great place to produce them," he said. AKG also made the acquisitions in order to establish itself as an exporting company, thereby hedging itself against currency fluctuations in the global market.

Orban Associates parametric equalizer.

AKG will continue to service and support all dbx and Orban products currently in the market, as well as retaining both brand names, Ravich said. The dbx acquisition delivers unspecified company assets and technologies plus the right to produce products for the professional markets under the dbx name, according to Ravich. Carillon will retain professional and consumer licensing rights and operations. AKG further plans to develop upgrades, new products and technologies under the dbx name, Ravich added.

AKG's international

Here's another reason we sell more cart machines than anyone else.



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marketing capability through five subsidiaries, including a new operation in India, gives Orban broadcast products more "legs," according to Orban general manager John Delantoni. Orban will become an operating division of AKG and will continue to operate from its base in San Francisco. It will also make products for AKG.

The dbx Professional Products Division is based in Newton, MA. In related news, a newly formed company of former dbx employees, has purchased the dbx OEM products division. THAT Corp. is based in Natick, MA; it will continue dbx OEM operations including voltage control amplifiers, RMS detectors and circuit boards. Carillon Technologies will continue to own and operate the dbx consumer products and licensing business, chairman Jacques Robinson said in a statement. Carillon also owns Audio Dynamics, ADC, CTI Japan and Finial Technology.

AKG Acoustics has operated for the past 30 years as a marketing and distribution subsidiary of its parent company, AKG Acoustics, Vienna, Austria. The parent company manufactures microphones, headphones and a variety of digital products including the CAP 340M sound computer and the highly rated DSE 7000 digital sound editor launched at the NAB. ■

UEI Moves to Buy Unitel

Exemplifying the current industry trend for creating vertically integrated companies through acquisition, United Kingdom conglomerate UEI Plc. is trying to acquire Unitel Video Inc. It recently executed a definitive agreement to merge the facility with a UEI affiliate following the failure of Unitel's board to approve a separate leveraged acquisition proposal.

Headquartered in England, UEI is the parent company of Quantel and Solid State Logic plus other high-technology companies working in the medical electronics and defense industries. Unitel, a leading production and post-production facility, has branches in New York and Los Angeles. UEI now owns 27 percent of Unitel's outstanding shares plus the right to purchase an additional 28 percent of shares currently owned by Unitel founder and CEO Herbert Bass and Alex Geisler. The merger agreement must be approved by two-thirds of Unitel's common stock shareholders. UEI's option will lapse September 18, 1989 or a week after shareholders do not approve the merger, whichever is later.

The de facto acquisition is expected to be completed by early June, according to a UEI corporate spokesperson. ■

Broadcasters Defend R-DAT

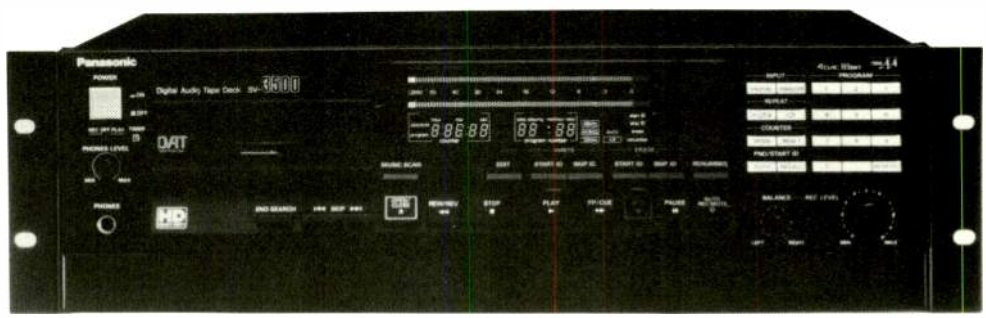
In the wake of a recent European report decrying the viability of the R-DAT digital audio format for broadcast use, the American audio community has rushed to the controversial format's defense. The report, which questions inter-machine compatibility and format durability, was issued in April by the Munich-based Institut für Rundfunktechnik.

"This format has been incredibly maligned and this report will slow acceptance down again," said Steve Woolley, director of sales and marketing for Panasonic RAMSA. "They clearly had bad tape and possibly bad transports." Unacceptable levels of error correction and limited number of passes found in the format a year ago were proven to be the result of bad tape which clogged heads, Woolley pointed out.

"If a machine is clean and you use good tape, at 2800 passes any error correction is minor and the results are inaudible," he said. "This is a robust format designed for the abuses of the broadcast environment." Panasonic, which featured a technology demonstration of a SMPTE time code-capable professional R-DAT editing system at the NAB, responded to the West German report by setting up a quality control test on the show floor. The Panasonic equipment was set up at 44.1 kHz to run 60 continuous passes per hour 24 hours a day; over 6000 passes were successfully completed by the close of the show.

"Damning a format on the basis of a small test is based on a very weak premise," snapped an industry insider who requested anonymity. In common with many manufacturers, he suspected political motives for the report. "The German community also naysayed the one-inch C format; you notice the Europeans make no R-DAT equipment or tape."

The broadcast communi-



Panasonic's SV-3500 studio DAT deck.

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ty also refuted the format's alleged compatibility problems. "If manufacturers comply with the DAT convention, there are no compatibility problems," Woolley stressed. The "Pro DAT" standard currently under discussion refers to compatibility in time code, not to format design.

"We've found very minimal errors in heavily abused tapes, but no audible problems," said Marc Damon Cohen, vice president of sales and marketing for Fostex. Fostex's four-head R-DAT time code deck was first seen last fall at the Los Angeles AES. Tests at the time revealed an error rate of 250 in 2800 passes. "These are better longevity and audio quality results than you'd get from analog tape formats," he said.

Varying degrees of compatibility reported in the West German study could result from mixing consumer and professional R-DAT decks, where tracking capability may be set to different tolerances, he added. "You need professional transports," he said.

Both Panasonic and Fostex insist that the R-DAT format meets professional application requirements. "It has been our experience that R-DAT machines work and work reliably," Cohen said. "In the face of experience in recording and production studios for over a year, the format works," Steve Woolley said. ■

This Is Not A Test ...

Does your interest in television extend beyond work? If so, you have a lot in common with the members of the British Amateur Television Club, 40 years old this year. The BATC, whose ranks include television and radio amateurs as well as pros, collects old TV equipment and archive material.

Last year the BATC produced an hour-long documentary on the development of the TV test pattern from the early years to the present. The group is now collecting material for a follow-up, "Test Cards of the World," and is seeking 2x2 slides of American test cards and station IDs. Contact Andrew Emmerson, 71 Falcutt Way, Northampton, NN2 8PH, England. ■

Heart Monitor.

No matter how you look at it, the heartbeat of your TV station depends on a healthy transmission line. If a problem develops, how would you ever know until it's too late?

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The rugged PRH-1 puts out a low current, 5,000 volt variable pulse that overcomes the obstacles of long transmission lines, with no risk of damage. What you end up with is a series of echoes from the pulse displayed on your oscilloscope screen which represent your transmission line. The shape of the echoes determines the nature of any problem.

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What you don't know about your transmission line can hurt you. Considering the consequences you'll suffer being knocked off the air, shouldn't you consider buying the PRH-1 as your top priority?

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The birth of the ACR-225 was a longer process than we'd anticipated, and many video professionals exhibited patience and confidence in us throughout the extended shakedown phase of the ACR's development.

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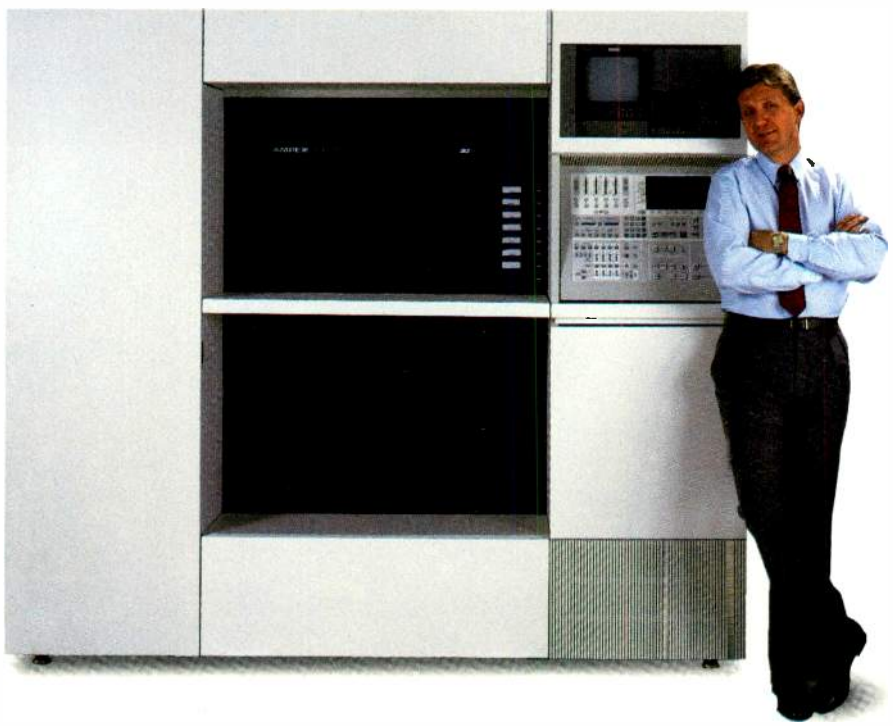
"It was worth the wait."



For that trust we'd like to say, "thank you!"

And for all of you who will someday own an ACR-225, we think you'll agree that the reliability and uncompromised signal quality of this advanced digital cart machine was worth every minute of the time it took to do it right.

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CROSSTALK
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Business Booms at NAB ... Panavision Adds 1125/60 Cameras

Business Booms at NAB

By all accounts, business was good at NAB '89. Record numbers of attendees (over 50,000 by show's close) transacted business with apparently gleeful abandon. Manufacturers, recovered from the ordeal of last fall's New York SMPTE convention, unanimously reported strong sales and good reactions to the enormous number of new product introductions.

Here, we briefly note several major business developments announced at the convention:

First, recording studio equipment manufacturer Neve has been named the exclusive North American distributor for Mitsubishi Electric Professional digital audio products. The announcement was made by Barry Roche, president of Neve North America, and Shinji Miyata, president of Mitsubishi's Digital Entertainment Corp. subsidiary. Based in Bethel, CT, Neve is a subsidiary of the European Siemens conglomerate.

Business was good at NAB '89, as a record number of attendees transacted business with apparent gleeful abandon.

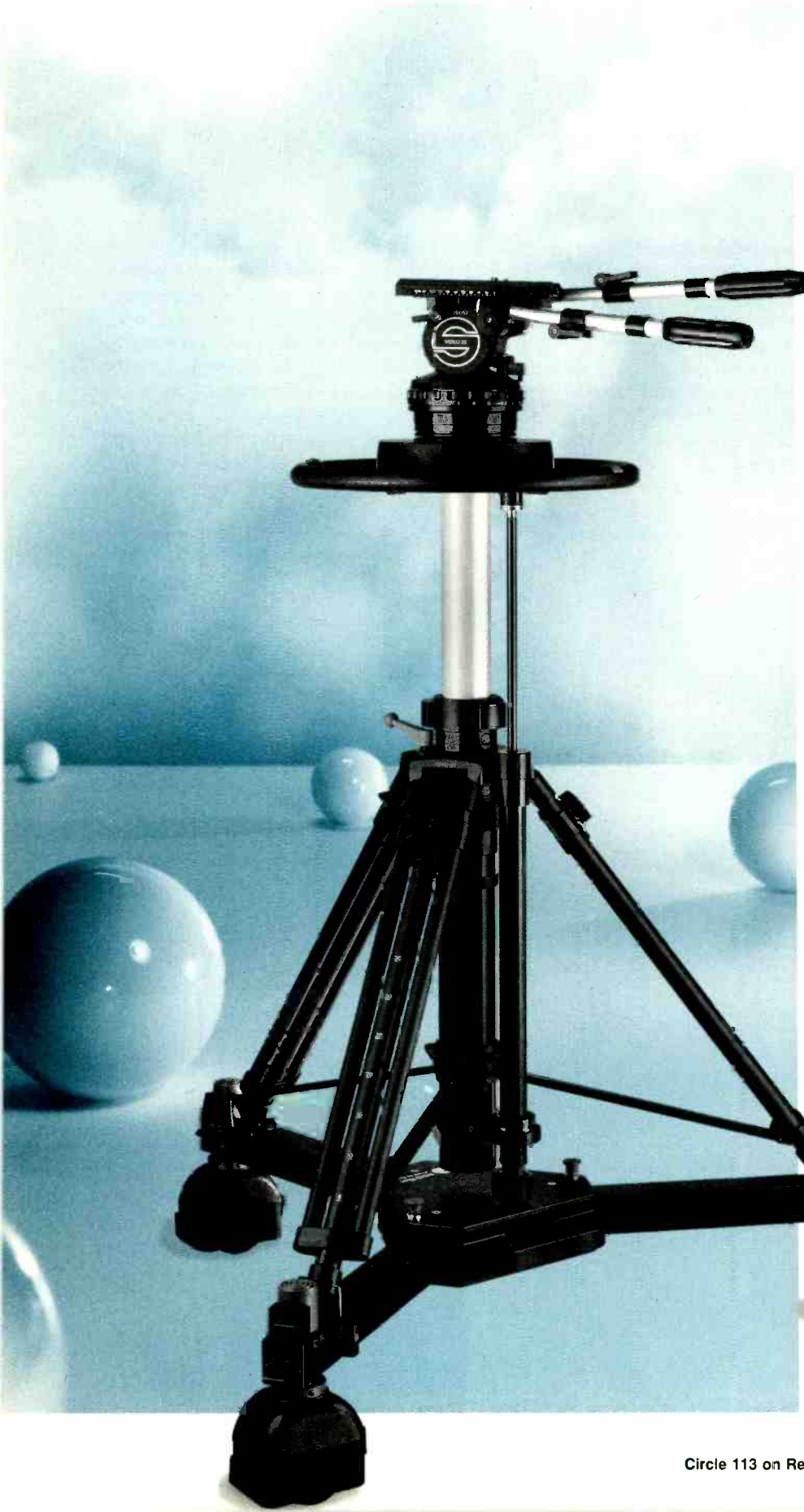
Effective immediately, Neve will distribute, service and support all Mitsubishi Prodigi-format digital reel-to-reel tape recorders and ancillary equipment in the U.S., Canada and Mexico.

"There's no question that Neve and Mitsubishi will cooperate and coordinate product development for the future," said Roche, adding that the venture will accommodate pricing packages on turnkey installations. "Siemens and Neve believe that Mitsubishi's Prodigi (PD) format is a key digital format and we will support it worldwide," he said.

Meanwhile, M&M Syndications, a national TV syndication company headquartered in Voorhees, NJ, has acquired Sigma Sound Studios, New York City. M&M producer Gary Robbins will become general manager of the facility, which is now also being positioned to offer audio sweetening for video. Ampex recently delivered a D-2 digital video recorder to augment Sigma's Neve V and SSL G- and E-series audio consoles and Mitsubishi 32-track X850 and two-track X86 digital tape machines.

Mitsubishi's X-8800 digital ATR.

Hello world.
We can put you on a pedestal.



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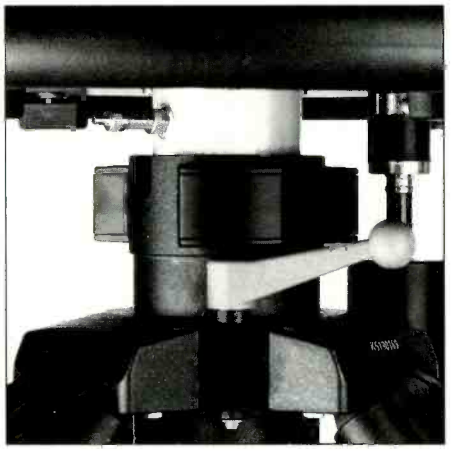

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"We answered an ad to buy some microphones for our television production operation," said M&M Syndications president Michele Pruyn. "Before we finished negotiating, we realized a recording studio was a smart fit with our creative and business strategy." M&M also owns and operates New Jersey-based film and TV production and post house Edit Masters.

In addition, Northvale, NJ-based Comprehensive Video Supply Corp. has formed a separate corporate division. Called CV Technologies, the division will concentrate on developing PC-based products for the professional video market. Comprehensive Video vice president Elizabeth Coppinger will head the division, which plans to acquire proprietary machine control technology for VTRs, switchers and special effects generators control.

Finally, *BME* has confirmed that two SNG truck and installation contractors—Centro and Dalsat—have ceased operations. At the same time, Phil Dudderidge, the former chairman of audio console manufacturer Soundcraft, has purchased the assets of Rupert Neve's high-end professional audio company Focusrite, Ltd. Manufacturers of EQ and compression modules and custom consoles, Focusrite ceased trading in January and went into compulsory liquidation in April.

Focusrite's liabilities were too extensive to accommodate a rescue, according to Dudderidge, so he established a new company, Focusrite Audio Engineering Ltd., to manufacture and market Focusrite products. Former Soundcraft R&D manager John Strudwick has been appointed technical director and former Focusrite engineers have been retained.

Panavision Adds 1125/60 Cameras

At a pre-NAB press conference in Los Angeles, Panavision, Inc. announced it will add 1125/60 HDTV cameras to its rental inventory before the end of 1989.

Sony's HDC-300 HDVS camera system.

As with all Panavision products, the cameras will be rented to customers, not sold. Rental pricing will be on a systems basis and "slightly more expensive than our film cameras, but less than twice as much," according to Panavision president John Farrand.

In an arrangement reminiscent of Panavision's previous video camera effort in conjunction with CEI, they will not manufacture the electronic portion of the camera, but will buy it from an outside source. These cameras will be existing model, ac-powered Sony units that will be remanufactured in the U.S. by Panavision to enable filmmakers to work with HDTV "without giving up familiarity with the look and feel of film cameras," said Farrand. The modifications will be operational, optical and ergonometric, based on Panavision's interviews with cinematographers who have used existing HDTV gear.

In an attempt to overcome objections about focus problems with current models, the Panavision HDTV cameras will include an optical viewfinder. To give cinematographers and camera operators the comfort of using tools they are used to, the video cameras will use the same prime, macro and zoom lenses used by Panavision film cameras in either spherical or anamorphic configuration. There will be complete compatibility with all Panavision optical accessories such as matte boxes.

Seven working systems will be available for rental late in 1989. To permit ease of system use, Panavision HDTV systems will also include rental of Sony 1125/60 video recorders.

Commenting on the use of HDTV as a production medium in its own right, without waiting for the battle over transmission standards to be settled, Sony Advanced Systems president William Connolly saw the Panavision announcement as an indication that "HDTV is here and now as an opportunity for filmmakers." Connolly revealed that Sony has sold over 100 HDTV cameras to date, worldwide, with over 35 units sold in the U.S.

Connolly said that he sees HDTV as a medium that need not be used alone, but rather as one that may be integrated with film where appropriate, or used as an effects or insert photography system within film productions. ■

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WE'VE SEEN THE FUTURE AND IT FITS.

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

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

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

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

Panasonic cameras, from our new, all solid-state AK-450 to the new all-digital AQ-20 and AQ-10, are designed to slip transparently into the operators' experienced hands.

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

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

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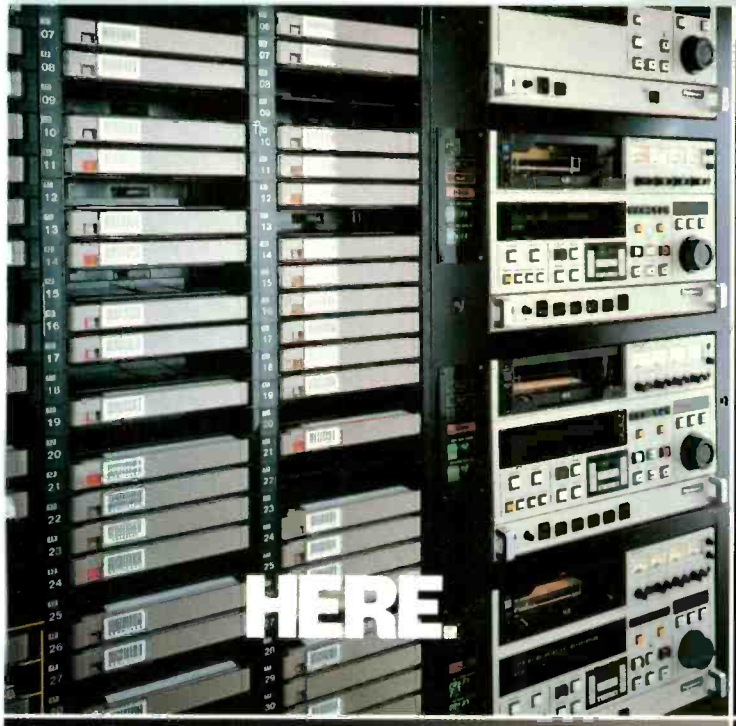
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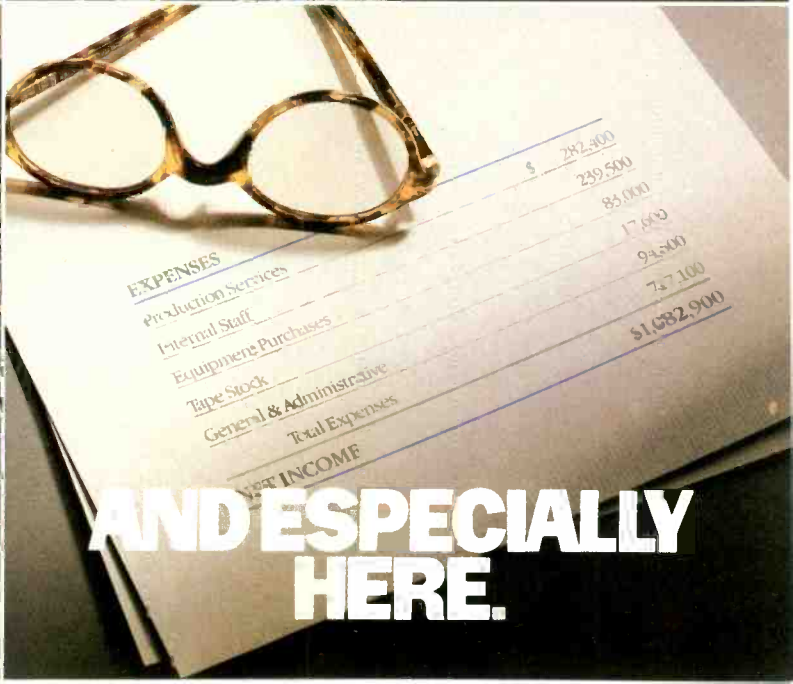
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ASICs Take Over Circuit Design

By James A. Ackerley

Floorplanning phase of ASIC design showing silicon graphics routing using a Sun workstation.

The last five years have seen a dramatic revolution in the design of electronic circuits. A new kind of chip called an application specific integrated circuit (ASIC), which may contain as many as 100,000 gates, is replacing the circuitry of entire printed circuit boards. An electronic system that once took months to develop can now be designed and produced in as little time as two or three weeks.

Manufacturers estimate that over $5 billion of ASIC chips will be produced in 1989. Companies involved in the design and manufacture of ASICs include LSI Logic, NEC, Toshiba, Fujitsu, Oki, Hitachi, Gould, Hughes, RCA and Motorola.

Few segments of the electronic industry remain unaffected by the trend to ASICs. The broadcast industry, especially, has been transformed by ASIC technology. A typical comment comes from James F. Duca, director of technical planning and market research for the Ampex Video Systems Division, who says, "All of our new digital systems depend on ASICs."

Dave Larkins, project manager for Grass Valley's DPM-100, expresses a similar thought. He says, "The DPM-100 is a two-channel digital effects device in a three-rack-unit frame. We could never have compressed so much into so small a space without the use of ASICs. This technology also kept costs and the selling price in line."

Dan Castles, general manager of the Television Division at Tektronix, says, "We are currently using ASICs in some of our new product designs and see that utilization as increasing. The continually increasing technical needs of broadcasters require more performance in the same or less space and we therefore see the application of ASICs as being necessary to achieve the level of integration necessary to accomplish this."

Another kind of semi-custom chip, somewhat similar to the ASIC chip, is the programmable logic chip. These are off-the-shelf items which are customized by electrical programming to perform any logic functions for which Boolean equations can be written. John Hamburger, marketing communications manager for Cypress Semiconductor, says, "The programmable logic market is growing very quickly and is being fueled by the dual benefits of design flexibility and reduced time to market."

Most ASIC design is done on engineering workstations using computer-aided engineering (CAE) software. These workstations have a much higher throughput, on the order of 10 to 20 MIPS, than the average personal computer and often derive a good portion of their increased speed from another new technology, reduced instruction set computing (RISC).

The RISC processor, which is currently the hottest development in computing and plays a prominent role in the design of ASIC chips, is usually an ASIC chip itself. In this way the revolution in electronic design fuels itself and the stream of new and better products for the broadcast industry continues to grow.

An ASIC can be made in one of two ways, either with gate arrays or cells. Using gate arrays, the initial chip,

ASIC technology reduces the size of the product and drastically cuts design time.

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which is called a base wafer or a masterslice, is partially prefabricated with rows and columns of p- and n-type transistors, but without the metal conductors that interconnect the transistors. Gate lengths as small as 0.7 micron enable great size and weight savings in the finished product. These base wafers are prepared in advance and in quantity.

The design problem is to prepare the masks that will allow two or three metal deposits on each base wafer to form the connectors that tie the transistors together into complete circuits. Since the same gate array is used for many different circuit designs, there can never be exactly the right number of transistors. Excess transistors are electrically, but not physically, removed from the circuit by running conductors through them.

While an array-based ASIC is a semi-custom chip, a cell-based ASIC is a fully custom chip that starts from a blank piece of silicon. One of the big problems with any kind of circuit design is getting a workable circuit, or in this case a workable system, on the first try. The big advantage of an array-based ASIC is a higher first-time success rate than a cell-based ASIC. In most cases, however, it is a close tradeoff and several complicated technical factors must be considered in choosing between gate arrays and cells.

The first step in ASIC design resembles the first stage of any electronic design. The customer's design engineer defines what the proposed system is to do and generates a schematic diagram. At this point, the customer has three options. He can turn the entire project over to the ASIC supplier, work with the supplier using the supplier's workstation and CAE software, or take over the entire design task himself.

Some CAE software uses a generic compiler that designs ASICs for any wafer material. Others use a silicon compiler, which designs ASICs only for silicon wafers.

Based on the data supplied by the design engineer, the CAE software estimates the die area requirements and, interactively with the design engineer, performs a "what if" analysis that becomes the basis of a basic chip floor plan.

The design process continues with the utilization of libraries of building blocks. The building blocks are many hundreds of predesigned units of circuitry that perform specific functions. To the extent that part of the finished ASIC can be built up by assembling these building blocks, the work of design is greatly simplified.

More of the ASIC's circuitry is developed using various compilers and logic synthesis. Working from simple functional descriptions, the memory compilers create custom ROM and multiport static RAMs. Logic compilers create such specialized blocks as adders and multipliers. Compilers also automatically generate schematics and simulation models, which can then be integrated with the rest of the design. The logic synthesis creates circuitry from truth tables and other expressions of logic.

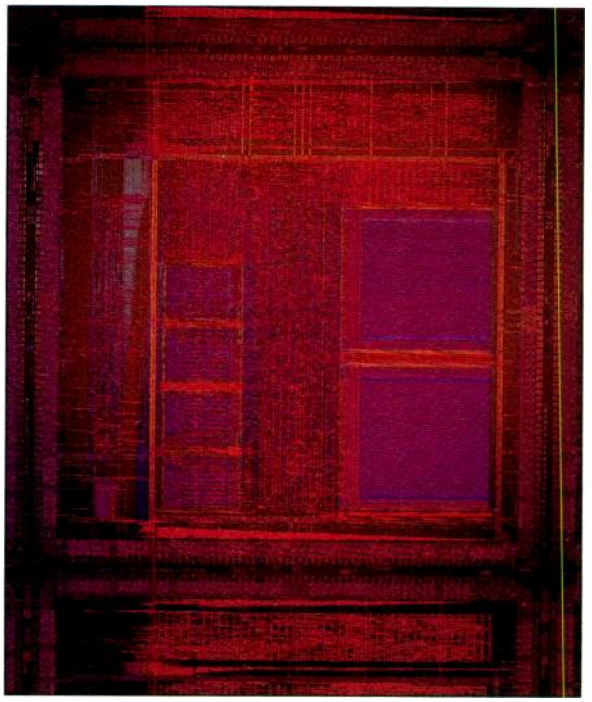
The CAE software generates waveform patterns to show the timing. Changing the waveform changes the circuitry. Potential noise problems can also be eliminated at this stage by analyzing the display for current spikes and floating nodes at peak and average power values for a given set of simulation patterns.

At this stage, the CAE simulates the operation of the entire circuit and the design engineer compares the results with the design requirements. After simulation, a complex ASIC goes through "floorplanning." This process moves the various blocks and subcells around on the chip to assure timing accuracy and efficient area utilization.

Layout integration, package planning, and testing complete the design of the ASIC. The CAE software performs the actual layout and routing of the chip by addressing and solving such issues as clock skewing and power routing. Testing is vitally important to ensure that the chip works the first time and that redesign is not necessary. The CAE software provides for testing by creating test patterns based on previously gathered simulation data.

The only chips not in danger of being replaced by ASICs are memory chips, which already deliver the maximum functional capability for the smallest expenditure of space. As Rich Brossart, product marketing manager for LSI Logic, observes, "The world is moving toward all ASICs systems. The computers of tomorrow are being built of all ASICs and memory." ■

Ackerley is BME's technical editor.



Photomicrograph of an ASIC containing an imbedded microprocessor. This chip is a complete electronics system and will be used to operate the control surfaces of a military jet aircraft.

POST-PRODUCTION
VIDEO RECORDING
HDTV
DIGITAL AUDIO
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RADIO BASICS

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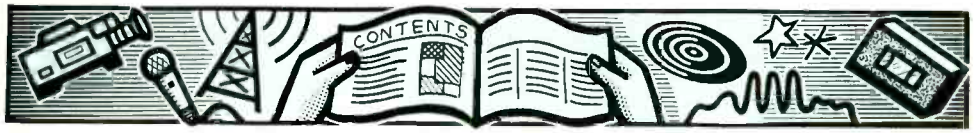

NAB '89: ENGINEERS SPEAK OUT ON THE STATE OF THE INDUSTRY

Technological change drives the broadcast industry—but is it driving in the right direction? At NAB 1989, seven panels of leading engineers from television, radio and teleproduction considered the impact of change on different areas of technology during *BME*'s second annual Engineering Roundtable series.

"Unfortunately, the '90s are going to be more chaotic than the '80s could have ever been," predicted one participant. "We're going to see a lot of things that are going to make the '80s look like slow motion."

If the pace of change is picking up, it's doing so from an already fast base. The pressures are felt by broadcasters and suppliers alike as technology advances and standards proliferate.

"Manufacturers get down their own developmental path so far that they can't turn back, and that's why we're seeing less and less standards," another panelist suggested. "I don't think you are ever going to see a standard for videotape or some kind of recording medium again. I think you'll be very lucky if two majors stumble into the same arena."

Does this spell doom for the industry? Hardly, although major upheaval seems likely on several fronts. In the pages that follow, we've recapped the seven Engineering Roundtables *BME* hosted during NAB '89. Our seven topics this year included video recording and acquisition; television basics, including advances in automation; radio basics; digital audio; high definition television; television post-production; and transmission for radio and television. Our panelists were radio, television and teleproduction engineers from around the country, representing a broad spectrum of interests and applications. The engineers who joined us for these wide-ranging discussions had strong opinions on the technical and economic pressures they face.

Opinions, too, shape the future of the industry. *BME* is proud to provide a forum for engineers to speak out. As another panelist commented, "We're not going to come away from this convention, or from any forum, with the answer or the solution. But it's important that there is a means of exchanging ideas back and forth. It's like any government, like any business left to its own. If there isn't feedback, then it's left in the hands of people who will serve their own best interests." ■

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CONNECTIVITY IS THE KEY IN RECORDING TECHNOLOGIES

In an industry squeezed more than ever by economic pressures—on manufacturers as well as TV stations and teleproduction facilities—format proliferation seems to have become a way of life. Panelists at *BME*'s Engineering Roundtable on video recording and acquisition, while weary of the "one more format" syndrome, recognized that standardization on a single format may no longer be possible in today's industry.

The logarithmic development of non-tape formats, furthermore, fueled their concerns about system interconnectivity and communication. And hopes for an all-digital future did not allay concerns over everyday analog problems.

Participants included Karl Renwanz, vice president, engineering and operations, WNEV-TV, Boston; Tony Cutraro, director of engineering, Marx Production Center, Milwaukee; Jim Bartel, chief engineer, Post Effects, Chicago; and Neil Feldman, president, Video Post & Transfer, Dallas. Eva Blinder moderated.

BME: There's a lot of interesting development going on in this area. Has anybody here seen the Panasonic half-inch digital format?

BARTEL: It's technically the same thing as D-2 in a way. It's limited to eight bits, though. D-2 has within the specification the capability of going 10 bits. But the recorders that are currently on the market are eight-bit.

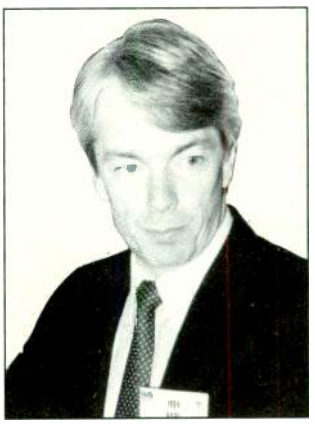
CUTRARO: I've been aware of the Panasonic machine. I'm just not interested in another format. The D-2 format exists, it's real, and now there's a portable one, too. I see no point in it, and I hope very much that we don't have to have it just for the sake of it being on half-inch tape.

FELDMAN: We've been extremely pleased with D-2. It's been a very successful format in our market. But some of the other major facilities have sort of been dragging their feet. And I think part of it is because there is a burnout in all of the formats.

RENWANZ: D-2 has not been accepted by the broadcast community yet. The half-inch format that Panasonic is showing does have some distinct advantages for a broadcaster in the future. One could be portability. And I'm not sure that even in the broadcaster's future much beyond eight bits is going to be terribly necessary.

CUTRARO: In my market, we have a broadcaster who's already got D-2 cart machines on line. And to me, it is the acceptance of the broadcasters that will determine how fast D-2 completely proliferates.

RENWANZ: Our station has ordered two ACR-225s. But I can tell you that we



Karl Renwanz

have 20 broadcasters in our market and out of those 20, only two have ordered that piece of equipment.

FELDMAN: Well, that's not exactly surprising. In post-production we have different pressures on us. But the point is to me, as a mastering format, D-2 is the logical format.

CUTRARO: I think a key word we're hearing here is the integration of a wide variety of different formats. D-2 is ripe for acceptance right now, but it still has to coexist with a lot of good acquisition formats.

RENWANZ: We are a total Beta SP house. We're going D-2 for air operations. And you know, I'm tired of more formats. I've been saying that for a lot of years, though. I said that for M-1. And I owned a lot of that.

FELDMAN: But the curious thing is all those other formats were always in some way a compromise down from one-inch as far as quality. Now here's a format that's a step up. And what surprises me is how much resistance there has been.

CUTRARO: Formats may not be such a problem at Jim's company, being as specialized as he is.

BARTEL: Formats are a problem for us, just as with everybody else. In post-production, of course, we're always after that Holy Grail of the best image quality in multilayering. We are always looking for a better format, a format that solves a problem.

BME: With the original introduction of Betacam and M-format, we started to move into a component world. D-1, of course, is a component format. Philosophically, is part of the resistance that broadcast stations have to D-2 going back to composite?

RENWANZ: As the co-originator of the component switcher, we had a great ill feeling toward any composite format. We wanted to

stay component because we learned to spell that word very well in 1982, and we're very happy with what we have. But I think what overcame our concerns was just the overall quality, and the fact that you can go down so many generations and get so many more features—you get tape speed wind that is quick enough to allow functions to happen that otherwise can't happen in videotape in a TV station. We are very happy with what we see D-2 providing at this point.

FELDMAN: I think first of all, in the long term, D-2 is going to help proliferate D-1 or any other digital component format, if there's going to be any more. And I say that because there are things that limit what you can do with special effects if you stay composite. If you do those things in component, you know that somewhere at the end you have to be composite. It all depends on when you finally make that jump. I was not a very heavy advocate of analog component, which to me just seemed to be a very big burden with very limited capabilities. The key here, even with D-2, is that we cannot give up any of the utility and flexibility you had in one-inch just for the argument that there's higher quality. Even though we could see high quality with component in analog, we didn't see the switchers and the support and everything else that our clients were accustomed to in the post environment. Now this is the argument with the D-2 switcher. Until I see a switcher that does everything that I'm used to seeing on a Grass 200 or 300 or the equivalent, I'm not going to get involved with that, just for the sake of saying we have an all D-2 switcher.

BME: Are switchers and other ancillary equipment for the new formats starting to come up in a timely manner?

BARTEL: They're starting. Already there are a couple of switcher products that are available. But I think the first products that are to market, again, aren't what Neil is talking about. They are more compositors. And that's nice, but we want switchers. We want, you know, a Grass 200-like switcher, two-three MEs, multi fader bars. Please, please don't give me a switcher with one fader.

FELDMAN: I'd like to see Grass just come up with a D-2 mainframe that interfaces with the 200 head. Then I don't have to go buy a whole new switch head.

CUTRARO: I think that once you see a format become embraced, you will start seeing a proliferation of ancillary equipment.

BME: You are all using metal tape formats at this point. How do you find tape costs and tape availability, compared to what you were paying before?

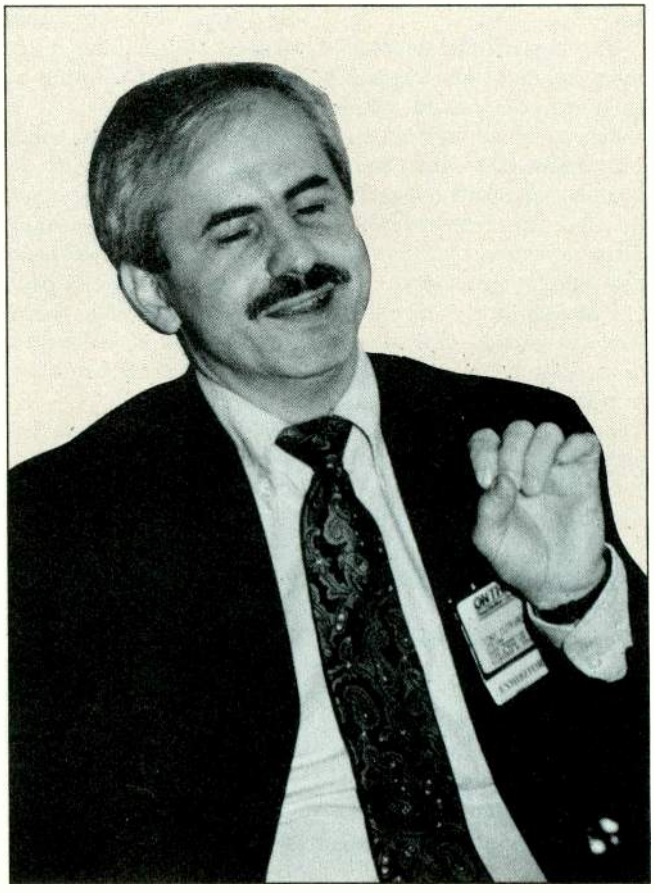
RENWANZ: We're at 100 percent metal tape. We have found our tape costs go down, because of the durability of the tape. A tape cycle for us is, the tape is immediately removed from its package, is placed upside down on the seat and driven to a location. You get to your location, you shoot, you throw the tape in the back seat when you are done. The tape is taken back to the edit suite, where it might be viewed, jerked back and forth for timing purposes—this all happens in record time, of course, because it's 10 minutes before news. Somebody then comes in and edits it.

That tape has had one cycle. I'm not sure how many passes that is. It never again sees the box, in our facility. We are at 20 plus cycles on our tape, and I've yet to throw any tape away.

FELDMAN: I think maybe James will back me up, but in post-production, we are not cycling tapes. So the cost of metal tapes is more to our clients because it's more to us at the present time. But I haven't seen anybody be particularly bent out of shape about that.

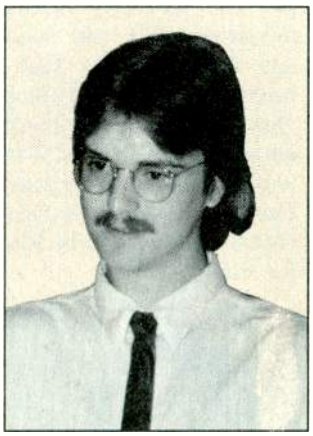
BARTEL: One other thing I'm sure you've come across is that we all were, at one time, very used to cutting down one-inch stock. You can't do that with a cassette.

CUTRARO: But there is also a wide range of available stock from three minutes all the way up to three hours, so you are pretty well covered.



Tony Cutraro

BME: What about the operational facilities of the machines themselves?
RENWANZ: We have 21 edit bays, five of which are multi-machine, and we operate on a LAN, so we have kind of a unique situation. And for what we do, the features are what took us to Beta SP.
CUTRARO: The operational end of the acquisition formats, at least for us, is pretty straightforward, and it's pretty foolproof. But because we borrow from the computer industry on the studio machines, now we are into some very heavily software-intensive machines, the D-2 machines and even to some extent the Betacam SP.
FELDMAN: Most people feel that the D-1 machine really doesn't have all the features they would like in the post environment. But as far as the operation, the panel is very similar to the D-2 machines. So it's pretty easy to feel comfortable with both. I think the big issue with D-2 for us was remote control of the machines into the edit suites. Zaxcom makes the system that we use, which is excellent and communicates with Betacam and Betacam SP, one-inch machines and their TBCs, and now the D-2 machines. There is one frustration with the Zaxcom and D-2, and that is we can't hit a button to take us in and out of preread.
BARTEL: If you are a seasoned operator and if you know how to use a one-inch machine, the D-2 machine is a godsend. But if you are new it takes a little getting used to.



Jim Bartel

RENWANZ: Operators really have to be a little bit more sophisticated, I think, in the newer formats—which is not bad news for the industry.
CUTRARO: I think regarding the engineering aspects of D-2, it also puts a tremendous responsibility of technical and engineering support on the manufacturer. I don't house equipment that can troubleshoot down to a component level what is going on inside of that frame.
BARTEL: Right. We're going to see more and more of that with digital technology and multilayer boards and ASICs and VLSI. There is no way this stuff can really be repaired in the field.
RENWANZ: We have most of the test gear to work on all the equipment we have. But we too are going to back off on how deep we go. If you purchase a piece of hardware and there is a board swap program for a few hundred dollars, it's not worth your time and expense to get involved. Perhaps in some critical cases, if you have enough machines, you have a few spare boards. We're planning our purchases with those spare concepts in mind.

BME: Let's move beyond tape for a minute. We're seeing more and more different ways of recording video and audio signals.
BARTEL: I think we're all looking at tape and saying oh, my gosh, there's another format. But we forgot a huge problem starting in digital storage. I would like to be able to take pictures from one device, store them on one digital storage medium, and be able to walk those over to something else. We're going to have to start looking at these digital storage mediums as seriously as we have been looking at tape, because they will be the future.
FELDMAN: This is more serious than that right now, because we are just at the point where we are going to have erasable disks at low cost. They are just around the corner, and they are really going to make a profound impact because of the cost of that technology and the fact that it becomes reusable.
RENWANZ: There are more formats around than we can count. That isn't as crucial to me as the communication link between them. It's that awful word "interface." You know, in the early '80s, late '70s, the word "user-friendly" was ruined. [Laughter.] And now we are ruining the word "interface" because the level of interface, the level of handshake, how deep it is, it's never defined. "We talk to this piece of equipment"—well, that's wonderful. Do you listen? Do you talk back? And how many languages are you fluent in? It's that communication link that is the real key to making all of these formats and devices work together.
FELDMAN: And if you are the guy who says "I want to get this first," you are seeing this beautiful piece of hardware, and the software is your hangup. By the time the software comes along, well, now your competitors have had plenty of time to know what you're up to.

BME: What about developments in erasable optical disks?
RENWANZ: I am intrigued by the floptical or any of the other methods that are coming up.
FELDMAN: The real problem for me is that I know today there are erasable CD disks for home use right around the corner. If we wait a year we're going to see this stuff, and the cost and all the rest of it that goes with mass production is going to completely change what we've had to put up with.
RENWANZ: And if you get something that's based on a consumer use, your cost comes down far quicker than it does for broadcast and post-production.

BME: Has anyone seen the Avid Technologies random-access editing system? They're recording video in real time onto 600 Mb SCSI drives that are hanging off a Mac II. It's not full NTSC resolution. But I thought it

was an interesting use of that technology.

BARTEL: We feel that random-access editing is finally coming of age. We were so impressed we bought the EMC² system. The system that we bought has removable optical magnetic media. To be quite honest with you, we had felt that the Avid had a little bit sexier interface to the user. But the EMC² is certainly head-and-shoulders above everything else that's available.

FELDMAN: We've got a Montage, and we've used it for several years. My only criticism of the random-access systems has been hunting for source material. We feel we need five hours, as much as we can get. But I do think that's going to change.

BARTEL: The drawback for the Mac II-based stuff is that you need removable media. Hard disk-based stuff is fine, but unfortunately the real world dictates that a session doesn't go for five days straight and end. It goes for two, it goes away, and then someone else comes in for another two.

BME: I want to segue into talking about cameras a little bit. This year it seems like CCDs, which have really taken over the ENG market, are within a stone's throw of the studio. There is also another development that I am curious if you've seen, which is the Panasonic digital processing camera. Anybody want to comment?

RENWANZ: We use 27 field cameras and the CCD is really the only way to fly. The question of what to buy has been a problem no different than tape formats for the past three years. But you have to ask yourself, ultimately, when is good enough good enough? And in our case, the BVP-7 from Sony is good enough. Every camera has an artifact. Some have many. In the studio, we've been using [RCA] TK-46s for longer than I've been at the station. I won't change them out until I can eliminate the need to shade them and set them up. And that includes having a CCD camera. It's getting close. I think 1990 is my year to purchase.

BME: Have you seen the BTS LDK 91?

RENWANZ: It looks very good. I think that the Panasonic digital camera looks good. I like the concept of having a digital stream from the output of the CCD to whatever medium we end up in. That camera may have some longevity.

FELDMAN: I don't know if it's pertinent, because I really haven't looked into this Panasonic camera, but one thing about keeping everything digital is that you have to keep in mind that some analog circuit processing is still superior to anything done digitally for the cost. In theory digital is great, but I wouldn't want to step down what we know we can do technically just to say it's digital.

RENWANZ: I fully agree. In fact, subjectively, which is the only evaluation you can give it, the camera looks quite good. It's a very small and very lightweight package, and they do have a version that you would use in the studio that I have seen as well. It looks very good and we're very encouraged by it, but if it's not available for two years, I'm not necessarily sure that that's going to be ideal for me.

Neil Feldman

BME: Is there something that should be here on the floor that's not? What are you looking for that maybe you didn't see this year?

BARTEL: I would say in composite digital, 10 bits.

FELDMAN: I would look more on the component side. We own a DF/X 200 and I'm very intrigued by 4:4:4:4 processing. The DF/X 200 and the Sony System G are incredible hardware devices that really bring another level of technology to what we do.

BARTEL: I know that, in effects work, everybody who is doing graphics has been clamoring for a tape machine that had a key channel in it. It's a pain to have to walk around with a matte reel all the time. The Aston still store device has noted that in its 4:2:2:4, which is a marvelous idea. Having a key channel there is great.

FELDMAN: I think Sony got a little miffed with the introduction of D-1, They wanted it to be more than it was. But I was pleased to see they were looking at 4:4:4:4.

BME: Karl, what about you? Do you have needs that aren't being met?

RENWANZ: I'm not satisfied with everything I see and there are small things I would like to see. But because of what we use and how we use it, I'm satisfied because I don't want to use tape in 1995. I want to use another medium, and there's a lot going to shake out in the next three or four years. And I can't say necessarily that I know exactly what's going to happen. I think it's going to be perhaps RAM, perhaps some kind of mini-floptical device.

CUTRARO: We're also seeing a very tremendous trickle-down effect to the point where there isn't that big a distinction now between what the entry-level guy can get for a lot less dollars and what we need to invest in order to maintain a certain level of distinction.

RENWANZ: You look at the computer industry, which is really miles ahead of us in technology, and they are heading into the visual world. And then you look at the video world heading into the computer world, and at some point—I hope it isn't a train wreck, but I hope it's a real merging of technologies. And I see it coming. ■

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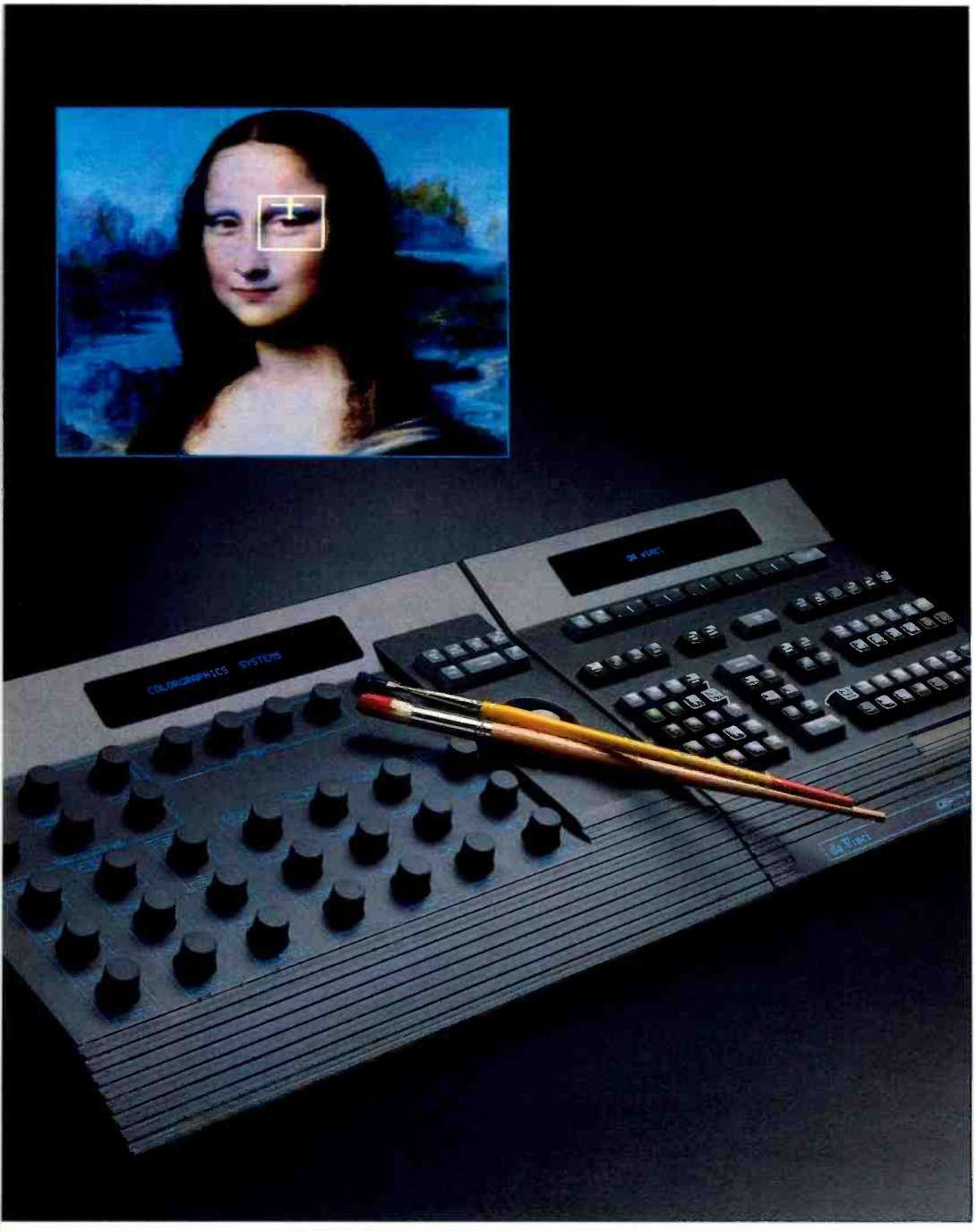

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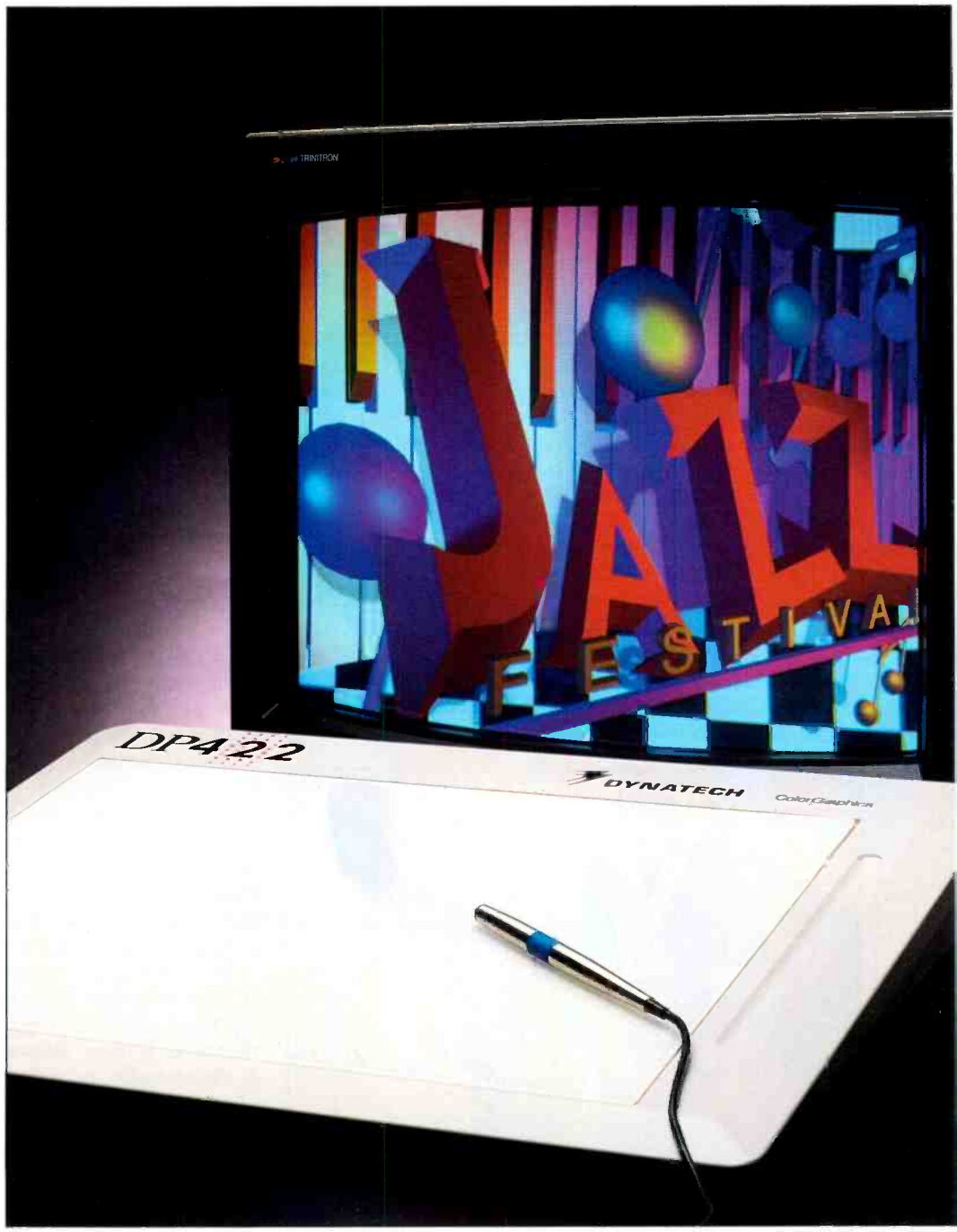

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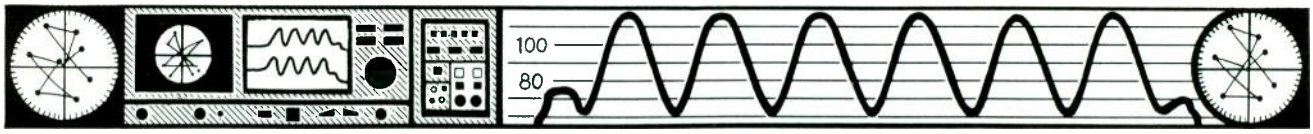


SEEKING THE APPROPRIATE AUTOMATION SOLUTION

The topic was "Television Basics," and our panelists took a hard look at the choices facing them in automating their everyday operations.

Like other television engineers, they face a daily balancing act as they weigh the sometimes conflicting demands of management and staff. All agreed we'll see continued automation of broadcast studio operations, but that the appropriate level of automation varies with the particular operation.

Joining the discussion were Talmage Ball, chief engineer of KSL-TV, Salt Lake City; Tom Mikkelsen, director of engineering, WTMJ, Milwaukee; Robert S. Murch, vice president, engineering, WPIX, New York City; and Roy Trumbull, assistant chief engineer, KRON-TV, San Francisco. *BME* editor Eva Blinder moderated the discussion.

Roy Trumbull

BME: When I walk around NAB this year, one of the things that I'm seeing is increased interconnectivity between various kinds of automation systems. Are we headed toward the totally automated television station?

BALL: They're economizing the equipment that produces the commercials and a lot of the things we're doing. That may move out of the station, leaving the station as an automated, computer-controlled facility that does nothing but put the program on the air.

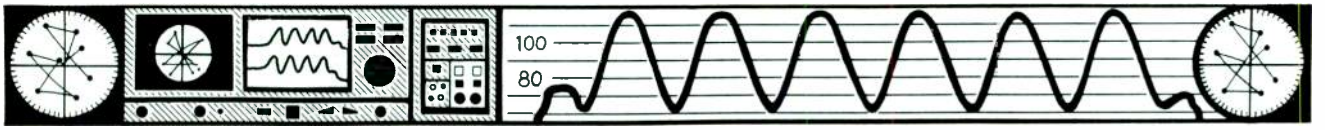
MURCH: And the large cart machines are out there. I would say this year the software is much more advanced than it has been in the past. Last year some of the machines were working fairly well. But I think this year a lot of software development is taking place. And it shows in the product. The machines can do more and more things that broadcasters are asking them to do.

MIKKELSEN: Software has really developed. And I think that the cost of PCs has been a big factor in driving the industry toward higher levels of automation.

MURCH: Well, that's always been the dream of PCs. One piece of hardware that's fairly well understood, bug-free, and can be used for many applications just depending upon the software.

MIKKELSEN: Talmage made a comment about manpower earlier. In terms of the total automated station, how far can you go and how far do you want to go? We've achieved a very high level of automation at our facility. The on-air operations essentially are all handled now by one engineer. How much further can you go? I don't think that any of us want to eliminate that individual, because that person still has to watch over the transmitter and do all these complex tasks that really require a human being.

TRUMBULL: I think you have to look at what you should logically connect together. Something that connects everything to everything is a salesman's dream, but not necessarily a station's dream. Because when you have a high level of networking you also are talking very, very slow transfer of data. There are some connections that make a lot of sense. I think you can trace out skeleton structures of things that require connection. And that's where the energy ought to go, not to putting in a network that ties absolutely everything together.



BALL: Well, the programming isn't perfect yet either. We ran into this years ago at the very beginning when we purchased the ACR-25s. And we thought automation was possible then. Electronically it may have been. But the commercials weren't all set at exactly 29.95 seconds. And the programs from the network didn't come in perfect. The human being there to make that segue adds a personality to the station, something that automation never will be able to take over until they can create perfect programming.

BME: Well, that's a good philosophical question. As Roy just said, the ideal automation system isn't necessarily the most automated system. And it probably varies a lot from station to station and market to market. What should be the central control hub, or should there be a central control hub for station automation?

MURCH: The distributed approach would seem to make sense to me. Certainly having master control on cart machine if you want to consider conventional master control. Perhaps "air operations" would be the way to look at that. That would be one hub, and also tied in with the traffic system. Another hub would seem to be the studio control room and the facilities going into it, and the newsroom computer system.

MIKKELSEN: I guess what we want to experience in the distributive approach is for the individual pieces to fail. You could lose a camera and still continue to have the show. You can be able to compensate for failures throughout the system. When you think about the ideal automation system, it's a risk. What is an ideal automation system? It's whatever works for you in your environment.

TRUMBULL: There's a whole operation we go through on a daily basis that you could make a strong argument for making entirely automatic. Except that I have a flow diagram in my mind that has a whole bunch of cash registers. And anything that's in that cash register's flow diagram I have a great deal of trepidation about leaving untouched. I think there ought to be checkpoints. We download a file from our traffic system, which is a subset of the information that's standard for the log. And then we transfer that file into a program that makes it suitable to operate a Betacart. But in the process of doing that we actually examine the file and see that everything is there.

BALL: That's probably the crux of the whole thing. It's got to be efficient, useful and really practical. We've talked to people on the floor in the last two days who could automate anything and everything. But it's not really practical. They're creating the need rather than just filling the existing need.

BME: Why don't each of you briefly describe to what extent your stations are automated now?

MURCH: We have Biased our Jefferson Data System traffic computer. And we have a small custom Dubner computer which is hooked up to that, through which we get a dump with the log, and we do some translation in that computer. We produce three identical disks. One goes to our Dubner machine control system, which controls a CDL switcher. The second diskette goes to our SPOT system, which is sort of a computerized spot player that controls TCRs to make data cassette spot reels. It's a closed-loop system that looks at the EPIS Electronic Program Identification System of the cart and compares it with the house number on the log to make sure that the correct commercial has been aired. And when events actually occur, the actual air time is logged as well as the scheduled air time. At the end of the broadcast day this information is dumped back to a diskette, which then goes back to the Dubner computer and is transmitted to Bias. Obviously we're looking to replace the cart machines and put in a more modern LMS system.

BME: What about newsroom computers?

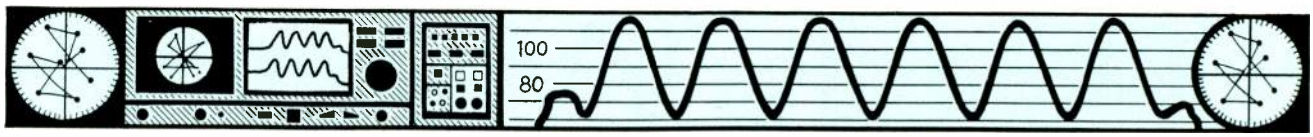
MURCH: We do not yet have a newsroom computer. I think that's just a matter of time. We think we have been a leader in robotic or remote-control cameras. We have three studio cameras controlled by the Vinten system, which is hooked into the E-MEMs of our Grass Valley 300 switcher. So it's possible to control the cameras from the studio switcher. We also put in two remote control cameras at Yankee Stadium. I believe we're the first station using that sort of technology for sports.

TRUMBULL: We have the Grass Valley M204 automation system for master control. We weren't the first installation, but certainly one of the earliest ones. On a daily basis, we download the next day's log file from traffic. Certain events, such as the cart machine events, are pre-

Tom Mikkelsen

assigned. The remainder of the events, which tape machine it's going to play on, is determined by the operator. So they edit the file that comes out of traffic to make those assignments. From the same file we get the basic information that's required for the Betacart, and we use a program to convert that into the format the Betacart requires. So we're making double use of the same traffic information.

We also inspect the commercial inventory file once a day and look for all com-



mercials that are designated as having a dub date that is the current day's date. We download those events onto a disk and we put that onto a computer that runs a program by Lauf and Associates called Barkeeper. It automatically generates all the information needed for the bar code label for the Betacart. The only thing the operator has to add is the start time. Our newsroom has a BASYS system. We had one of the original systems and now we have their current version, which is a lot faster.

BALL: We have two Betacarts in the station. We have the Jefferson Pilot program to build the log from the traffic department. That is sent out on a disk and we load the Betacarts with that. One Betacart is primarily used for playing commercials. The actual switch from our own programming or network programming into a commercial is still made by a master control operator. We experimented years ago, when we first received some of the very earliest versions of the ACR-25, to go to total automation. Management didn't like it and they're not going to do it or ever try it again until it can be done to their satisfaction.

BME: Why didn't they like it?

BALL: You just couldn't get the programming timed perfectly to fit in there in those days. The timing is a lot easier now. You can time those Betacart commercials so they start and stop perfectly on time. The other Betacart is used for the news department and they sit side by side. So one is a backup for the other in case one fails. That's programmed by the news producers and the Newstar computer prior to the newscast. The Newstar computer has really automated our newscast. It was tough to get the anchors used to the teleprompter version of it because they can't scribble on their sheets that we used to pass under the camera. But once the changeover took place it got a lot easier.

MIKKELSEN: We have several, I guess we'd call it islands of automation, and we're beginning to develop more. Initially, just the beginning of this year, we purchased an Odetics TS2000 and placed that on line. That's operating very successfully. We receive the schedule from Bias. It goes into what they call a black box, which is basically a RAM device that'll hold seven days of schedules. That then is available to the Odetics system all the time. Traffic can go home and you can always go back and get another schedule, which is a very reassuring thing. With the Odetics system we purchased six Beta SP machines; you can turn over the machine to record or playback. Along with that we have the XR800 external switcher option, which will allow us to control two external devices outside the operating environment of the robotic tower, specifically for, in our case, program playback. We also

Bob Murch

will be getting the external device interface, which will have a bar code reader. The commercials and programs will be prepared at a workstation that is external to the on-air operations.

We will be looking into Bias Link to do auto reconciliation. We hope to implement that sometime later this summer. But we're just now getting our feet on the ground. Now we're ready to begin addressing other automated operations associated with our on-air operation. And we've just recently purchased a Newstar system, so we will be automating our newsroom operations. In the newsroom we have one TSM robotic head, and that has had a significant impact on our overall manpower efficiency and labor savings.

BME: Talmage and Roy, do you see robotic cameras fitting into your operations?

TRUMBULL: Well, I think that part of automation requires that you compromise and give up something in the process. If you go to robotics you have to have talent that agree to play the game. They can't wander around off their mark. Perhaps there are things you have to set in the show that you can't change during the show anymore. If you're the network and you freeze the show an hour and a half before it goes on the air, yes, you can put all your tapes in the automatic machine and make the thing work very fine. If they're still writing the show after you've gone on the air, no, you can't do that. So, I think that when you add an automatic function you have to also impose discipline upon yourself that maybe you're loath to do.

BALL: We're still a nonunion station. And it's difficult to justify changing the cameras over to robotics when you're nonunion. In addition to that, we use a lot of different new camera shots for every single newscast. And we even had some two-shots in our evening newscast where the dolly is moving during a shot. It would be very difficult to trust that with robotics and stay on the talent. Robotics just isn't in the cards for us yet. But we're looking at it down the road.

MURCH: Our experience in general has been very different from what your speculation is. First off, robotic cameras, we found, promote better planning. But even if there is an unplanned shot, it's always possible for the operator to manually control the camera from the panel. We use the robotics where it makes sense, where the show is fairly well planned and

there is a shot sheet, a script, and we follow that. But if there are changes, it's possible to accommodate it. You mentioned that you have to sacrifice something when you use this type of automation. My observation is what you're sacrificing is chaos. We've had a number of people come visit our installation who, when they walk in, think this can't possibly work in our station. And they go away believers.

MIKKELSEN: One of the interesting things to remember, too, is that when we talk about automation, the first thing people think of is "no manpower." And that's not true. Automating doesn't mean going from three or four people down to zero people. Planning with the people is the key thing. You've got to make sure everyone understands what you're doing, why you're doing it, and deal with it in an open manner.

TRUMBULL: I think that a burden has been shifted from one budget to another budget. If you reduce personnel you suddenly have created a critical condition for capital replacement. If you try to beggar your capital replacement budget under a condition of reduced staff, you're going to have big problems because you have made the reliability of the equipment an employee on your payroll. And if you don't replace your capital equipment at the appropriate interval, that employee, albeit a machine, is going to go on strike. So you've simply taken something off of one payroll and put it into a different budget category without realizing it.

MIKKELSEN: That's a double-edged sword, because you have two different types of assets. You have equipment assets and you have human assets. And not only does your equipment age and end its useful lifetime, but so do your human assets. As we go through our careers, we need to reinvest in both our equipment and our human assets, and I think that's our responsibility as managers. We have to train our people on these new automation systems and continue to maintain, if you will, our talented people in our plants, because as we reduce staff these people play an increasingly important role in our operations.

BME: Bob, how did your camera operators initially react to the robotic cameras?

MURCH: Well, some of them, of course, were very concerned. We talked to them about what they might want to do when we put in robotic cameras. Some of them wanted to do news editing. One of them is still involved with the studio operation, with the prompter and moving the cameras in position. We had a fair number of people whom we sent to school. You know, at first the scenario is "it can't be done and it's going to create problems." But after they saw what the capabilities were and they understood what we were trying to do, they accepted it and in some cases became champions of the system.

BALL: I'd like to ask your feeling on test equipment. Tektronix has put everything into one box now and raised the price to $10,000. If I need a vectorscope, I've got to buy everything. We're looking at the test equipment which is supporting us in being able to communicate with this new equipment. What's your feeling on how supportive it really is?

TRUMBULL: Well, I think we're faced with the need for two things. We have the need for the plain old garden variety piece of equipment. And there is a place for the fully automated piece of equipment. There's the bread-and-butter level of troubleshooting, and

Talmage Ball

then there's the one where you really want to get the entire dossier on what that piece of gear is doing. So I think there's an ongoing need that will never change for having the bottom end and the top end in all this gear.

BME: Have you seen any of the other test equipment that's on the floor? There's a fair amount of new stuff at this show.

BALL: There seems to be more competition with Magni, Leader and Tektronix.

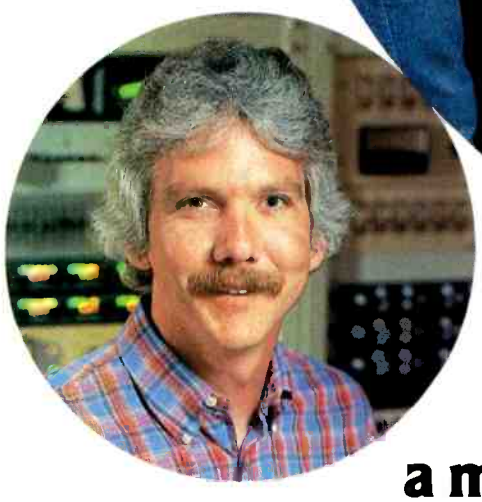
TRUMBULL: Well, Magni certainly has made great leaps in testing component video systems, like that bench equipment and the D-1s and D-2s and so on, providing those signals. And, of course, other folks are hot on their heels.

MURCH: I think the competition in that area is good. And I agree with Roy about the need for a range of products.

TRUMBULL: Yeah, the top end doesn't necessarily obsolete the bottom end.

MURCH: I think the [Tektronix] VM700 is a great gadget. But I'll tell you, for audio testing, we have some sophisticated audio stuff but there are times where I'd just like having some of the Potomac Instruments equipment around because it's very simple. It doesn't measure certain things down to the nth degree as some other gear might, but sometimes that's not what the problem is. You don't need to know down to five decimal places.

TRUMBULL: We have two Audio Precision System Ones that we use extensively. We use it both at the studio and the transmitter and it's very valuable to us. But we also have an Amber that we tote around. So if you're going out chasing mice, you pull the Amber out and go find the problem. And if you really want to do a complete analysis, you get the computer out and use the Audio Precision and document everything. ■



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RADIO BALANCES BLUE-SKY NEEDS, REAL-WORLD PRESSURES

Two observations best sum up what's basic about the radio industry today: "You can't solve people problems with technology" and—from a discussion about whether a new "talking transmitter" should speak English or Spanish—"The state of the art has exceeded the state of the need." On some fronts, however, our panel found that the state of the art could still bear improvement.

Even more important, we found that today it's crucial to understand the changing nature of the radio business. These days station management can turn over with each LBO and radio stations are bought and sold for their real-estate value. Often led by bottom-line-driven managers with little experience or love for broadcasting, today engineering management finds its most vital "basic" is internal communications.

Providing for the future of an engineering department no longer depends on coming up with the next technological fix, our panel said. Today career engineers must use the skills of an accountant as well as a diplomat to motivate staff and to make management an informed power in the corner of the engineering department. "We're the most cost-effective department in the station," summed up one panelist. "They just don't realize it because we spend money. It's the cost of doing business—it just happens to show up in our department."

Our panelists represented stations of various formats from around the country: Margaret Bryant, engineering manager, WMAQ-AM, Chicago; Jim Carollo, manager of engineering, WGN-AM, Chicago; Matthew Connor, chief engineer, WKYS-FM, Washington, DC; Robert Lankton, director of engineering, WBRD/WDUV-AM/FM, Bradenton, FL; Richard Rudman, engineering manager, KFWB-AM, Los Angeles; Jim Wagner, vice president, technical and engineering operations, Jacor Communications, Inc., Cincinnati. Senior editor Beth Jacques moderated.

Jim Wagner

BME: Has cart machine technology kept pace with your needs?

WAGNER: That's a good question. The limiting factor of the cartridge machine is the cartridge itself right now.

CONNOR: The tape medium itself.

LANKTON: Not necessarily the medium. We're pretty much an automated format and we ask, "Why deal with cartridges at all when you can put it on R-DAT?" You still have to have some kind of transposable medium. Writing to CD doesn't seem to be coming that quickly, and R-DAT is smaller, easier to deal with, better quality, easier to keep, and as far as machines go, a lot cheaper for automation purposes. Instead of having a situation where we have four 48-tray Instacarts running, which is a lot of maintenance and a lot of expense, you can do the whole thing with three R-DAT decks.

RUDMAN: How many individual pieces of sound—events and limits—do you have to keep alive in your commercial inventory at any given time?

LANKTON: We master things now. We have four 48-tray Instacarts in our load all the time, and we run with maybe four or five empty trays.

RUDMAN: How many cartridges do you have active in the system at any given time—cartridges that could be accessed from your Carousels feeding the Instacarts? That is, what's the total number of carts, or storage space?

LANKTON: Everything we use is in the machine. We don't store commercials on cart: If you buy a spot, it gets produced and it goes on air. If it gets pulled from the air, it's gone. If it's stored at all, it's stored on commercial reel. We try to keep the machines fresh; they're full all the time and there's nothing that's been idle for more than two days.

Margaret Bryant

Right now we're turning a music service on reel-to-reel, and we're going to take that in a CD format and control several CD machines with an IBM PC to

make that one source in the system. And then we'll use R-DAT machines for the spots. That will be really nice and simplify production. The integrity of R-DAT seems to be very good as far as maintenance goes. There are some questions on head wear, but what doesn't?

BME: What do you think about the recent West German report claiming the format didn't satisfy professional broadcast requirements?

LANKTON: Some things could probably be better. It would be beautiful if you could write to CD, store it, and keep it forever. But the biggest concern for R-DAT seems to be head life. Sony is claiming 2000 hours—but 2000 hours of actual use is a long time for something that's only playing spots, not music. Actually programming on R-DAT might not be feasible, but as a production tool for a spot load, 2000 hours is acceptable. We're doing tape machine maintenance on our analog ATRs at less than 2000 hours. R-DAT heads are plug-in modules, there's no alignment, and the machine is back up and running instantly. Heads are cheap—$150. I don't think I would use it as a programming device for music with live assist, but in our application we run live assist as a spot device. R-DAT lets you take an automation system that's basically pretty primitive and condense the whole thing down to fit in a rack, and the key is infinite walkaway time.

WAGNER: We've explored a lot of systems and we keep coming back to the fact that although we'd all agree we don't like carts, there's a lot of benefit to using them in the broadcast station. One of the biggest issues is reliability.

ALL: Absolutely.

WAGNER: Carts seem reliable, a lot more than they were 50 years ago. They're convenient, and they have individual control over each item: One spot or one record is on one cart. Not retaining control over an individual cut on CD is a big complaint we've had from programmers. They turn up their noses at CD, and here I thought I was doing them a favor—better quality, nice little disks with 20 selections that they can handle. But our data just keeps coming down to cost versus benefit in a typical radio station. If you look at it, the average listener just can't tell the difference between a CD or an R-DAT tape or even an ordinary cassette tape after you get through all the audio processing and audio enhancing, if you want to call it that.

Jim Carollo

Richard Rudman

BRYANT: With R-DAT and CD you have to consider cueing and access time versus just shoving in a cart.

WAGNER: There are trade offs to both. Let's face it, in larger markets you can get three or four or five thousand carts in a control room. . .storage suddenly becomes a problem. Floor space is a consideration.

CONNOR: In cassette-based automation systems I've dealt with, if you lose one cassette and it's got, say, 50 spots on it, and if you haven't made a duplicate, all of a sudden that production time is wasted. Gone.

RUDMAN: Talk about putting your job and reputation on the line! It takes guts to recommend putting your total station's commercial inventory in a black box.

CONNOR: In a black box that's very susceptible to glitches!

RUDMAN: "Okay, Mr. GSM and Mr. General Manager, we're going to put your entire commercial inventory, all our livelihoods, our ability to put bread in our families' mouths, on this format, which is going to solve all your problems. And there won't be any problems with it, ever."

BRYANT: "And by the way, we don't think we need a backup."

RUDMAN: Let me introduce a premise. With Winchester disk technology, there are two kinds of hard disks: those that have crashed, and those that will.

WAGNER: We've experienced problems playing compact discs and the operators tend to blame the machines. I tend to believe the problem is the CDs. I wondered what you all thought.

BRYANT: I was at a music format previously and quite often they would blame the CD player. You'd pull it out, and there would be this big "smooch" on the CD itself. The unfortunate thing is they don't realize that's an operator failure, and they tend to blame the technology. As a result, they're less likely to be willing to experiment with new technology.

CONNOR: Although it's still a combination of both things. We were 99 percent CD in New York [WNEW-FM], and we still had two to three failures a day, even on just average cuts. There would be a little bubble on the CD, anything.

WAGNER: It's been my feeling for some time that while some problems are inherent in the machines, most of them are inherent in the CDs and the machines get blamed. I think that's something that needs to get pointed out.

LANKTON: You can't solve people problems with technology. You've got to solve them with the people. We have a place that is very clean. We go by a very set standard and a set of rules. This is what you do when you're in our control room. We don't have monkeys or gorillas. People that deface or abuse things are gone. And we don't have those kind of problems because we don't have people grabbing the CDs and so forth. But you know, then, that makes my job a lot easier, too.

RUDMAN: Here's a chronic problem in many broadcast operations we experience in all-news. The way a lot of stations are structured now, who is left to really listen to the station?

LANKTON: The engineer is the only one at our place.

BRYANT: Our staff listens.

RUDMAN: This is an issue I think we're all trying to fix now, because when we departed from the world of operators sitting on the other side of the glass, we had to find other ways to find people to listen to what's going on minute-to-minute in the station. Some of us have been more successful at it than others. When you had a person on the other side of the glass, he or she may have had years of experience, a Ph.D. in everything: Some incredibly intelligent people were badmouthed and badrapped because they happened to be sitting on the other side of the glass *appearing* to do nothing. There are reasons why that era is gone, but we lost something. How can we get it back? Should we get it?

BRYANT: Reinstate the three-year rule.

CONNOR: Is it a lack of personal pride at this point?

RUDMAN: Are we giving people jobs they can be proud of?

LANKTON: If you pay someone $12,500 a year, you're going to get a $12,500-a-year job.

BRYANT: It comes from above: If the station is just interested in saving a buck, that's what you're going to get.

RUDMAN: There is a time in this industry for the engineers who remain in it to stand up and speak to management and tell management what it has to hear, rather than what it wants to hear, and that time is now.

The other thing is that a lot of the solutions are not on the shelves. For instance, at KFWB we devised what we call the "Upcut" system, which was designed to defeat the ability of most people to produce a cart that was "upcut," or too loose. It's a digital delay in series with the cartridge machine. Having come from a station with DJ background into all-news, I know there's a chronic conflict between people who are pushing buttons on-air and expecting something to happen the instant they do, and the people who are producing sound in the abstract. And in order to be able to deal with that simple, basic act of faith—that when I push the button, something happens—I had to go out and find something that was not on the shelf.

Some small entrepreneurs have done fantastic work for me that resulted in products they're selling. But talking about wiring and products we need, if there's a need for something right now, it would be a good documentation program that could run on MS-DOS machines and Macintoshes. Any of us could probably sit down with a software program or an outline of what we want in such a program, but I don't think it exists off the Egghead Discount Software shelf yet.

BRYANT: I think another problem, too, depending on format, is how much equipment you have to build or put together yourself. Unfortunately, it's getting more difficult to find people who are capable of doing the construction as well as the design.

RUDMAN: I'm playing around with building an expert system where something in Hypercard from Macintosh would be there 24 hours a day, and there would be an operator to supplement things that are in notebooks or would happen when the earthquake comes and the Macintoshes tumble to the floor. I'm trying to come up with ways to help people when we can't

Matthew Connor

have engineers in the building.

LANKTON: We installed the TFT 7600 remote control system a few years ago when we built new studios. We incorporated the software with an IBM PC to do all the logging, meter reading, site control, etc. I'm a big believer in site control. I've got all three air-conditioning units coming back; everything in the building is remote-controlled or given status. Something we tried was to make the system interactive for the operator so if we catch lightning, or a bird watcher kicks the FM off, we can see when it went down and how. We can track the chain of events and get back on. But it would be neat to incorporate into that the text of how to do things, how to call up different menus, even make it a tutorial for new operators.

BRYANT: Did anyone see TFT's new EBS monitor that tattles on when the last alert was? This should be in more equipment; they should put a clock on it.

RUDMAN: That's right—so you can go up to a piece of equipment and say "What happened to you during the last 30 minutes?" and find out. (*Group*: Maybe some storage.)

CAROLLO: I *like* that TFT innovation—that means Margaret and I won't get those 14 phone calls a month asking "*When* did you run your EBS? Are you sure you sent them?"

BME: Is NRSC going to impose a new set of requirements on you?

CAROLLO: Most of us, I think, already comply or over-comply.

WAGNER: We evaluated the Delta splatter monitor and I think it can be a very useful tool. I'd like to see the splatter monitor be standard equipment in most stations. And I'd like

Rob Lankton

to see a field version perfected that would be more sensitive so you could go and snoop on your competitors. It would be nice if it had a little bit more receiver sensitivity. But it's a very useful tool.

CAROLLO: The NRSC standard is about to become mandatory anyway. And it'll take hold over the next few years. There are five clear channels in Chicago, and if you look at them you can see it's had a pretty dramatic effect.

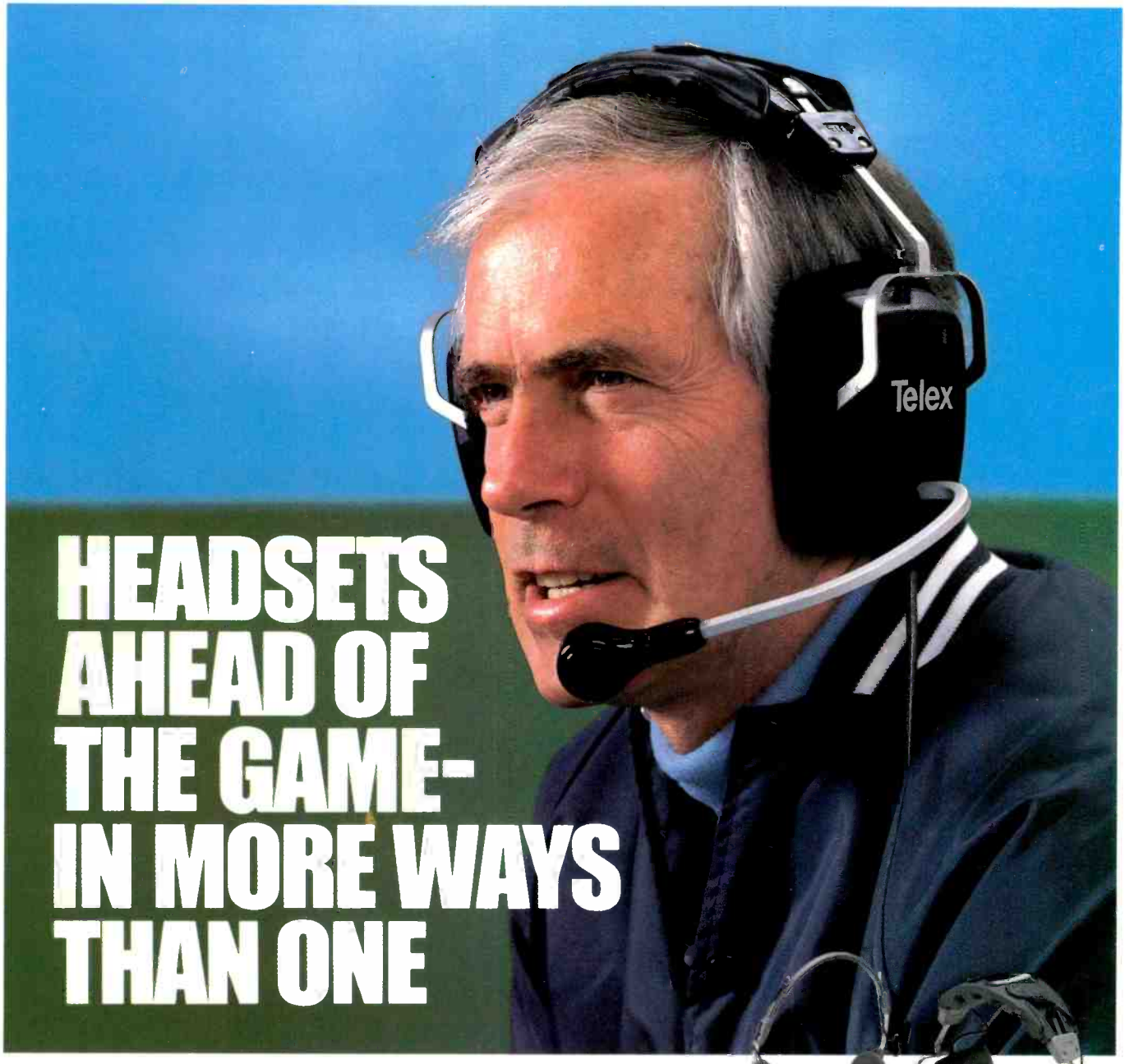
RUDMAN: Something basic I wanted to mention is that in remote pickup, we all deal with frequency coordination. Try to go in to your general manager and explain what the frequency committee does for him. It's an interesting little process.

CAROLLO: Speaking of RPU, in Chicago, and probably in New York and Los Angeles and other major cities, trying to do remote broadcast by remote pickup systems is almost impossible. There's just too much congestion. The only thing I can manage to do on RPU is helicopters. But as far as the station manager goes, when he comes in and wants to do a remote—and we do many—it's up to us to identify the costs and find what method we could use. Much as I would like to use it, relying on RPU is just impossible. It's true that just about everything we do as a remote broadcast has a revenue side to it. So the choice to broadcast from a remote site is frequently based on how much revenue is associated with it. Sometimes the costs are outlandish—we do remote broadcasts from Europe and we're going to do one from Russia in a month. I'm sending an engineer for five days just to do a broadcast for a couple of hours, but it's the only way to get it done. You wouldn't do that if you were just trying to cut costs. The choice has to be made by station management; our job is just to present the costs as they are.

WAGNER: What we're also doing is explaining the technical end to nontechnical people. It's a two-way street, and in some regards, it's our failing. But it's also their failing, because a lot of guys out there put their hands over their ears when you start talking technical and say "I don't want to understand that." People say, "Jim, I ask you what time it is, and you tell me how the watch works." But the trouble is, I'm telling him the time, and he doesn't like the time. They say, "How did you arrive at that?" And I say, "Well, here's how the watch works." I think that's a valid response. The trouble is, they just don't like the answer.

CAROLLO: We can toss the blame back and forth, but there's also another aspect here. I think what it comes down to many times, and we're all guilty of it at one time or another, is that as engineers we tend to see things as black or white. It's either working the way it should, or it should be fixed, or it should be better. And there is no in-between. I found that attitude to be counterproductive dealing with management. What I tend to do is present it as shades of gray: From this end of the spectrum, anything can be done with electronics—however, it will cost X, it will take this much time, and so on. I present the options and let them choose. They will find the points at which they've committed enough dollars and don't want to spend any more. It's really their decision. If you approach it that way, I find I have very little trouble with management or what I'm permitted to do.

LANKTON: I'm in a situation where, instead of saying, "Well, you don't understand the needs of engineering," I try to understand the needs of management. Doing it that way, we've always arrived at a good conclusion. ■



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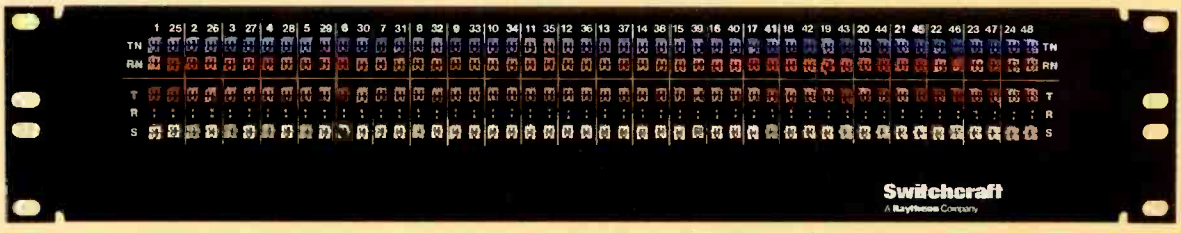

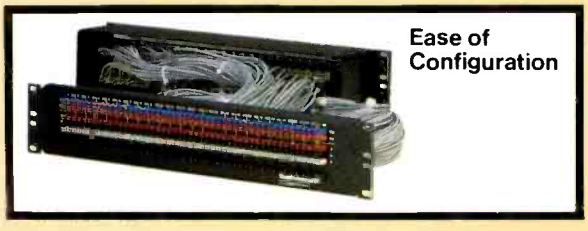

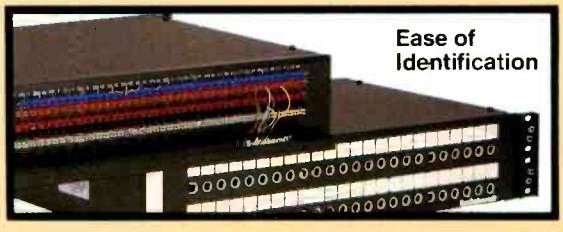

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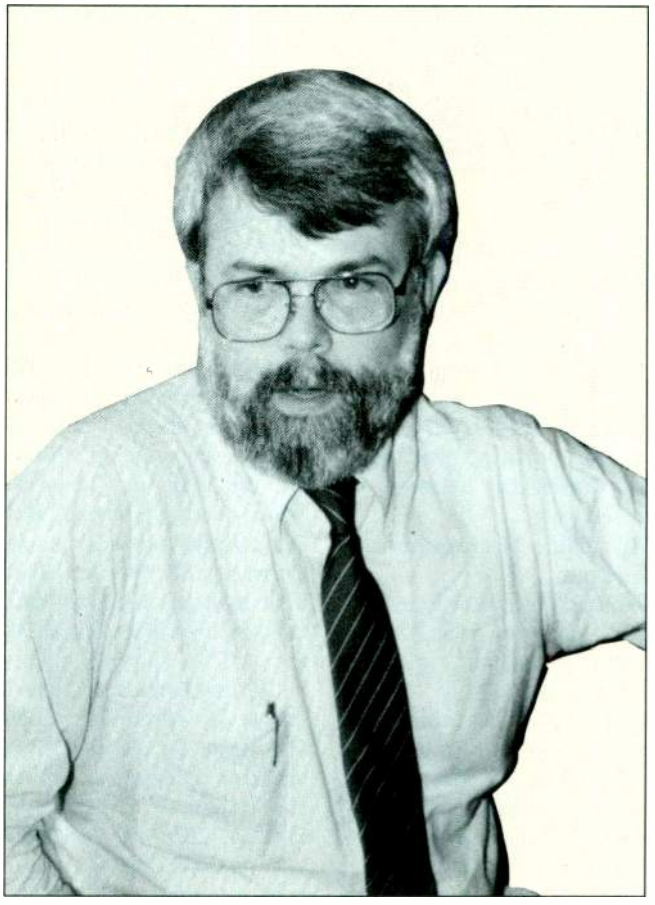
DIGITAL STRIVES TO BE THE NEW AUDIO WORKHORSE

Digital is the wave of the present, in the radio, television and recording fields, and our roundtable on digital audio covered a lot of ground. Despite the recent DAT report controversy, users' experiences with this format were generally positive. DAT still shows no signs of replacing the analog cart machine—but CD players are becoming the new radio workhorse. And as digital audio workstations become more common, digital interconnection is a growing issue, as it is in the video world.

Our panelists included Murray Allen, president, Universal Recording, Chicago; Andy Butler, director of engineering, WBAL/WIYY, Baltimore; Michael Callaghan, chief engineer, KIIS-AM & FM, Los Angeles; Tom Holden, systems engineering manager (radio) and Tom Shevlin, systems design engineer (radio), CBC, Ontario, Canada; Herb Squire, chief engineer, WQXR-AM & FM, New York City. Audio editor Skip Pizzi moderated.



Andy Butler

BME: Digital audio tape (DAT) is first in a lot of people's minds, so let's start there. Anything that you've seen that's interesting here at NAB?

SHEVLIN: The Panasonic seems to be giving a lot of features that we've been asking for—the editing capability is pretty much the same as the DASH machines.

BME: You're speaking of the Panasonic DAT editor system being shown with unspecified model number, price and availability date?

SHEVLIN: Yes. They've also got a very nice looking portable DAT there with SMPTE time code and off-tape monitoring, and a good-looking editor system.

BME: And the head goes around so fast that read and write are almost simultaneous, so it's read after write, but without any echo.

CALLAGHAN: I saw a report which indicated that in West Germany, in less than 35 playbacks of a specific DAT cassette, there were dropouts and compatibility problems between machines. If you wanted to dub a record onto something, at least in terms of my format, it has to be played back more than 35 times before it needs redubbing.

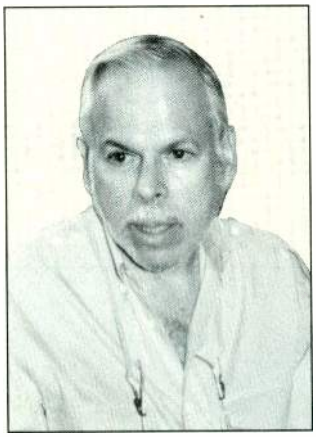
HOLDEN: Our experience at CBC differs, since we tend not to reuse the tape a lot because we're using it for archiving. I think across the country, we have about 100 DAT machines used for this. We've had some comments about tape breakage—both the shell and the tape itself. But it's rare.

ALLEN: We use a lot of DATs in production work. In Chicago, and even nationally, most studios now exchange product on DAT. In fact, we will send CD masters on DAT rather than on any other format. But we have found certain brands of tape that we avoid due to poor dropout performance. I have seven DAT machines in use all the time, and they do exchange tapes quite easily. We've only had one example where tape worked on one person's machine and didn't work on somebody else's, out of literally hundreds of tapes.

SQUIRE: At WQXR, we have two Panasonic porta-

bles and one Panasonic studio machine. We're just using DAT for live concert recording, or protection copies of live broadcasts. We dub the tape back to analog for post-production in-house, and so far, no problems. But the amount of usage that any given tape has gotten is negligible, maybe three or four passes at most to this point. We haven't really done any life-cycle tests because we're too busy doing the recording, let alone doing the testing in the shop. Besides, we're moving to new studios, which prohibits any kind of extraneous research work at this moment.

BME: Are any of you using it as a cart machine replacement as yet?
ALL: No.
CALLAGHAN: The machines I've seen don't lend themselves well to that for a number of reasons.
SHEVLIN: Some of us took note yesterday of the version of the Sony PCM-2500 that duplicates the layout and color of the ITC cart machines.
HOLDEN: One of the concerns we have with DAT machines as they stand now is that when you try to integrate them into a fully digital facility, most will not actually lock up their digital outputs to an external word clock. So if you try to take two DAT machines and mix them in the digital mixer, it won't work.
SQUIRE: I saw something interesting at Gotham Audio. They had what looked like a semi-pro-to-pro digital interface, with RCA-



Murray Allen

phono to AES/EBU format XLRs. And it had protocol for changing the sampling rate and also copy code protection elimination.

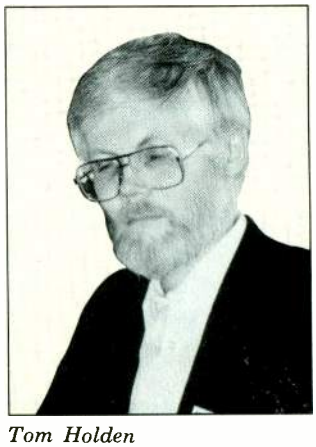
BME: How many of you are actually doing direct digital interfacing between devices now?
SQUIRE: We use strictly analog.
HOLDEN: We're starting. In fact, an installation we're working on right now is a fully digital facility right from the line level inputs up to the monitor amplifiers. We are working with AES/EBU digital interfacing as much as we can, and where we can't get products that will support that, we're having to work at this stage with SDIF-2.

BME: What console are you using?
SHEVLIN: Phase one will use the new Yamaha DMP-7D; phase two will use the Calrec/AMS Logic 1.
ALLEN: We have digital interface between Mitsubishi PD format recorders and New England Digital products now. It's been like pulling teeth, though, to get these systems to work right. Sometimes we go through Sony PCM-2500s to get to other things. WaveFrame was showing a system that will accept all digital formats in, which could be very helpful. Every day, we see more mixed elements, and you have to deal with them.

BME: You mentioned DASH, and that's one of the next things on my list. How many of you others are using any of those larger digital formats?
BUTLER: It's still a little pricey for most radio stations.
ALLEN: We use the 32-jack machines for film mixing. It makes a wonderful vehicle for storing things on. We may use 25 or 35 dubbers on a film mix. But our master recorder is an eight-track Winchester disk system and we back that up on a Mitsubishi 16-track. The next day, somebody may come back who's using the Mitsubishi reel-to-reel as an element, and creating a new master on the Winchester disks. So it's all this combination. All music is digital reel-to-reel, though, with the exception of some of the people that back it up on computer disks, which we try and stay as compatible with as we can.

BME: Digital workstations are another new area. There's been at least one substantial announcement here at the show, from AKG.
BUTLER: If I could pick one trend that's especially encouraging to me at the show, it's that we're finally starting to see a fairly large push to bring the digital storage and manipulation out of what I consider an absolutely impractical level for a radio station. It's now coming down into something where an individual station can start thinking seriously about doing it. The price that AKG is talking about is starting to be something that an individual radio station could justify.

BME: Especially when you see what it could replace. In the case of both a mixer and a multitrack recorder, it could be quite competitive. And the time saving pays additional dividends.
CALLAGHAN: The thing that I think is going to be the most important factor to bring digital recording to radio stations is the company that can get past that resistance of people who're used to working with a tape recorder and you take the razor blade out of their hand and you give them a computer interface that they have to learn instead. What we're finding where we are is that anybody can



Tom Holden

use a razor blade to edit. But when you graduate to the digital system, it's a whole different ball game. You have to learn to do a whole lot of different things. Some of our people have skills that are way beyond mine, and they can sit down at a New England Digital and look at the keyboard and do those things. And other people just don't seem to pick it up. I think the company that's going to make a lot of money is the one who can take something that complex and get it to the point that people can be productive in the first half hour.

One of the things that we hope will evolve is the ability to transfer digital audio data at faster than real time. That would allow us to have one large storage cache somewhere, and while we were playing one 60-second commercial, we could download the next 60-second commercial, and not have to race to get it there in time.

BME: How about high-speed upload and download to a workstation for post-production?

ALLEN: The biggest thing clients complain about is loading. They say, "Why are we getting off the ground so slow?" But the minute you load it, it goes like lightning. So we try to get people to send in their material in advance for uploading. Then you download at the end of the day. We have a night shift that comes in and does all the downloading.

BME: For folks who are

Tom Shevlin

used to working mostly in two-track production, these loading processes still seem tedious.

ALLEN: What's fast about it is the routines you get into. We do a lot of the Bud Light TV commercials. Each commercial will have several different versions. The first one might take a while because they're making all the artistic decisions on how each effect should sound. But they number every sound effect—footstep number one, match number three, etc. Then, when they want another version of it, they don't even show up. They just send us the frame count numbers where they want them. We assemble the thing in a matter of 10 minutes.

HOLDEN: What all this points to is that the upload/download thing is just a boring and frustrating administrative overhead. What we really need as a storage medium is something with the capacity of tape, the random-access capability of hard disk and the removability or portability of something like an R-DAT cassette or a CD. And we keep hearing that perhaps that's just around the corner, in the form of erasable CDs. But it ain't here yet and we're itching to see it. I think that has the potential of rendering R-DAT as a temporary phenomenon and perhaps the hard disk as well, at least for studio-type applications.

BUTLER: I completely agree. I think one thing we will have a very difficult time selling to radio broadcasters is the concept of some big central storage device networked to studios. We've seen this in the way that CDs were accepted. We are very much in the habit of being able to grab the product and carry it to where we use it.

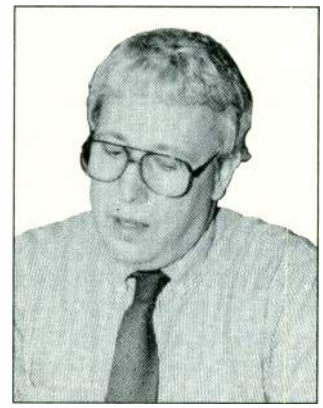
BME: What about other formats?

SQUIRE: The 8 mm format has the capability of 24 hours of digital audio per cassette. We're using two of the Sony 8 mm machines right now for special logging purposes. For example, we did a 60-hour live radiothon broadcast, and air-checked the whole show using two machines alternating recording tracks.

BME: How about STLs (studio-to-transmitter links)? Anybody using digital in that area?

SQUIRE: I am looking at it seriously, considering T-1 with 23 GHz. The thing I was very impressed by is the QEI T-1 composite system; it's got tremendous promise.

HOLDEN: A full T-1 is probably way too excessive for an STL. I'm not sure if any of you have listened to



Herb Squire

ADPCM systems, but you can get very credible mono performance in 64 kbit/sec. There is a demonstration of a 20 kHz system, offered at 128 kbit/sec (mono) or stereo at 256, at the SSL booth and it's really interesting to do an AB comparison between the CD input and the ADPCM inserted into the chain. Few people detect any difference.

SQUIRE: We're sort of at the tip of the iceberg with the compression schemes. And telco is putting in more and more fiber. They can't get rid of the copper fast enough.

BME: Getting off into the more theoretical regions here, what do you all think about broadcast delivery in digital to the listener? It wasn't so long ago when the term "FM quality" meant highest fidelity. Now of course, "CD quality" has taken that over and FM has become a "mid-fi" medium.

SQUIRE: And fading fast.

CALLAGHAN: The average listener now is much more aware of quality sound than 10 years ago. We don't get away with a lot of stuff we pulled off

back then.
BUTLER: My program director asked me to back off on the audio processing—*that* was a brand-new trend. His complaint was that his girlfriend played a CD and turned on the station, and didn't like the fact that they didn't sound the same. Thanks to the CD, we may finally be able to clean up some of our chainsaw audio processing and get back to something a little better.
SQUIRE: This is the first time in history the consumer has a better edge, and the tables have been turned.

BME: How has this affected television audio?
ALLEN: I have definitely seen every TV station that's gone stereo in our markets clean up its act.
BUTLER: I wouldn't be surprised to see digital audio take off once it reaches television, more quickly than it has done in radio, because in TV they are more oriented toward central source material distributed through the plant. They run on a central switcher. They think in a networked way.
ALLEN: I don't know how long it's going to be before the D-2 machine becomes a standard and replaces the C-format machine. But it's a digital audio source that is far superior to what we have now.
HOLDEN: Yes, audio in the D-2 or D-1 format uses a 20-bit PCM system.

BME: How about the CD? Where do you all stand on that?
CALLAGHAN: They're a workhorse. When we get a record from a record company, we expect that it will be on CD and that automatically means that we don't expect it to have the distortion that we used to get in 45s.

BME: Are you still using the cartridge or any other format?
CALLAGHAN: Oh, yes. CDs have album-length cuts, but for our format, we have to do some editing, and then dub to cart for air.
SQUIRE: We're at about 70 to 75 percent CD direct on the air. We have a problem right now finding a decent professional machine that will do more than one cut at a time easily, to emulate maybe a $130 home machine in terms of programmability. So we can program an entire opera, maybe miss a movement or a part, put a pause in for announcing the last spot so the announcer doesn't have to worry about reprogramming the next cuts while he's trying to read. We've had our share of failures with machines, both professional and consumer.

BME: Have any of you seen something here on the floor that looks promising?
CALLAGHAN: I still like the Denon CD-Cart. I'm glad to see they're going to be putting in some variable speed functions. That will let me keep my programmers happy.
SQUIRE: Regarding the Denon, I'm concerned about the purchase price of all the CD carrier boxes, and the loss of liner notes, both of which are problems for classical formats especially.

BME: Certainly those are difficulties with that approach for folks who have huge libraries. But for the smaller rotations . . . .
SQUIRE: Oh, yes, then it's no problem. If that was our format, I would go to the Denon in an instant.

BME: What others are you looking at?
SQUIRE: EMT has come up with a new CD player, available in a few months. It looks like it has some promise. Tascam has got the 701 and the new 401 system that looks interesting, too.
BUTLER: We did a count, and found that about 92 percent of our air time is CD. All that we play off analog disc or cart are titles that are not CD-available. We use one of the old Sony multiplayer, single-controller systems, which is becoming a problem for a couple of reasons. Parts support is not very quick on it. And if you have a failure with the common controller—it's static-sensitive, for example—you're in trouble. We're going to convert to the Denon system so that each machine is an integral unit. We don't like the price of the carrier boxes at five dollars apiece. Converting our library is going to cost more than the players! But we have a terrible p-p-p-p-problem with CDs hanging up on the air from dirt and scratches.
SQUIRE: I have a Studer C730 in my shop right now for evaluation. It has very limited program capability but with its auto pause and so forth, it could do it for us.
HOLDEN: We've found that some of these so-called professional machines have poorer tracking capability than some of the consumer machines.

BME: Anything else regarding digital audio that we haven't touched on?
HOLDEN: Digital audio routing systems may be not terribly interesting to small station operations, but for a network center, it's an area that we are looking at very seriously. A French company called Digitech is doing something with the AES/EBU digital audio interface standard in a small 16x16 switcher with A/D and D/A converters; it also supports the user bit so that one can, for example, encode some channel-identifying data for display at a control panel.

BME: Sounds like another very useful new area. Thank you all for joining us, and for sharing this information. ■

Mike Callaghan

SERIES VI

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ADVANCED TELEVISION COPES WITH COMPATIBILITY

HDTV, while edging ever closer to reality, still faces formidable technical and economic barriers. How best to break down those barriers and start the implementation ball rolling was foremost in the minds of the participants in *BME*'s Engineering Roundtable discussion on HDTV. Standards for production and distribution, the influence of the consumer electronics market and compatibility with NTSC were other issues of importance.

Participants were Stan Kronquest, chief engineer of Telemation Productions, Seattle; Richard Farquhar, vice president of technical services, SOS Productions, Columbus; and Bruce Bredon, chief engineer, Mincey Productions, San Diego. Eva Blinder moderated.

BME: It seems fairly likely that our transmission standard will be 59.94 Hz. Right now the only production standard that's in use is the 1125/60 Hz standard. I know you've got some opinions about that, Bruce.
BREDON: Yes. I have a problem with 1125/60 because the number of images per second is not the same as our existing system. A lot of people think that there's going to be a world standard of 60 Hz. I don't think Europe's going to buy that.

Obviously, there are very large advantages in scan converting from HDTV down to the present standard. And I think the present standards will be around for quite a long time to come. In the real world that we live in, I think we have to consider compatibility, even though we'd rather not. And if we're going to have a world production standard I believe it should be a 50 Hz standard, not a 60 Hz. There are certain advantages to going 50 Hz. The temporal rate is sufficient to give good temporal response.

BME: Is that true of 50 Hz interlace as well as 50 Hz progressive scan?
BREDON: There are advantages and disadvantages. I think we have to carefully look at what's going to happen with digital technology. For instance, horizontal and vertical sync are there to let the electron beam get to the other side of the screen. Well, now, with memory as cheap as it is, maybe horizontal and vertical sync time periods aren't necessary anymore, because if you can buffer the signal inside your monitor, you can then use that bandwidth that's wasted per sync blanking periods. Then, if CRT is the display method, delays can be introduced in the receiver by using memories to provide the necessary retrace times.

Stan Kronquest

BME: Wouldn't that raise the price of a receiver considerably?
BREDON: Well, I see receivers on the market that have low-quality still stores in them that put a picture in the corner. This is today's technology, not 10 years, 20 years from now when things are going to be a lot cheaper and a lot better.
FARQUHAR: That's one of our options, an open-architecture-type of receiver. But I would agree with Bruce on compatibility. Eight millimeter, which did not go as projected, was not compatible. I don't believe Super VHS is taking off as projected. Again, it's not usable with what you

have in your home.

BME: Stan, how important do you think it is for a production standard for HDTV to be compatible with the distribution standard?

KRONQUEST: I think that compatibility is a straw man. Historically we've seen that with the compatibility urgency that was flailed about with the advent of NTSC. And in reality everybody went out and bought color sets very, very rapidly. I think no thought was ever given to transmitting color wideband in another portion of the spectrum. They rushed in. I feel that at this time we have an 1125/60 which does in fact work. If we're ever going to get into canning HDTV programs, we ought to take advantage of hardware and software that now exists and worry about the rest of it later.

BME: You're probably all aware that ANSI has rescinded 240M on appeal.

KRONQUEST: I think it's a tragedy because nothing else is even remotely possible now. We've just made a big step backward.

BREDON: I think now while we're early enough in this game is the time to change to a suitable standard. I don't believe 1125/60 helps anybody. Nobody I know of is working with a 60 Hz standard, at least no major markets. But the present system, let's face it, is going to be around for a long time. We have to maintain compatibility. One very important thing to me is that when you shoot something in HDTV, a lot of people are going to be viewing that on NTSC. And it's important that you cannot have any loss of quality shooting with HDTV as opposed to shooting with an NTSC system.

KRONQUEST: Before it goes too much further, I don't know why 60 isn't an acceptable number. Because it certainly divides into 24 and 30 equally, and that's what the majority of the world's visual literature is on. Go down to Hollywood and look in the vault. I think we're just insane in this business.

FARQUHAR: But 1125/60 will go down very easily, or transcode down for broadcast use.

BME: What about the recent proposals for a 1250-line, 59.94 Hz standard for the U.S.?

BREDON: That would require a 20 percent higher bandwidth or a 20 percent lack of horizontal resolution in order to accomplish an equivalent number of lines.

FARQUHAR: I'm still concerned how you are going to distribute it. I don't mean to harp on distribution, but if we can make the best product, if we can't get it out the door nobody is going to see it.

KRONQUEST: I know a distribution system and it was at a hotel in New York at the last SMPTE, and I've been following it ever since. And they're able to output four standards simultaneously with one input. Put in HD and you can get out anything you want. It's an analog thing, which will probably doom it to defeat because it is not digital. It's a system called Genesys from Arizona. And they're continuing to work on it, they're showing it here at this show.

BME: Have they done any over-the-air tests of it?

KRONQUEST: Yes, I think they have. You can transmit NTSC plus HDTV from a normal transmitter simultaneously. They have a subscriber box you call up and it gets decoded. It seems to me from what I've seen, and on paper, it's a lot more simple than the digital frame stores and the buffers and the recounts.

BREDON: To do scan conversions involving different field rates, I think it's very obvious, is much more complicated and expensive to do than the same field rate. Field rate, you memorize two, three, four lines, that's it. When you're changing between 60 and 59.94 you've got to memorize the whole field and you've got to lose a field every 17⅔ seconds. You'll see what looks like a bad match frame edit.

KRONQUEST: That's not

acceptable, yeah.

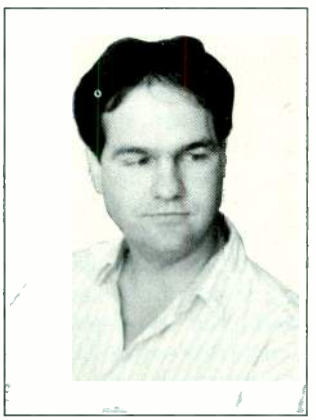
BME: Stan, what do you think we ought to do to really push the implementation of HDTV? You brought that up before. What's your point of view?
KRONQUEST: Well, Bruce proposed steps. I'm trying to think what the steps might be. Maybe you could take an organization like ITS or SMPTE and say, we're going to give you a year, and they'd say, so what? Or we could find somebody and convince them of the profitability of wide-screen, stereo, *Star Wars*-type entertainment for the home. But that is not along the lines of what Bruce and Rich feel. They feel, and rightfully, that they want the highest possible standard technically. And I think we ought to create a demand for it.
BREDON: I think the demand will be inherent once the prices are reasonable.
FARQUHAR: We have to educate the marketplace about what's available. If you walked down the street right now and asked somebody about HDTV, we're talking about at the consumer level, it's something they read about in the newspaper. They might have seen it mentioned on a news broadcast, but they have not seen it.
KRONQUEST: I think maybe what we need is a series of demonstration projects, which as far as I know has never been done publicly. Like a very large NFL football game with HDTV receivers in the away team's home town—something of that nature. You're going to find opinion makers watching that, and that's very important.

BME: What about the political situation? In Europe, the Eureka project has received government approval for industry to sit down at a table and plan how to implement HDTV. In this country, that's considered a violation of antitrust laws and restraint of trade.
FARQUHAR: A couple of bills have been introduced in Congress to provide money for HDTV research. And I think it's very important for the government to support HDTV research and the marketability of it. The Japanese government is doing it, Europe is involved in theirs. We should be involved in ours.

BME: Has anybody been over to the Tropicana and seen the [1125/60 Group] exhibits there? Did you see anything in particular that was interesting?
FARQUHAR: Several things. Probably the most outstanding device there was the paint system, the Shima system. What you could do with it just puts our present NTSC system to shame. In fact, the whole HDTV display was quite impressive.

If you look at the history of HDTV over the last four or five years, the show was fantastic. You're talking about tape machines now. You're talking about matting. You're talking about film interchange. The paint system. You're talking about projection systems. All of them very, very high quality.

BME: Stan, what did you see over there that was particularly interesting?
KRONQUEST: I agree that that graphic system was quite good. You know what I was impressed by? I looked at the tubs and the camera controls and they weren't any bigger than the ones we've got now. I was astonished.
BREDON: I'm impressed by the Hitachi digital VTR. They had it at Dallas two years ago. It's refined more now. They're showing twentieth generation recordings that are amazing.
KRONQUEST: Let me ask you two guys, what do you think should be done to get this thing settled? You want it to happen. I think I want it to happen. Because life is boring unless you do something new.



Bruce Bredon

BREDON: I think we need to set a series of well-defined, objective goals and take things a step at a time. I think it's too early now to be doing any more than research on transmission standards. I think a transmission standard is at least five to 10 years away, easily. And I think any reduced bandwidth system is going to be horrible. The beauty of HDTV is it's an RGB wide bandwidth recording. Even in NTSC, RGB looks pretty damn good.

It's important to realize that when people are buying these expensive HDTV sets, they're still going to want to be able to watch the standard NTSC programming. And if we don't have a compatible scan standard, being able to double that line rate into an HDTV display is going to be much more difficult if it's a 60 Hz display. You'll either have to have a display that'll operate at the two different scan rates or have a frame buffer in it. High quality? I don't think so.

Another thing is the talk about 1125/60 being a world production standard—I don't see that happening. The judder in converting from 60 to 50 Hz is so severe, nobody in the 50 Hz camp is going to accept that. We need to take that into account when we decide on what production standard we really want. Do we really want a production standard that is asynchronous to our existing standard? Another possibility, when we do decide on a transmission standard, do we want to utilize that portion of the picture that is already allocated for transmission on the NTSC spectrum? There may be ways of implementing that already available information in the NTSC signal on one channel and augment that with other channels. Now, if we're going to end up doing that on transmis-

sion, we're going to need a 59.94 Hz standard.

KRONQUEST: Didn't you suggest there should be two production standards?

BREDON: I think it's necessary to have two standards for different parts of the world. I think we should not have a separate production and transmission standard. Don't get me wrong, color encoding is a different story all together. Definitely we should have a production standard that is a component half bandwidth for each chroma channel. Hopefully we'll be smart this time and stick with component until the thing is transmitted. But the scan standard has to be decided upon.

BME: Stan, what about you?

KRONQUEST: Maybe some enlightened large entertainment company from Southern California can figure out a way to distribute wide-screen entertainment down at the video stores. I think that's the natural thing, you know.

FARQUHAR: I agree with Stan. Home entertainment's a big thing now. In September, Panasonic or JVC will have an HDTV half-inch recorder and player on the market in Japan. I'm not sure it's going to be here. But in the next few years we'll see HDTV here.

BREDON: It's interesting that they're talking about consumer HDTV recorders when nobody has developed a decent consumer NTSC recorder yet.

BME: What about simply enhancing NTSC for broadcast distribution? The Faroudja approach, although it's not true HDTV, makes a high-quality picture. If you add further information to get maybe a wide-screen image out of that, would that not be a good approach for broadcasters?

FARQUHAR: Well, I think we want to make sure we don't have a watered-down version of high definition television getting to the consumer. I think we've got to set our standards high.

KRONQUEST: Absolutely. 1125/60 is a minimum acceptable standard.

BREDON: Keep an eye on those FIR filters they're coming out with. I think we're not going to hear much about comb filters anymore. The finite impulse response filter is an all-digital signal processing. It's a real new filter technology from Central Dynamics. Basically it's a filter that dynamically tailors aspects of an impulse and operates on a three-dimensional method.

KRONQUEST: I think 1125/60 is around, it works, and it certainly could be used. But the demonstration part is essential to create excitement out of apathy. But then there would have to be a format change, if reason prevails.

BME: We've seen some big format changes in terms of production. The change from composite to component, which is happening in a lot of places, is not an insignificant change. Is the change from 60 Hz to 59.94 Hz sometime in the future, is that comparable?

BREDON: A much simpler change, I think, in a lot of ways, especially where facilities are concerned. Because your wiring doesn't change. Your routing doesn't change. Your equipment doesn't really change that much. Most of it's digitally derived scanning rate and it shouldn't be that difficult even to modify current equipment.

Richard Farquhar

BME: In the cameras it looks essentially like a chip change or a clock change. In terms of other equipment it may be more difficult. And then if you have two libraries of program material, one in 60 Hz, one in 59.94 Hz, that's a little more difficult to deal with.

BREDON: One thing I don't think anybody is addressing is the ramifications of how we're going to deal with the 1250/50 people.

Should we get together with them and develop some standards, particularly involving digital HDTV systems, where we can standardize things like pixel rate and possibly other aspects of digital recording and distribution of HDTV signals? I think everybody agrees that HDTV is going to be digital. It's not going to be three-wires analog for very long. And I think it's very obvious that we're going to have two standards.

KRONQUEST: Unfortunately you're right. To get on with what Bruce said, I think all factions still have to continue to communicate, whether 1250, 1125, 1050.

FARQUHAR: We've got to be very, very careful that we continue to communicate with the different standards committees.

KRONQUEST: Do you guys have any idea about what organization might do all this?

FARQUHAR: The FCC is really going to be involved in transmission standards. The NAB, I think, should also be concerned about transmission standards and production standards. The 1125/60 group, of course, will be, for their particular standard. The networks should also be involved in this. The Eureka should also be involved. There are so many factions, you could fill this room.

BME: But seriously, do you think we are ever going to get all those different groups to cooperate?

KRONQUEST: Only if there's an incredible lot of money in it. If Hollywood does it, they'll follow.

FARQUHAR: Flowers grow toward the sun. If you develop a leader people will start following. ■

The International Teleproduction Society Annual Forum

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ECONOMICS AND TECHNOLOGY CHALLENGE VIDEO POST

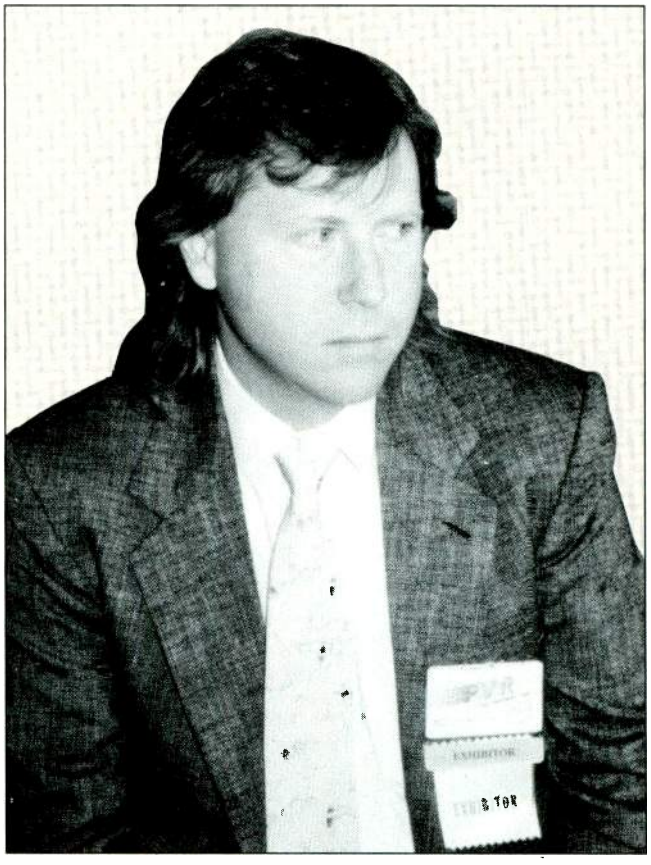
What's on the mind of the post-production community? Delivering the best job for the client's money but—at the same time—keeping the facility profitable. Factor into that mix the proliferation of new formats, new types of competition and midlevel pricing for last year's "gee whiz" technology. Also factor in the specter of HDTV, which is currently seen both as a threat and a new opportunity. No wonder many facilities are asking for time out while they assess the increasingly market-driven nature of the industry.

Our panelists included John Conrad, chief engineer, Video Tape Associates, Atlanta; Bob Frey, director of engineering, Pacific Video Resources, San Francisco; Ken Miller, vice president, engineering, Capitol Video Communications, Washington, DC; and Marcos Obadia, vice president/chief engineer, Limelite Video, Miami. Senior editor Beth Jacques moderated.

BME: Does the production work undertaken by broadcast stations cut into your business?
MILLER: We used to think the biggest separation in the industry was between video and sound or film people. Now we find it's the post-production core of creative people versus people at television stations who are subsidized, so to speak, by their advertising revenue. They work for both client and non-client.

BME: Wasn't the WGBH-TV [Boston] production department charged with becoming a profit center? I gather it responded by buying state-of-the-art equipment and developing a plan to compete on the open market.

MILLER: That's an unusual example because WGBH is a PBS-owned station. They had to go out and raise separate money to form a company that did production on a for-profit basis. By charter, PBS stations aren't allowed to be anything but nonprofit. So they form these companies with separate donations.
CONRAD: Many of the PBS stations do their productions for profit but don't incorporate that way.



Bob Frey

FREY: Sometimes the whole situation creates difficulties with post-production businesses because you find they are a subsidized company and they are bidding against you on a project. You have to make a return on your investment, and it's pocket change to them—or some extra money in their budget.
OBADIA: It happens in Miami, it happens in Boston. I don't know if it's growing.
MILLER: It happens in Washington.
FREY: It happened in Seattle. It's generally a minor problem. It's one of those things that post houses growl about and just go on. I would guess that if there were a marginal production company and a PBS station took something away, it might hurt them. But it's not a huge industry problem, it's just one of those things where PBS stations are probably stepping beyond where they really should. Churches, too.

BME: Can you foresee a day when a religious organization views production as a potential profit center and decides to expand, even to the point of pursuing outside business?
OBADIA: It would be a different thing in their case because they have tax-ex-

empt status. I can see that all the investment that religious organizations have could one day be used for profit.

MILLER: There are a lot of competitive factors right now. In our market, we see the separation between the $100-per-hour rooms with effects and the traditional $400-$600 rooms. "Low-level" companies are sprouting up all over Washington, DC, but they fill a need—it's like one step beyond very sophisticated off-line. And there's a lot of documentary-style things and informative shows which can be done with three Betacams and a Grass Valley 100 switcher.

FREY: A lot of straightforward commercials can be done that way, and broadcast.

MILLER: Cable is a big avenue for low-cost commercials. And manufacturers have noticed that: They deal in numbers. Whatever they can sell the most of, that's the product they're going to push. The D-1 format was a prime example: They built what they thought everybody wanted. And then they priced it in such a way that it became highly selective as to who actually purchased it.

FREY: It's a very difficult machine to manufacture. You had a standards committee that came up with the D-1 standard, and participation from major broadcasters who ended up not being the customers for that product. In our environment, we have to put out the cash, buy the equipment and buy into a good part of the technology that we want. Along with that come some things that are perhaps not especially tailored to what we really need.

OBADIA: Or what the clients want to pay. Because that's the other problem we've all noticed. Yes, all this digital technology is great, it makes great pictures, great commercials and great special effects. But when you have to shove it down someone's throat for a particularly high rate, and he was expecting to pay the same as a one-inch rate, or less, because he can do it just like that on an A62 somewhere else—the bottom line is we have to give technology away until we can get the end-user hooked on that technology. At that point it could become profitable, but at first it's always money-losing.

CONRAD: Some parts are. But when ADO was first introduced, it wasn't a hard sell. It was wonderful, it was added value and clients could see it immediately. But upgrading from a good-quality one-inch to D-1 or D-2 is an incremental increase. It's not the sort of benefit where they can say, "Wow! Look at that!"

FREY: What you need is an opportunity to show your client when that technology is to his advantage—then he's sold. For example, say you sell a client hard on doing something in digital. He really doesn't want to, so he does part of it in analog and then he comes back for effects. And then he realizes he doesn't want to drop a generation. All of a sudden you're using the analog master as a submaster, you're mastering on the digital machine, and the client realizes he can do a pullup, for instance, and not lose that generation. And the next time he comes in, he says, "Let's go right to digital."

OBADIA: That's the same process that happened to everyone with the Abekas A62. It was a $250 add-on to a room and nobody at first wanted to pay for it. People said "I'm not into layering," so you had to give it to them and show them what it could do. Nowadays, we can't give a session without an A62. Once you get them hooked into the technology, they will not go back to the old ways. I don't see how you can go back to editing in one-inch without an A62.

BME: Speaking of new technology, what do you think of Sony's entry into the switcher market?

CONRAD: High time Sony entered the market. They manufacture so many other things so well, it makes sense for them to complete their line.

OBADIA: I guess they're following the line Ampex started, system integration. That's logical, for the two major players.

MILLER: Salesmen love system integration. Everything passes through them.

FREY: It's interesting that Sony is showing switchers. I looked at them, and they don't seem to be that tailored to the American market in terms of features. Their inexpensive switchers were not all that inexpensive when you compare it to a Grass Valley 100, or whatever. And they were missing things like effects memories and features they'll definitely add later. But it was nice. They have two keyers on one ME switcher, for instance, which is a nice touch. I was impressed with one of the manufacturers on the floor who pulled off a D-2 switcher that apparently works. It looks good, it's got some neat features, it's a relatively simple concept with simple implementation. It doesn't do anything that will blow your mind away,

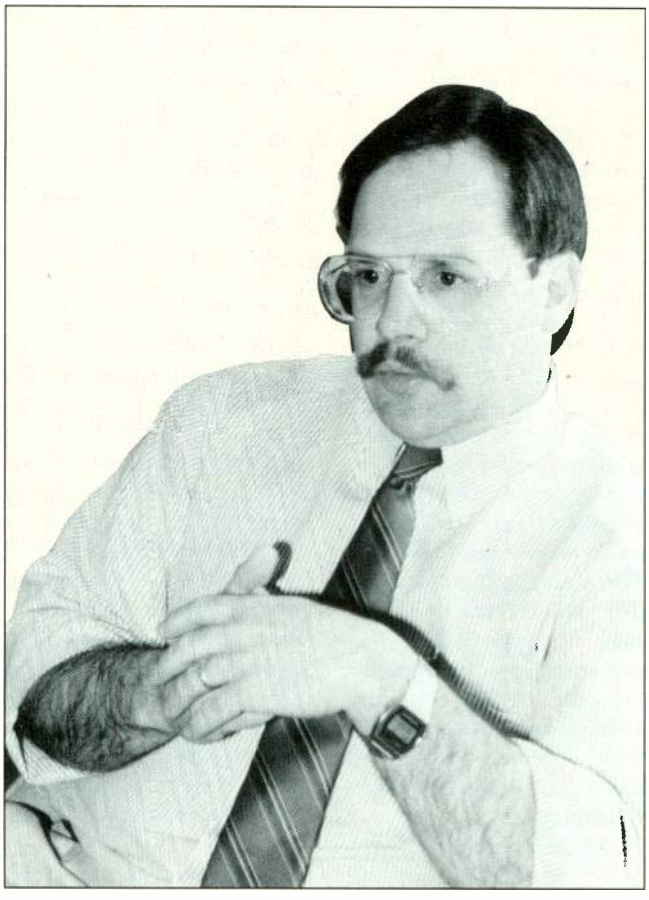
Marcos Obadia

but it's a very useful device.

MILLER: I think that the D-2 format will lend itself to people who can be very clever and quick and do software-oriented things that have a chance of changing very fast. You don't have to design a nine-layer board and go through the prototype stage anymore. I think we'll see even more acceleration in product delivery, which is scary. What's also scary is when a new product is out and your editor is sitting there with

equipment that's buggy. You don't pass that back to the manufacturer. The reputation of your house is on the line.

BME: What do you think of the prices on new mid-range effects equipment?
CONRAD: A $29,000 ADO for my market? Give me one right now.
FREY: We always have situations where what you really need is a "video tool," something to do simple things.
CONRAD: Ninety percent of what you do with an ADO is not complicated work or fancy effects. If you looked at the picture afterward, you couldn't necessarily tell an ADO or any DVE had been used. You just have a fix you have to do somewhere, so you go in and fix it.
FREY: And the danger, of course, is that you shoot yourself in the foot. You have a 3000, and when you add an ADO 100 you find you're using the 100 at a much lower hourly rate and displacing the business you would have done with the 3000.
CONRAD: People do get excited about digital formats, the "D" word. They come in and they want "digital," but they don't know what it means or how it applies to their project. So we have to talk carefully to them and find out exactly what they want to accomplish. After a few times, they know what to expect.
MILLER: In our market, clients expect nothing in digital ever to degrade. That's the point manufacturers have sold them. But if you take a D-2 format and force composite through an analog system, where there are a lot of weaknesses, that myth of going 10 generations just doesn't work. Just a small percentage of differential phase problem in any of the equipment, and 10 generations has totally ragged the picture. When post was tape-limited in any format, you didn't dare go down 10 generations without telling the client, "Well, you know what you're going to get." Now clients expect this digital recording format to correct all past design ills that have existed forever.



Ken Miller

OBADIA: We started with D-1 because it was the first digital format available and we built up a need for it. But because of the publicity about D-2, our clients walked in and said "We want to do it on D-2." So we explained the processing of working on D-1 and finishing on D-2, but they were confused by the numbering of the format. They think D-2 is better than D-1. I'm afraid when D-3 and D-4 come along, they'll think it's automatically better.
FREY: It's interesting how clients perceive new formats. We've had clients call and say they're shooting in the field and they want to master on S-VHS because they've read someplace it's sharper than one-inch and you can go five generations. So some people have done it that way, and then we explain what we can do about bumping up source footage. In general it's cheaper to stay with the acquisition format. We recently did a project for NBC where the acquisition equipment had to be small and unobtrusive. So they shot on ED-Beta and we bumped it to Beta SP, edited to D-1 and transferred to MII to meet NBC requirements. Now I'm sure sooner or later someone's going to want a D-2 dub . . . and a VHS copy so they can look at it at home. The proliferation of formats is enough to drive you crazy. There are new ones all the time: Look at the applications they are beginning to suggest for Sony Hi8. It has time code, it has serial control. Is this starting to sound like an acquisition format?
OBADIA: I'm sure that soon I'll hear one of my clients say "Why do I need to take the Beta compact in the field? I can shoot with my Hi8 camera and bring you the metal tape and you'll do the edit." Yes, this is beginning to sound like it's heading that way. And everybody compares new formats to one-inch. But, since one-inch is on the way out.
CONRAD: Although people are still buying them like crazy.
OBADIA: Everyone says, "Oh yes, Hi8, it's better than one-inch." They think Betacam is better than one-inch. We still have one-inch

machines to pay for.
MILLER: Quad cart is still around, although it's supposed to be superseded by the MII cart.

BME: Has anyone seen Panasonic's digital half-inch equipment?
FREY: It's interesting that the EL display looks very, very familiar. It looks like they pretty much copied the D-1/D-2 EL display complete with audio channel levels and the threading diagram.
OBADIA: "D-3" has another problem. Now we're talking a different tape format. It seems to me that D-2 19 mm tape is going to be established as the interchange program format. Why would you penalize your client after he comes from the field with a different tape format?
CONRAD: For the same reason Betacam did initially—it was just easier to slap that camera on your shoulder. Right now there's that portable Sony D-2 machine.
OBADIA: Which is still 19 mm tape.
CONRAD: That's correct, but Panasonic may have a point in getting a more compact unit like Betacam where someone can just shoot it. The advantage is that it's digital and you can make a clone from that tape format to your D-2 tape format to get it into the interchange. Now you won't necessarily lose anything in the dub up process, which you always did before when you went from that initial Betacam source to the edit session. So they may have a point.

BME: To summarize, some of you feel a D-2 field machine will be used but not be immediately popular.
CONRAD: Over the last five years I've watched one-inch commercial field work peak and drop off and film come back. It seems like most of the commercials and high-dollar productions in Atlanta are shot on film.
FREY: Most of our high-end productions are done on Betacam SP and our process can use the field masters directly in component form.
CONRAD: Betacam SP in preference to film?
FREY: Certainly in preference to 16 mm for fairly high-end work. If they've got the budget for 35 mm, I think things get done in 35.

BME: What about origination when clients are thinking of effects from the start?
OBADIA: We originate a lot in film, transfer the negative to D-1 and go into heavy compositing until we marry, say, a 3D-generated image and a film job together. Not everything in life is blue-screen work, and film is not really the ideal medium for that because of the grain. Film is a great medium, and I personally believe that film has great latitude as an acquisition medium, but at the same time compositing with film-originated material can cause real headaches.

BME: Do you anticipate any problems with the advent of HDTV?
FREY: I think everybody seems to see HDTV as something that we're all going to convert to. I don't think anybody's going to convert to HDTV. It's an additional business opportunity. It's something that some of us will be involved in and some of us won't. The NTSC business that we're doing now is not going to go away for a long time, especially for all the corporate applications.

John Conrad

MILLER: It's the psychology of achievement. They built this equipment, so it's out there. But there are so many underlying issues that have to open for it to be an economic advantage. Right now it's not there. It's really a penalty to be HDTV.
CONRAD: I think 35 mm will be the origination format for HDTV. That sounds strange, but I think that initially, probably 95 percent of the productions will be in film.
MILLER: That's not going to be a technical choice. It's going to be an economic choice, I believe.
CONRAD: Well, I think it's going to be a technical choice too. I have a strong hunch that the high-def Ranks and things like that are going to make a better picture than an HDTV camera. They are pushing tube technology past its limit to get good resolution out of these things.
OBADIA: Last Thursday there was a very interesting meeting in town for business opportunities in high def. One of the panelists there was from Universal City Studios in California, where they've been heavily studying high def applications. And they've come to the conclusion that it's 40 percent more expensive to come up with the same results in high def.
MILLER: There's a lot of assumptions in that there's even a traditional path to take high definition television and find editors and equipment that they can work with to finish a product on time. It's a new format with not all the pieces in place. In one sense, it's stagnating a lot of other possibilities that people would be exploring.
FREY: We have clients all the time who are asking questions about high definition. And we're in a component environment, so we're monitoring in RGB. You are not looking at NTSC artifacts, or the artifacts that a comb filter creates on a monitor or whatever. If the client hasn't been there before, they look at the screen and think that they are looking at a high-def picture. If we could get pictures to the home looking like they look in our facilities, the public would be satisfied for years and years. ■

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EXPLORING THE SPECTRUM OF TRANSMISSION ISSUES

Transmission, a bread-and-butter issue affecting every broadcaster, had added interest at NAB 1989. The first over-the-air transmission of Faroudja's SuperNTSC system, on view on the convention floor, did not go unnoticed by the participants in *BME*'s Engineering Roundtable on transmission for radio and television.

Other important developments caught our panel's attention: developments in solid-state VHF and AM transmission; antenna advances, including vertical and elliptical polarization; the klystrode tube; and the FMX controversy.

From transmission, it's a short step to spectrum allocation issues. What constitutes sound allocation policy, and how current FCC proposals stack up against it, was another topic for debate.

Joining moderator Skip Pizzi for the panel were: Rick Edwards, vice president, broadcast engineering, Guy Gannett Broadcasting Services, Miami; Don Lockett, director of engineering and operations, Programming Division, National Public Radio, Washington, DC; Milford K. Smith, vice president, radio engineering, Greater Media, Inc., East Brunswick, NJ; Fred J. Steurer, P.E., vice president, engineering, Pulitzer Broadcasting Co., St. Louis; and Glynn Walden, engineering manager, AM stations, Group W, Westinghouse Broadcasting, Philadelphia.

BME: What strikes you as significant in the area of broadcast transmission?
STEURER: Solid-state VHF TV.
SMITH: It's been an avalanche with solid-state VHF. It wasn't here and all of a sudden it's here in multiple form.

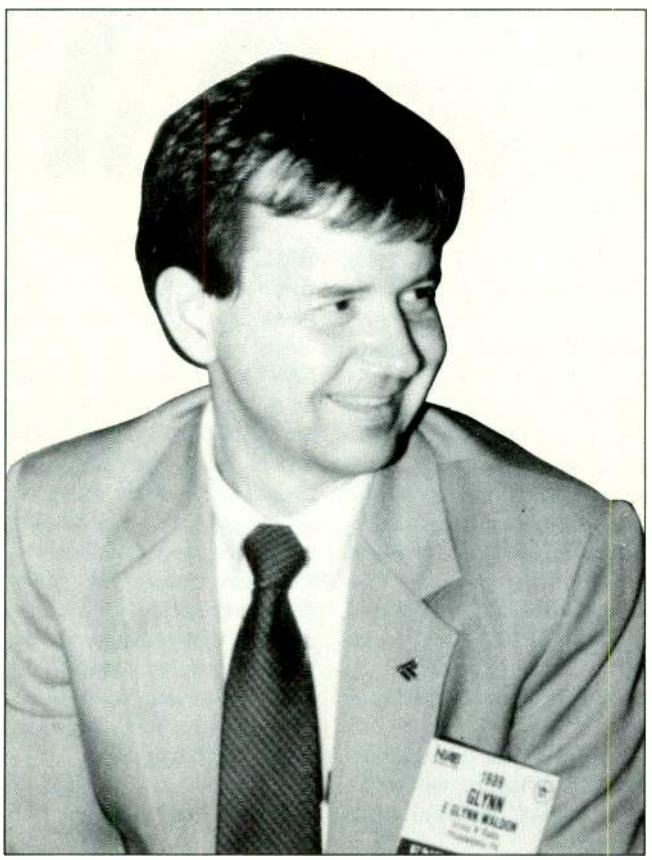
BME: Why do you think that has happened?
STEURER: Several advantages—no tubes, no high voltage, and a lot of redundancy. If something fails, so what? The automatic power brings it up. A lot of headroom.
EDWARDS: It's modular, so there's less maintenance.
SMITH: The potential for catastrophic failure has been considerably reduced.

BME: How about the ambient noise? They run a lot quieter, don't they?
EDWARDS: Yes, and not only ambient noise but actual signal noise. Noise is the number-one spec, folks. Nothing more important than that.

SMITH: But let me tell you what I like about the solid-state more than anything else. I believe in closed loop systems on air, and I think the better, the purer, the cleaner, the dryer the air you put into a transmitter the better off it is. Now, the neat thing about solid-state is that you can do that without the ambient rods being so dramatically high. You don't have to exhaust all the air. Therefore, you can drop a small air-conditioning unit in there and make the thing work far more efficiently than you would if you were exhausting a PA.

BME: How about other TV transmission advances?
EDWARDS: I think antenna technology is just beginning to take off. Especially vertical and elliptical polarization.

BME: Are they improving their efficiency output?



Glynn Walden

EDWARDS: Not necessarily, but I think we're doing a lot better job of serving the public now than we ever have. The vertical pattern, especially UHF, you put in 10, 15 percent vertical power and in the ADI you're going to get better than 60 to 70 percent of the market. And you can saturate those people who have antennas hanging off the side of a house and the lead-in wires are bad. You build a much better standing wave ratio around the set. This is more prevalent on UHF than on VHF because of wavelength. We've had a tremendous amount of success with that.
STEURER: The antenna means everything. There are two manufacturers out there using the traveling wave-type antenna using waveguide, and the important thing is to get at least 100 dBu signal into your most populated area.
EDWARDS: That's right. Years ago people thought that was an incredible amount of signal, but you know now you want it.

BME: How about klystrode technology?
LOCKETT: It's pretty much accepted that the klystrode works at this point, and Georgia Public Television has made a commitment to it in terms of multiple transmitters. The big question is tube life and whether or not that tradeoff in savings for efficiency will show up as more tubes down the road.

Until we get documentation from them, we won't know what the real cost-benefit is.

WALDEN: Changing the subject a bit, I was extremely impressed with the Channel 39 over-the-air enhanced definition television.

BME: Yes, it's the Super-NTSC system.
WALDEN: I had been by earlier when they were just hardwiring it, and I said to myself, "Wait until they put that thing through the air." After transmission, I was shocked at how good it looked.

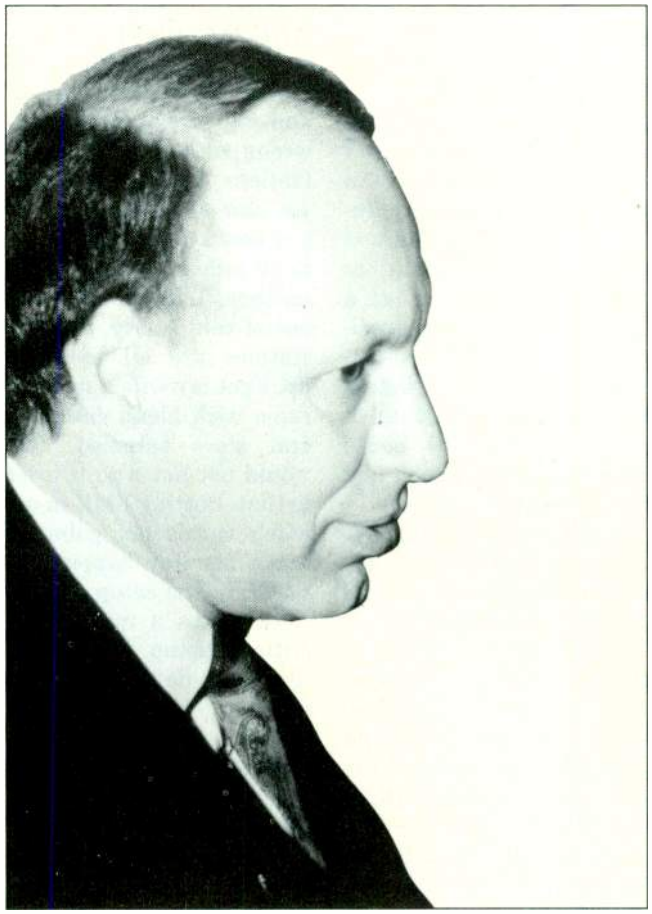
Don Lockett

BME: Moving to radio, there's been a lot of progress in AM with solid state.
SMITH: I find it ironic that as much trouble as AM radio is in right now, with as much audience shift as there is to FM, there is probably more new AM technology on the floor in the last couple of years than ever before. But transmission improvement on AM is almost something that you've got to do. Maybe you've got to do it frantically at this point.
WALDEN: You know, if you look back and you see the stations that are surviving, they're the ones that are continuing to invest in the new technology.
EDWARDS: Absolutely. AM did not die because FM quality was better. AM died because people moved out of the coverage areas. Or, they can hear the station at one time of the day but they can't at the other time of day.
STEURER: That plus the ambient noise.
EDWARDS: Well, in effect, that's the bottom line of what I'm saying. The ambient noise is what's killed AM. It may happen to FM, too, if they're not careful.
SMITH: There are a lot of us that are just very scared of what's going on here. There are a lot of things being implemented that are in direct contradiction, in many cases, to a sound allocation policy.

BME: Along those lines, how about the FM-DA (FM Directional Antenna) issue?
SMITH: Again, scary is the word.
STEURER: They're trying to work that out on that equivalent protection business.
EDWARDS: It just doesn't work.

BME: And the Class A across-the-board power hikes?
SMITH: If anybody increases power there is interference to someone else. Any kind of an across-the-board anything in the FM service is going to result in interference to other people. It's just that simple. FM isn't broken. AM got broken. AM was compromised unmercifully over the years. And how you ever fix it after the fact, I don't know.
EDWARDS: The thing that amazes me is that people who are reasonably intelligent are promoting this. If they really understood the across-the-board issue, they would be against it because they're going to hurt themselves.
SMITH: In the long run, absolutely. And having been involved in the thick of this thing—our company is based in New Jersey. The impetus behind this largely came from New Jersey, and we are sitting in New Jersey saying "no, no, no." You're absolutely right. This whole matter of allocations engineering is something that most of us don't deal with on a day-to-day basis. Most technical people in the industry are not real up to speed on it because they have no reason to work with it on any particular basis. So there's no reason to expect that anybody besides a technical person would know anything about it. Yet it's the basis for the whole ball of wax. And I haven't met more than a couple of dozen people who truly understand how it works and the whole concept of interference and protected contours and DD ratios and that kind of stuff.

BME: What about NRSC — has it made any significant improvement?
WALDEN: I have some spectrum photographs of Chicago from about five years ago showing all the stations crossing into each



Fred Steurer

other. If you go back today and take the same spectrum photograph, you see distinct blips on every station. NRSC cleaned it up. But there are cases where NRSC is too weak. NRSC-2 was a draft standard that the FCC just picked up and adopted. There are numerous faults of the system but, again, it's a big improvement over what we had.

SMITH: Yes, we're better with it than without it.

WALDEN: I have a very serious third adjacent problem in Boston. NRSC-1 into a properly operating transmitter will meet the problem, but NRSC-2 alone does not. And that makes a difference. NRSC-1 and NRSC-2 make a difference whether we're talking 60 square miles of lost coverage, or maybe close to 500 square miles of lost coverage on WBZ. That's very important to us. We're doing a showing to show what the difference would be with the two. But you can meet NRSC-2 without buying an NRSC processor. You might have to make some compromises, for example, run no pre-emphasis and run low amounts, and no clipping on the output and run low modulation levels. But, still, NRSC-1 does provide much greater protection.

SMITH: On our stations with NRSC-1, with a clean transmission system, at 20 kHz off carrier in many cases you're down 80 dB.

WALDEN: We see -50 to -60 at 20 kHz removed with NRSC-1, and NRSC-2 only calls for 35.

SMITH: We find the solid-state transmitters sometimes tend to do a little better than the tube stuff here.

BME: Are we going to see the end of the tube transmitter in our lifetime for radio?

WALDEN: I don't know about in this country but certainly in places like Saudi Arabia, where they pay 50 cents a kilowatt hour, some of these new solid-state transmitters save enough money in a short period of time to be very attractive.

SMITH: And some of the performance specs you're seeing on these AM rigs now are like FM rigs from 10 years ago.

WALDEN: It's pretty costly for me to keep a tube-type transmitter running, not only from the cost of the electricity but from the operating costs. When you change a tube in a tube-type transmitter, the "diddle factor" takes a lot of time and it has to be done in the middle of the night, at overtime rates. With the solid-state transmitters like the Nautel and the Harris, you have a go or no-go condition. If it's working, you have low IM, you have a low harmonic distortion, you have low noise. If it's not working, then there's something wrong and it's not a matter of twisting knobs.

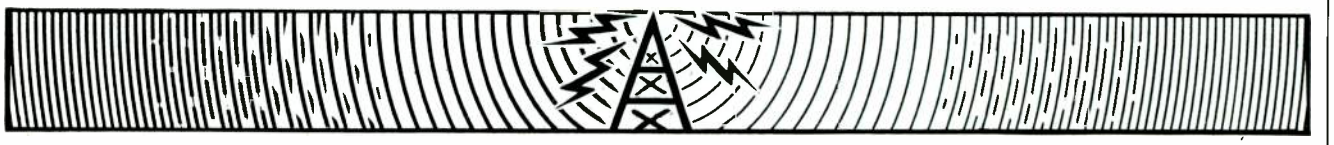
BME: Last year we heard a lot about AM synchronous noise. This year it doesn't seem to be on the agenda much at all.

SMITH: Well, I think we've all heard about it enough times now so we've pretty much got a handle on it. There is at least one neat new box out there that measures it very nicely, and allows you to keep an eye on it. I think most of us have come to the conclusion that if you get it right it can make a difference. It's another part of the NRSC-FM subgroup's agenda, to try and put a "how-good-is-good-enough" number on synchronous noise.

BME: What about remote control? Any advances there?

SMITH: I don't know, there are several manufacturers we'd really love to see finish their software. We've got a couple of systems that we bought over the last year that were supposed to be able to do everything, including buy anniversary

Milford Smith



gifts for chief engineers' wives, that so far are not doing much more than the old basics. Some of them seem to have, in fact, gone backwards. They used to be able to do smart things and can't anymore.

EDWARDS: Something else that I think needs to be investigated very strongly is STLs. They are often our weakest link. Our noise floor on FM is about 75 dB. That's pretty good. Of course, as soon as you put the STL on there it changes dramatically. What I think we and the manufacturers ought to be looking at is a practical digital STL. We'd get rid of a lot of problems that way.

SMITH: We've got a 23 GHz on the air in Boston, a very short hop, like a half a mile using the dbx 700 which I think is the best one, may it rest in peace. But the difference in transparency between that and conventional STLs is amazing.

BME: The good news here is that soon there will be much more spectrum-efficient systems available.

EDWARDS: And there are other ways to overcome the spectrum space problem. Even in large cities you can use UHF taboo channels for point-to-point communications. The FCC has got to realize this is a real problem now and start allowing us to use it.

STEURER: I think the first time that the FCC is going to open up the taboos is for HDTV.

LOCKETT: In the discussions that are taking place now about where high definition is going, there's been no acknowledgement of the fact that radio may have some requirements with the same spectrum. I think that that needs to be addressed.

SMITH: There hasn't been a whole lot of discussion lately as to what HDTV will use for STLs.

WALDEN: I think that allowing the telco entry into delivering fiber optics will also allow us access the other way to use fiber optics to get our signals where we need to get them, in a way that's a lot more efficient than trying to put them over the air.

EDWARDS: Yes, but you're opening up a real big thing here, because when fiber optics hits the houses, the over-the-air television that we know today will be completely changed. Yet, we run a UHF transmitter and it's costing us $20,000 a month in electricity bills. If that can go away, we'd sure like to see that.

BME: The other thing to consider with the coming of fiber is that radio is not going to suffer nearly as much because it's such a mobile medium.

SMITH: Radio is very resilient, it really is.

EDWARDS: Radio will get stronger and stronger every year that goes on. As a matter of fact, we were talking earlier about the demise of AM. If you check the numbers you'll find that AM has now bottomed and started back up again.

SMITH: Yes, that appears to be the case.

BME: Do any of you have opinions on this FMX brouhaha, or any experiences with it yourselves?

SMITH: I was prepared to believe all the negatives. I was ready to shoot holes in it. The Bose report was interesting reading. There is at least some truth in there. But we have had a lot of knowledgeable, sensitized people doing a tremendous amount of listening in almost every kind of bad situation we could come up with. We don't find the problem.

WALDEN: It's interesting. I have a difficult time accepting the advantage. In a test run, you attach an attenuator to the output of the FM signal generator until the point where the noise starts to appear. And then you can turn off the pilot and the noise will go away. But if you increase the attenuator a little bit further, the advantage disappears.

SMITH: It depends a lot upon the receiver, but there's a point where you're coming out of full quieting in your receiver and are on the way to no stereo, and it's that doughnut in your service area where this thing is going to work.

STEURER: That's right, the difference between threshold and saturation differs from one receiver to another.

SMITH: It is a subtle difference in many cases.

WALDEN: I know all the FM engineers hate blend, but if it wasn't for blend, Class B FMs would not be doing what they're doing now.

SMITH: Absolutely correct.

WALDEN: Blend saved FM radio in the northeast. I moved there from Miami and my wife said, "What's wrong with all these radio stations here?" In Miami we had all Class Cs, and you could hear them for 50 to 70 miles. I moved to the northeast, living 18 miles out of center city, and the stations are all breaking up. I got my wife a new car radio with blend circuitry, and she's satisfied. She would not listen to it prior to that. Putting FMX in my wife's car is not going to make her any happier.

SMITH: The setup on it is critical. It's a much more critical setup than anything to date, that's for sure.

BME: The predicted problem with the system is the multipath increase which, of course, is probably a much worse problem as far as its audible degradation of the signal.

WALDEN: When you increase the channel loading, it's going to be more difficult to receive.

SMITH: Well, I was prepared to hear grossly worse multipath events with this stuff on it. And I'm not hearing it. Nor are 150 employees of the two radio stations. Now it's got to increase multipath susceptibility, as you load the channel, particularly at higher frequencies. It has to.

WALDEN: But is it already so bad in those places where it increases that it doesn't make any difference?

SMITH: That may very well be the case. ■

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—Dana Geiken, DMB & B

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—Merle Welch, Foote, Cone and Belding

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

—Karl Hagnauer, KPLR

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

—Robert Strutzel, WGN-TV

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

—Jim Martin, WOAY-TV

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BTS did not invent the three-way lounge chair. Barcalounger® did.

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3-D Computer Animation

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switchers, videotape recorders and graphics equipment are among the best-engineered, highest quality and most reliable in the world. Our work in High Definition and CCD products is pacing an industry which faces the most sweeping technological advances since its beginning.

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NEW PRODUCTS FROM NAB 1989

Here's the latest information on over 350 hot new products from one of the hottest NAB shows ever.

ABEKAS INTROS POST SWITCHER

Abekas Video Systems' A84 digital post-production switcher is a 12-input, CCIR 601-compatible unit that incorporates the company's trademarked Adaptive Sub-Pixel Intelligent Keying processing to prevent stair-stepping artifacts in key edges. The unit features eight digital key processors; three independent digital wipe pattern generators; 12 video and key inputs; 12 each video, key and mask framestores; 10-bit digital input/output; 32 separate color matte generators; nine color modifiers; and keyframe-based effects memory. List price is $295,000.

Reader Service #165

ACOUSTECH INTROS AUDIO MONITORING SYSTEM

Acoustech Corp.'s MTR 4.5 audio monitoring system features two input channels for stereo monitoring; high-input isolation between channels; balanced inputs with professional three-pin connectors and loop-through outputs; no attenuation of loop-through signal; levels to +22 dB without distortion; and 50 Hz to 17 kHz ±4 dB response.

Reader Service #166

ACCU-WEATHER HAS NEW GRAPHICS SYSTEM

The UltraGraphix 240 weather graphics system, based on Macintosh architecture, provides trouble-free access to graphic selections. Features include high color resolution, high spatial resolution, print capabilities, NTSC output, weather imagery, many wipe styles, color table moves and total weather segment products. May be leased or purchased at $28,900.

Reader Service #167

ACE UNVEILS ARRAY ROUTING SYSTEMS

Featuring a compact 64 x 64 matrix in nine RU, the ACE Array routing systems can be used individually or in multilevel systems. They are available in configurations up to 128 x 128. Other features include extended video bandwidth (30 MHz), integral video output monitoring bus and dual power supply system. ACE Array is distributed by Midwest Communications.

Reader Service #168

ACCOM DISPLAYS DIGITAL DECODING SYSTEM

Accom's D-Bridge 221 decodes and sample rate converts digital NTSC D2 or analog NTSC RS-170A to D1, RGB or Y(R-Y)(B-Y). Frame-based, three-dimensional adaptive decoding eliminates cross-luminance and cross-chrominance artifacts from the output picture without prefilter-

NEW PRODUCTS AT NAB

ing. To sharpen picture detail, the unit has up to 12 dB of horizontal and vertical enhancement for the luminance signal and up to 12 dB of independent I and Q horizontal enhancement for the chrominance signals. Remote control is optional. Delivery is 90 days and the price is $32,500.
Reader Service #169

10x2 video/audio routing switcher features 30 MHz bandwidth, HDTV compatibility and remote control capability, along with expandability to 10x10, up to two audio/LTC channels, optional tally relay and optional serial interface. Immediately available at $1495.
Reader Service #172

AGFA OFFERS IMPROVED TAPE

Agfa has improved its PEM 469 audio mastering tape used for professional recording and in audio-for-video applications. The new tape has a cleaner-running oxide surface for greater storage stability and a new backcoat and film base for greater durability in withstanding multiple passes.
Reader Service #175

ACCOM

ACRODYNE PRESENTS 1 kW SOLID-STATE TRANSMITTER

Acrodyne's TRU/1000 1 kW solid-state UHF transmitter features four slide-out visual amplifier modules rated at 350 W each. The separate aural amplifier, using the same devices as the visual, delivers 100 W output. Built-in diagnostics are also included. List price is $60,000.
Reader Service #170

ADAMS-SMITH PRESENTS EDITOR

Still-frame and slow motion sound editing along with simplified edit list management are features of the Adams-Smith 2600 A/V audio-for-video editor. Also featured are automatic track selection, bi-phase dubbers and a motion control knob for use with VTRs. The emulation feature permits the audio tape recorder to be controlled from the videotape editor, allowing audio sweetening to be done in the same room as video editing.
Reader Service #171

ADRIENNE DEBUTS SMALL ROUTING SWITCHERS

Adrienne Electronics' AEC-2

ADVENT DISPLAYS PORTABLE KU-BAND ANTENNA

Mantis is a segmented antenna designed to comply fully with the performance requirements of international satellite authorities, particularly in respect to sidelobe and cross polar performance. The six identical and interchangeable high-strength aluminum petals provide the durability needed to withstand rough handling and extreme environments. Delivery is two weeks to 90 days.
Reader Service #173

AF ASSOCIATES HAS ROBOTIC CONTROL

Total remote control of up to eight cameras from a single control panel is accomplished with the Advanced Robotic Control System (ARC) from AF Associates. ARC controls the pan and tilt positions of each Radamec EPO head and also the zoom, focus, and iris settings of the lens. Once set, positions, settings, programmable fade times and shot linking sequences may be stored and recalled at the press of a button. Price range is $10,000 to $15,000.
Reader Service #174

AKAI EXHIBITS DIGITAL RECORDING SYSTEM

A-DAM, AKAI Digital's audio multitrack format recording system, consists of the DR1200 digital multitrack recorder, the DL1200 programmable autolocator and the DM1200 meter unit. It uses 8 mm videotape as its recording medium. The A-DAM recording system features 16-bit quantization, selectable 44.1/48 kHz sampling frequency and error correction capabilities, along with digital crossfade, synchronized operation of up to three DR1200 recorders and a number of automated operations. Available nationally in July.
Reader Service #176

AKG PRESENTS DIGITAL SOUND EDITOR

AKG Acoustics' DSE 7000 is a RAM-based digital audio workstation incorporating the equivalent of an eight-track recorder, editing system and mixer. Designed for use in preparation of commercials and other short recordings, it features "undo" capability of edits, punch-ins and recording; eight-track capability with loss-less digital track bouncing; integral digital mixer with 10 inputs, including level, pan, echo send/return, track bounce and solo functions; digital audio in 16-bit linear PCM format, 20 kHz bandwidth at 44.1/48 kHz sampling rate; and workstation format for stand-alone operation.
Reader Service #177

ALAMAR UNVEILS MC-2055 AUTOMATION

Alamar USA's third-generation automation system, MC-2055, can accommodate up to 16 independently scheduled program channels, along with one general-purpose record channel and an all-source to all-destination channel. GPRC option is designed to eliminate missed feeds due to failure to place VTR in record mode. The MC-2055 uses a '386 computer and will be available in September. List price is $24,000.
Reader Service #178

ALEXANDER UNVEILS BRICK POWER GAUGE

Alexander Batteries' Brick Power Gauge is an LCD, built directly into the battery case, alternating display of battery voltage and capacity used since full charge. Also new from Alexander is the Beta Battery Manager, designed to charge, analyze, discharge and condition up to three beta (NP1-type) batteries. It will charge a battery with 1.8 Ah capacity in approximately two hours and 15 minutes.
Reader Service #179

ALLDESIGN INTROS DAMS

DAMS is AllDesign Services'

digital audio mass storage system for on-air presentation use. Based on a Winchester hard disk, the system features more than 540 minutes of full-bandwidth (12 kHz) stereo programming storage space; on-line automatic memory redundancy that switches to backup drives in case of failure; transparency to third-party automation control systems; integrated data logging and database facility to track system usage.
Reader Service #180

ALLIED FEATURES WELDED TOWERS

Allied Tower offers a full line of welded guyed towers, Models 18 through 54, suited for AM broadcast, two-way cellular, CATV, microwave, FM and TV broadcast uses. The firm also offers angle guyed towers, knock-down guyed towers, self-supporting towers, and accessories.
Reader Service #181

ALPHA AUDIO UNVEILS BOSS/2

Boss/2, Alpha Audio's second-generation automated audio editing system features digital waveform editing; concurrent multiprotocol communication (RS-422, RS-232, SMPTE and MIDI); direct serial control of Sony-, Ampex-, or ES-BUS-speaking machines; and the ability to mix synchronizer brands when necessary.
Reader Service #182

ALPHA VIDEO PRESENTS SAFETY RAISER

Designed to prevent accidents involving ENG microwave masts and overhead power lines, Alpha Video's Safety Raiser uses three types of detectors—magnetic, electrostatic and microwave—to detect overhead lines.
Reader Service #183

ALPS PRESENTS VIDEOCASSETTE STORAGE

ALPS cabinets are designed for maximum storage and fast retrieval. It is never necessary to move one cassette to reach another. Since the cabinets protect the cassettes from dust and damage, plastic cases are unnecessary and 50 percent more cassettes will fit in a cabinet, according to the manufacturer.
Reader Service #184

ALTA INTRODUCES TBC/SYNCHRONIZER

Cygnus 5.5 from the ALTA Group is a wideband TBC/synchronizer and effects system providing 5.5 MHz of bandwidth in both the composite and Y/C modes. Cygnus 5.5 also provides 3 dB chrominance noise reduction on composite inputs, and a new one-line, chroma-luma delay capability ensures multiple generation color integrity. Price is $5950.
Reader Service #185

MEASUREMENT PACKAGE PREMIERS FROM AMBER

The Total Solution Audio Measurement package from Amber Electro Design consists of the Model 5500 programmable audio measurement system and AudioCheck, a PC-based, menu-driven software package. The hardware provides a comprehensive measurement capability including frequency response, noise, several kinds of distortion, phase, wow and flutter and more. System specs are THD below 0.001 percent, noise -120 dBm, generator output +30 dBm balanced. Various outputs are available, from simple pass/fail to multipage hard copy reports.
Reader Service #186

AMEK/TAC PRESENTS BULLET MIXING DESK

Amek/Total Audio Concepts' Bullet is a compact mixing desk featuring 10/4/2 configuration in a free-standing chassis. The channel has mic and line inputs, phase reverse and phantom power on/off; four-band EQ with high-pass filter; two mono and one stereo auxiliary with six auxiliary buses; separate routing for four subgroups; and stereo output. The fader has 100 mm travel and is fitted with a large mute switch.
Reader Service #187

AMERICAN BROADCAST SHOWS SEQUENCER

The MicroCart 50 from American Broadcast Systems is a $14,900 VTR sequencer control system that is self-programming for 50 break sequences. It has two-second preroll and accommodates stereo audio. A CRT displays events by name, library ID number and duration for verification and error prevention. The price includes computer, interface cards and cable harnesses for eight transports, 10-input program switcher, sync DAs, remote control panel, CRT terminals and printer.
Reader Service #188

AMPEX DEBUTS DIGITAL EFFECTS SYSTEM

Designed for smaller facilities, the ADO 100 features high-end picture quality, unlimited functions, and upgradability from 2D to 3D. Effects include rotation on three axes, mosaic, flip, spin, tumble, roll, posterize, solarize, freeze, crop sides, add borders and exaggerate perspective. Also featured is the ability to fly irregularly shaped objects, characters and logos without the expense of a second effects channel or the need to develop a matte reel. Ready for immediate delivery. The 2D version lists for under $20,000 and the 3D version lists for under $35,000.
Reader Service #189

ANDREW UNVEILS 2-IN-1 ANTENNA

Andrew Corp. has introduced the latest member in its G/T Series Cherry Picker antenna family, the 7.3-meter "two-in-one" receive/transmit antenna. The unit can transmit in Ku-band and receive in both C- and Ku-bands. It is motorized and has a six-port feed system, dual-polarized in both C- and Ku-bands.
Reader Service #190

ANVIL ADDS NEW MATERIAL TO LINE

Anvil Cases has added a new mica material to its line of transit and storage cases for broadcast equipment. The company says the new material makes the cases virtually indestructible.
Reader Service #191

APHEX UPDATES AURAL EXCITER

Two modes of noise reduction and a spectral phase reflector circuit for improved bass clarity are key features of the Aural Exciter type III from Aphex Systems. Processing recreates and restores missing harmonics to produce natural brightness, clarity and presence. Servo-balanced inputs absorb high common-mode voltages and servo-balanced outputs avoid level loss. Currently available at $995.
Reader Service #192

ARRAKIS INTROS 12,000 SERIES CONSOLES

Arrakis Systems' 12,000 series consoles come in three mainframe sizes with eight, 18 and 28 channels. System 6 features one ECM 8 eight-channel mainframe, six TPM 1 input modules, six blank input modules, one TOB 1 output module, one CRM 1 monitor module, power supply, installation kit, manual and spare parts kit. System 12 is identical but with an ECM 18 18-channel mainframe and 12 TPM 1 input modules. System 18 consists of the above with an ECM 28 28-channel mainframe, 18 TPM 1 input modules and 10 blank input modules. Prices start at $3999.
Reader Service #193

ART UNVEILS AUDIO EFX

The DBS-8000 effects processor from Applied Research and Technology will perform eight functions simultaneously and features a harmonic exciter, compressor/limiter, equalizer, expander, noise gate and more than 40 other digital effects. Price is $699.
Reader Service #194

ASACA DISPLAYS STILL STORE

The ASACA ADS-300 is a compact still store recorder, editor and player incorporating a fast, reliable and rewritable magneto-optical disk drive. One removable disk cartridge stores up to 1600 frames of color still image data. System firmware enables horizontal and vertical roll of user-defined playlists. Random access allows the operator to alter playlists and edit data at will. The system is $59,000, replaceable cartridges are $280; available in July.
Reader Service #195

ASTON ELECTRONICS OFFERS STILL STORE

Full broadcast quality and either 524- or 625-line operation are available with the Aston Electronics Wallet, which stores 42 images and key signals on a removable disk and 39 images and key signals on a hard disk. Features include a recall time of less than two seconds, software keying, several special effects, a display sequence stack

NEW PRODUCTS AT NAB

AT to BA

table, image naming, elimination of horizontal flicker, field averaging, field interpolation and field doubling.
Reader Service #196

ATI UNVEILS ULTIMIKE AMPLIFIER

Mounted near the microphone, Audio Technologies' M100 Ultimike amplifier can eliminate dimmer noise, RF pickup, hum and rolloffs from long cable runs, according to the company. Features include up to +20 dBu input, switchable gain and low cut filter, 48 V phantom power, phase reverse switch, DC remote gain trimmer and switchable output limiter. List price is $299.
Reader Service #197

AT&T PRESENTS GRAPHICS SOFTWARE

AT&T's Graphics Software Labs has introduced three products: RIO, a 2D design and layout package; TOPAS, a 3D solids modeling and animation package; and Panorama, image sequencing software. All three feature a user interface described as simple to pick up by a first-time user.
Reader Service #198

AUDIO ACCESSORIES PREMIERS NEW PATCH BAYS

The WP-KR prewired patch bays from Audio Accessories are typically supplied with tip, ring, sleeve and normals brought out, unless specified when ordering. Each unit features Audio-Line jack panels wired to a Krone LSA-Plus terminal block. A total of nine models are available.
Reader Service #199

AUDIO DESIGN PRESENTS PRODAT

Audio Design's PRODAT digital audio tape system features balanced outputs with XLR connectors and multiturn pots for adjusting level between 0 dBm and +20 dBm at full 16-bit modulation. Other features include switchable 44.1 kHz and 48 kHz sampling frequencies for analog and digital recording and a copy-prohibit switch to prevent digital transfers on domestic R-DAT digital audio recorders. The latest version includes a Harris (AIWA) XD-001 as the deck. List price is $3950.
Reader Service #200

AUDIO DEVELOPMENTS UNVEILS DA

Audio Developments' AD 081 distribution amplifier features a modular design, with each module including four inputs and one output or vice versa. Input selector switch allows all modules to output the same input. Price is $5000 to $6000, depending on configuration.
Reader Service #202

AUDIOPAK AA-4 CARTS DESIGNED FOR DIGITAL

Designed to capture the extended frequency response of digital source material, Audiopak's AA-4 broadcast tape cartridges use 614 tape, a premium oxide formulation that delivers superior high-frequency saturation headroom and extended frequency response, according to the company. The AA-4 uses the same neutral casing as the company's AA-3 cart—warping, stress relief or molding tolerances in the casing do not interfere with tape azimuth or phase stability.
Reader Service #201

SYSTEM ONE ADDITIONS FROM AUDIO PRECISION

The System One Dual Domain addition to Audio Precision's System One line provides, according to the company, a digitally based analysis and synthesis of audio frequency signals in both the analog and digital domains. Together with System One + DSP, Dual Domain adds harmonic and spectrum analysis capability for users making analog measurements. On the digital side, Dual Domain has an input/output option that allows interfacing to most professional and consumer digital audio devices. Both parallel and serial interfaces are provided. Delivery begins this month; list price is $12,950.
Reader Service #203

AUDIO-TECHNICA INTROS ATM25 MIC

The ATM25 microphone from Audio-Technica features exceptional low-frequency handling for broadcast dialog, says the manufacturer. The narrow acceptance angle of the hypercardioid polar pattern allows the mic to focus on a desired sound source, control feedback and reject unwanted sounds outside the pickup pattern. The ATM25 features 30-15,000 Hz frequency response, 600 ohm balanced output and -57.8 dBm sensitivity.
Reader Service #204

AUDITRONICS UNVEILS TV310 CONSOLES

Auditronics' TV310 Series of audio consoles feature four aux send and returns, output submastering, four group master faders, VCA fader control, cue, stereo solo, stereo monitoring, phantom mic power and a complete metering package.
Reader Service #205

AURORA PRESENTS 3DS SYSTEM

Aurora Systems' 3DS system is based on software developed by Intelligent Light. Features include complete animation software, multiple light sources, rendering, digitizer/editor and multitasking. Files are compatible with all other Aurora systems via Ethernet. Two versions are available: Model 1 at 25 MHz and Model 2 at 33 MHz. Both use a 348 MB fixed disk and 60 MB streaming tape for backup.
Reader Service #206

AVID ANNOUNCES NONLINEAR EDITOR

The Avid/1 Media Composer is a new digital, nonlinear editing system based on the Apple Macintosh IIx or IIcx. The system digitizes and compresses video in real time to display edited sequences instantly, direct from one to seven 600 MB SCSI hard disks. The Avid/1 can simultaneously handle full-color video at 30 fps and two channels of 44 kHz, 16-bit CD-quality sound. Available this summer. Base price $50,000.
Reader Service #207

NEW CONSOLE INTROED BY AUTOGRAM

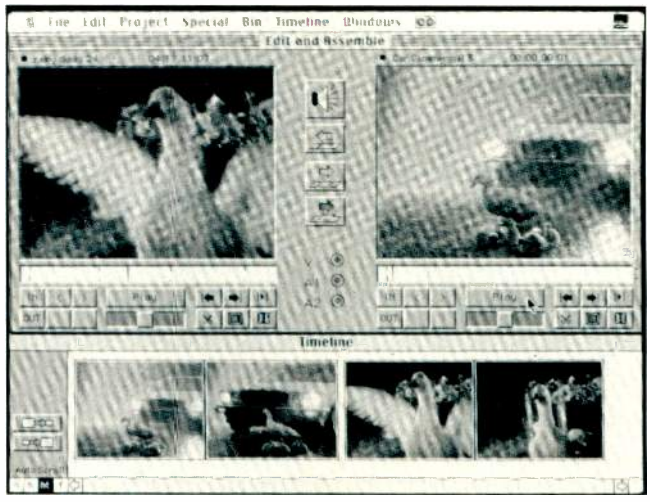
The Pacemaker 828 console from Autogram Corp. features eight pots (six dual and two with eight inputs each), S/N better than -90 dB at +18 dBm out on program/monitor and better than -80 dB at 2 W on headphone/cue, output frequency response of ±0.1 dB 20 Hz-20 kHz on program/monitor and ±0.5 dB 20 Hz-20 kHz on headphone/cue, and output distortion of less than .05 percent THD and IMD on program/monitor and less than 0.1 percent THD and IMD on headphone/cue.
Reader Service #208

AVCOM UNVEILS PORTABLE TEST RECEIVER

Avcom's PTR-25 portable test receiver features circuitry derived from the company's COM-2 and COM-3R satellite receivers. A full range of outputs are available to provide signals for TV monitors, video recorders and audio amplifiers. An IF-sampled output is available for observing the 70 MHz IF signal.
Reader Service #209

BAL PRESENTS CODER, DECODER

Digistream Mk II from BAL Components is a coder and decoder conforming to the signal processing specifications of CCIR 601 and CCIR 656. The transmitter encodes a component analog signal, creating a parallel digital signal conforming to CCIR 656. The receiver decodes the digital signal to create a



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NEW PRODUCTS AT NAB

BA to BT

component analog signal.
Reader Service #210

BARCO PREVIEWS LARGE-SCREEN MONITOR

Barco Industries' prototype CVM-110 43-inch direct view broadcast monitor features a brighter picture than rear projection systems of similar dimensions. The image is approximately 900 square inches, nearly 50 percent larger than existing 35-inch monitors. Luminance is 30 foot-lamberts in full white and resolution is 500 lines. Also new from Barco is a D-2 decoder for use with the CVS series intelligent broadcast monitors to provide compatibility with digital composite video systems.
Reader Service #211

BASYS UNVEILS MCS ONE

The MCS One machine control system from BASYS features a modular design. The Playlist module interprets video instruction within a script; the Download module permits MCS One to connect to four production devices; the Event Control module provides direct on-air control of the character generator, video cart, still store and robotic camera systems.
Reader Service #212

BASYS PRESENTS PC NEWSDESK

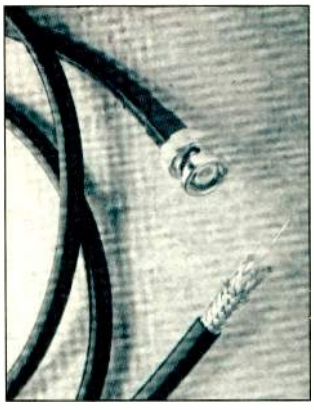
BASYS' PC NewsDesk, a low-cost newsroom automation software package, is available in single-user or multiuser configurations, expandable to seven devices. The system runs on a dedicated IBM PC AT or compatible. List price for the multiuser package is $6900.
Reader Service #213

BELAR FEATURES TV AURAL MONITOR

Belar Electronics Laboratory's Model TVM-100 precision aural monitor is a wideband TV aural modulation monitor designed to measure the total modulation characteristics of mono as well as multichannel television transmitters. Two models are available—the TVM-100L, with a frequency range of 54-216 MHz and the TVM-100H, with a frequency range of 470-806 MHz. The RF input on both models is 100 mV to 5 Vrms (composite). Frequency response is ±.01 dB, 30 Hz to 50 Hz. Linear phase deviation is less than ± .05 percent.
Reader Service #214

BOLAND UNVEILS UNIVUER

Boland Communications' uniVuer places a stereo audio bargraph meter into a video signal for display on a video monitor. The device permits monitoring of stereo phase coherency with the addition of the MonSter option. It is compatible with NTSC, PAL and 1125-line HDTV video standards. List price is $1895.
Reader Service #215


BELDEN

BRILLIANCE LINE UNVEILED BY BELDEN

Belden Wire and Cable now offers a flexible, 75 ohm precision video cable, Brilliance 8281F. The cable is constructed of 22 AWG (7 x 29) bare copper conductor insulated with polyethylene, with a stranded center conductor. Also available is 8281A, an NEC-rated video cable that passes the UL test for wall installation without conduits.
Reader Service #216

BEXT SHOWS SDR FM COMPOSITE RECEIVER

Designed for translator/booster applications in conjunction with one of the Bext exciters and amplifiers (where allowed by the FCC), this unit is claimed by the manufacturer to be the only front-panel programmable composite receiver in the market. The unit offers MPX and SCA performance and 100-200 KHz telemetry/data subcarrier capability in addition to main program and standard SCA's, RF immunity, variable bandwidth for maximum selectivity, adjacent channel rejection and 50 dB minimum stereo separation. $3000; immediate delivery.
Reader Service #217

BEYER INTRODUCES SHORT SHOTGUN

Designed for studio, camera mount, fishpole boom or handheld applications, the MCE 86 is a lightweight, high-quality shotgun microphone. Frequency response is 50 Hz to 18 kHz. Maximum SPL at 1 kHz, with less than one percent THD, is 148 dB and any phantom power source generating 12 to 48 V can be used to power the MCE 86. Price is $495 and delivery is two weeks.
Reader Service #218

BROADCAST AUTOMATION FEATURES LIVE-ASSIST CONTROLLER

Live Assistant allows connection of up to eight audio sources, plays sources in any order with 24 programming events, has thumbwheel operation to allow visual identification of the sources programmed and their order and uses LEDs to show which source is on the air and which is next. A built-in silence sensor and closed-loop fail-safe features prevent dead air. Price is $2495.
Reader Service #219

BROADCASTERS GENERAL STORE OFFERS AUDIO WORKSTATION

News Director is an easy-to-install, flexible and user-friendly solution to the everyday problems associated with news workstations. This microprocessor-based 16 x 2 program audio and monitor routing switcher is designed to be the central control device in newsgathering and editing control rooms.
Reader Service #220

BE UNVEILS FM TRANSMITTERS, EXCITER

Broadcast Electronics' B Series of FM transmitters has been completely restyled in two-toned technical gray. Each incorporates the FX-50 50 W FM exciter. The line covers a power range of 100 W to 35 kW. Transmitters of one kW and larger use a single tube. The exciter (also available as a separate unit) offers THD and IMD less than 0.003 percent, transient IM distortion less than 0.01 percent and S/N of 93 dB.
Reader Service #221

NEW CART MACHINE INTROED BY BE

Broadcast Electronics' Dura Trak 90 cartridge machine features toroidal power transformers, active balanced inputs and outputs, Phase Lok V head block, low-voltage, current-regulated solenoid, fast-forward as a standard feature, and auto switching VU meters. Specs include maximum wow and flutter of 0.12 percent DIN, WTD; audio output level of +20 dBm before clip; less than 1.5 percent THD in the record/play system; crosstalk limited to -50 dB between any two adjacent channels; and frequency response of ±2 dB, 40 Hz to 16 kHz.
Reader Service #222

BROADCAST VIDEO PRESENTS TRANSLATORS

Broadcast Video Systems Type 100 and Type 300 interformat translators both come in NTSC or PAL versions and both feature Y frequency response of ±0.2 dB to 5.5 MHz. Linearity on both is <1 percent, as are tilt and gain stability. Type 100 converts S-VHS YC to R-Y, B-Y, Y (Betacam or MII); Type 300 converts R-Y, B-Y, Y (Betacam or MII) to S-VHS YC.
Reader Service #223

BRUEL AND KJAER DISPLAY STUDIO MIC

Studio microphone type 4011 is a high-quality prepolarized condenser microphone with a first-order cardioid pick-up pattern. Each microphone is individually calibrated and has a flat on-axis frequency response over a wide range, smooth phase response, also smooth off-axis response, designed to avoid "muddy" off-axis sound.
Reader Service #224

BRYSTON UNVEILS ELECTRONIC CROSSOVER

Bryston's Model 10B electronic crossover features independently selectable crossover points for high-pass and low-pass. Crossover slope can also be independently selected, from six, 12 or 18 dB/octave. The unit can be used in two-way stereo, three-way mono or two-way mono internal connections.
Reader Service #225

BTS INTRODUCES PORTABLE CAMERA

BTS is offering a new frame-transfer CCD portable camera with improved resolution. The new LDK-91 has 800 pixels per line compared to 610 for its

predecessor, the LDK-90. Other features new to the LDK-91 are frame-transfer anti-flare sensors, adjustable shoulder mount, diagnostics, operational-status display in the viewfinder and over 700 TVL resolution. Price is $27,900, with deliveries scheduled to start in October.
Reader Service #226

BT to CA

BTS PREMIERS TVS/TAS-3000 SWITCHERS

BTS' new TVS/TAS-3000 video/audio distribution switcher provides a video bandwidth of more than 50 MHz and uses surface-mount technology to reduce signal path length and stray capacitance effects. The 19.25-inch high chassis provides up to 160 inputs with 20 outputs or 70 inputs with 40 outputs. The system slew rate (70 V/μs) supports the system bandwidth for all signal amplitudes up to full video level (700 mV peak to peak).
Reader Service #227

BURLE UNVEILS LPTV POWER TUBE

Burle's 9017 power tube is designed for LPTV use. The UHF linear beam power tube features full input to 860 MHz, forced air cooling, 1.1 kW peak sync output and 15 dB gain (typical).
Reader Service #228

CABLEWAVE EXPANDS CABLE LINE

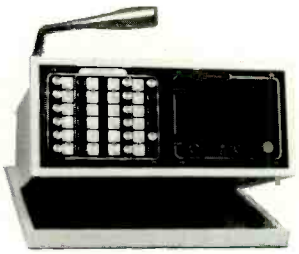
Cablewave Systems, a division of Radio Frequency Systems, has expanded its Flexwell family of RF transmission lines to include 5-, 6⅛-, 8-, 9- and 12-inch diameter, air-dielectric, semi-flexible, 50-ohm coaxial cables. Cables are manufactured in continuous lengths using seam welding. Those up to eight inches in diameter have a copper outer conductor and black polyethylene jacket for direct burial. The nine-inch and 12-inch cables have aluminum and copper outer conductors, respectively, and no jacket.
Reader Service #229

CANON UNVEILS REMOTE CONTROL HEAD

Canon's U-5L remote control pan/tilt head is designed to permit mounting of smaller-sized ENG studio/field cameras and lenses. The unit is functional on ⅔-, one- and 1¼-inch cameras

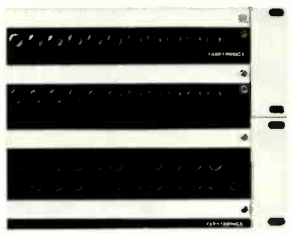
farrtronics

MANUFACTURERS OF BROADCAST AUDIO EQUIPMENT

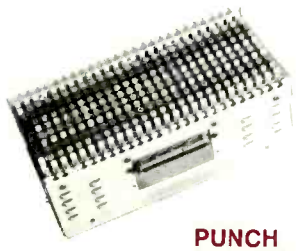


INTERCOM & IFB

AUDIO DISTRIBUTION



AUDIO/VIDEO PATCHFIELDS



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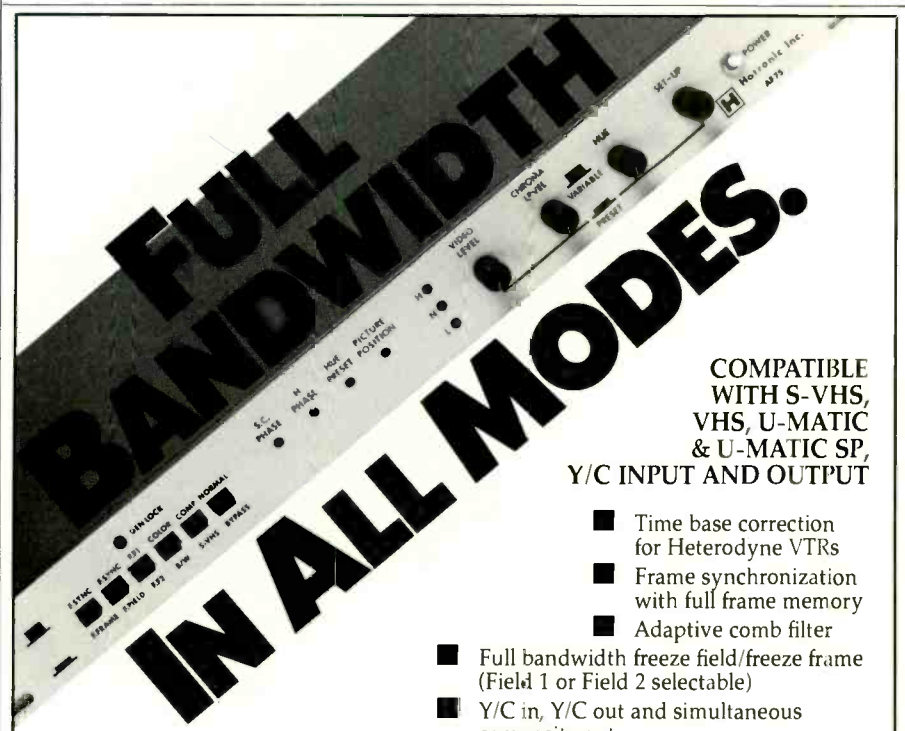

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and lenses, and features both servo control and manual control operation. The built-in memory enables adjustment of zoom focus, pan and tilt positions to be preset for up to 32 shots.
Reader Service #230

CANON INTROS CCD STUDIO LENS
Canon's J20 x 7.5 lens for studio cameras features a 20:1 zoom ratio, internal focusing and focal length range of 7.5 to 150 mm. The company says the lens can focus to 0.6 meters without distortion. Among its other features is an external LED indication system for positioning flexibility.
Reader Service #231

CEL UNVEILS NEW EFFECTS SYSTEM
CEL Electronics' MS852 digital effects system consists of a dual-channel framestore/TBC, combined with a Maurice touchscreen for ease of use. Zoom, tumbles, blinks, slides, mirrors and perspective are all accessed in CCIR eight-bit 4:2:2 by touching the screen; a conventional controller is available. Sequences and special menus can be stored on a 5¼-inch disk. A single-channel version is also available.
Reader Service #232

CENTRAL DYNAMICS INTROS STAGE*1 ENCODER
The Stage*1 D-1-to-NTSC encoder from Central Dynamics operates at a frequency of 13.5 MHz and, when paired with the Stage*1 decoder, produces E-NTSC color images that the company claims are virtually indistinguishable from RGB and component color signals. Features include full 10-bit in/out architecture, on-board sync generator and NTSC- or Y/C-selectable analog outputs.
Reader Service #233

CHYRON UNVEILS iNFiNiT!
Chyron's Scribe iNFiNiT! graphics and animation system encompasses all the standard features of the company's Superscribe with some additions. Among them: standard dual-channel configuration, full-color 32-bit-per-channel display and optional features that include real-time transformations of 2D objects, 3D animation. The unit includes 16 on-line fonts, modeling software, advanced paint software, a third internal mix channel, full-color, real-time video capture, Chyron IV font converter, logo compose, mouse, and CCIR 601 inputs and outputs.
Reader Service #234

CHYRON ANNOUNCES NEW SUPERSCRIBE FEATURES
Chyron has announced new features for its Superscribe character generator/graphics system, including the ability to create real-time, object-oriented animations, shaded backgrounds in any direction and soft-edge masking; Chartist presentation graphics to produce antialiased presentation and business graphics; and Scribe Toolbox, a system of six master fonts.
Reader Service #235

CINEDCO HAS DIGITAL EDITOR
Audiflex from Cinedco edits dialogue to marry the sound track to the video track. Features include visual sound display editing, synchronous hard disk audio recording, multitrack capability to eight channels, CMX EDL compatibility for assembly from dailies, programmable fades and crossfades, control of one or more external sources and point and play sound scrubbing. Delivery is scheduled for the fourth quarter.
Reader Service #236

CINE 60 DEBUTS CAMERA BATTERY SYSTEM
The SL camera battery system consists of an improved battery pack, a dual universal charger with time- and temperature-controlled charging, and battery mounting plates with improved electronic contacts and positive locking. Nominally rated at 4 Ah, the system is available in 12, 13.2 and 14.4 V sizes at prices under $500.
Reader Service #237

CIPHER DIGITAL UNVEILS SOFTOUCH II
Designed to work with the company's Shadow and Shadow II synchronizers, Cipher Digital's Softouch II edit/controller features disk storage on an integral 3.5-inch drive, full-screen color display and ability to print data on a standard printer. List price is under $4500.
Reader Service #238

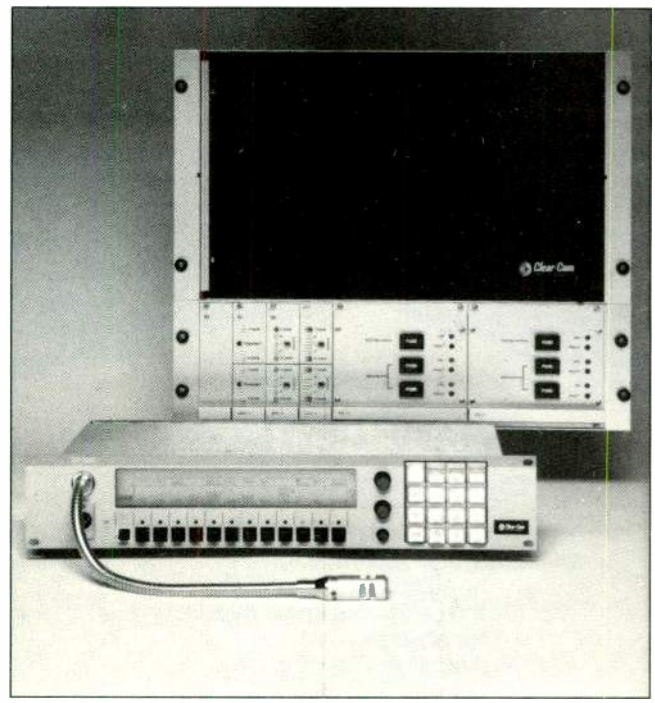
CIRCUIT STUDIOS PRESENTS 3D SOFTWARE
Velocity 3D is an animation software tool featuring previews with solid models, interactive modeling and design, and object, path and light source editing, all in real time. The package offers advanced rendering capabilities, unlimited light sources, Bitstream typefaces and an intuitive user interface. Available July 1 for the AT&T Pixel Machine and Sun 3/260; software only, $15,000.
Reader Service #239

CMX UNVEILS EDITOR
The new CMX 300 editing system can be used as a film-style picture editing system or as a time code editing system. The device generates a standard CMX EDL on a 3½-inch floppy disk, complete with up to 999 time-coded edits. The unit features two Gismo log control knobs for simultaneous control of up to three VTR sources and one record VTR. List price is $10,950, including four VTRs and a serial switcher interface.
Reader Service #240

CLEAR-COM INTRODUCES INTERCOM
Clear-Com's Matrix Plus digital matrix intercom system is said to combine the best features of point-to-point and conference line intercoms. Plug-in interface cards provide connection to virtually all types of external communications equipment and systems. Digitized audio between station and matrix prevents noise and crosstalk. In addition, the central matrix features multiprocessor programming and switching. Expected availability is September at a price of $2360.
Reader Service #241

CMX INTRODUCES UNIVERSAL INTERFACE
CMX's 68K I² serial intelligent machine interface is designed to work with more than 50 VTRs. It also features configurations of one, two, three or four machine interfaces or a single board. The 68K I² is plug-compatible with existing Multi I chassis and interfaces and has Dynamic Motion Memory/Motion Memory as a standard feature.
Reader Service #242

COLORGRAPHICS ENHANCES GRAPHICS SYSTEM
DP 4:2:2 from Colorgraphics Systems now features 3D modeling and animation allowing full control of object attributes, lighting, and camera movement. Other features include A/B roll editing using VTR, DVTR or DDR machines and real-time cel animation generated from 3D objects, 2D shapes, text or



CLEAR-COM

NEW PRODUCTS AT NAB

cutouts integrated with live video or moving backgrounds.
Reader Service #243

COLORGRAPHICS ENHANCES DA VINCI

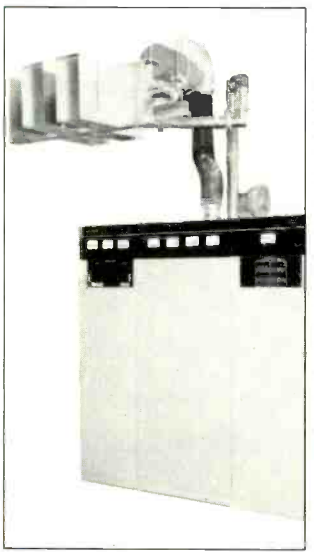
Colorgraphics has added geographic isolation to its da Vinci color correction system, permitting 32- or 64-vector secondary processing to allow hue, saturation or gray value modification of individual colors.
Reader Service #244

COLORADO VIDEO UNVEILS BRIEFCASE TRANSCEIVER

Colorado Video has introduced a Video Briefcase version of its Model 286C digital color freeze frame transceiver for transmitting still video over phone lines at 9600 bits per second.
Reader Service #245

COMARK OFFERS TRANSMITTER LINE

Comark has introduced a line of air-cooled, Klystrode-equipped transmitters at power levels from 10 kW to 90 kW. These transmitters are configured for



both diplexed and common amplification operation and feature high energy figures of merit. Air cooling simplifies installation, operation and maintenance. Common amplification eliminates the traditional output diplexer and its associated high power RF switching system. Delivery takes three to four months.
Reader Service #246

COMLUX UNVEILS OPTICAL TRANSMISSION TERMINALS

Comlux's Model 3561/3562 optical transmission terminal set consists of a fully self-contained 4:1 multiplexer, optical transmitter and system clock source in one package and an optical receiver and 1:4 demultiplexer in the other. The transmitter provides four 140 MHz clock signals and one 3.481 MHz clock reference output for synchronization. It accepts four 140 MB/s data streams. Single-mode optical output power is -3 dBm. The receiver accepts optical data at 560 Mb/s, demultiplexing it into four 140 Mb/s streams. Optical sensitivity at the system interface is -32 dBm. List price is $10,600.
Reader Service #247

COMPREHENSIVE DEBUTS CAMERA ADAPTER

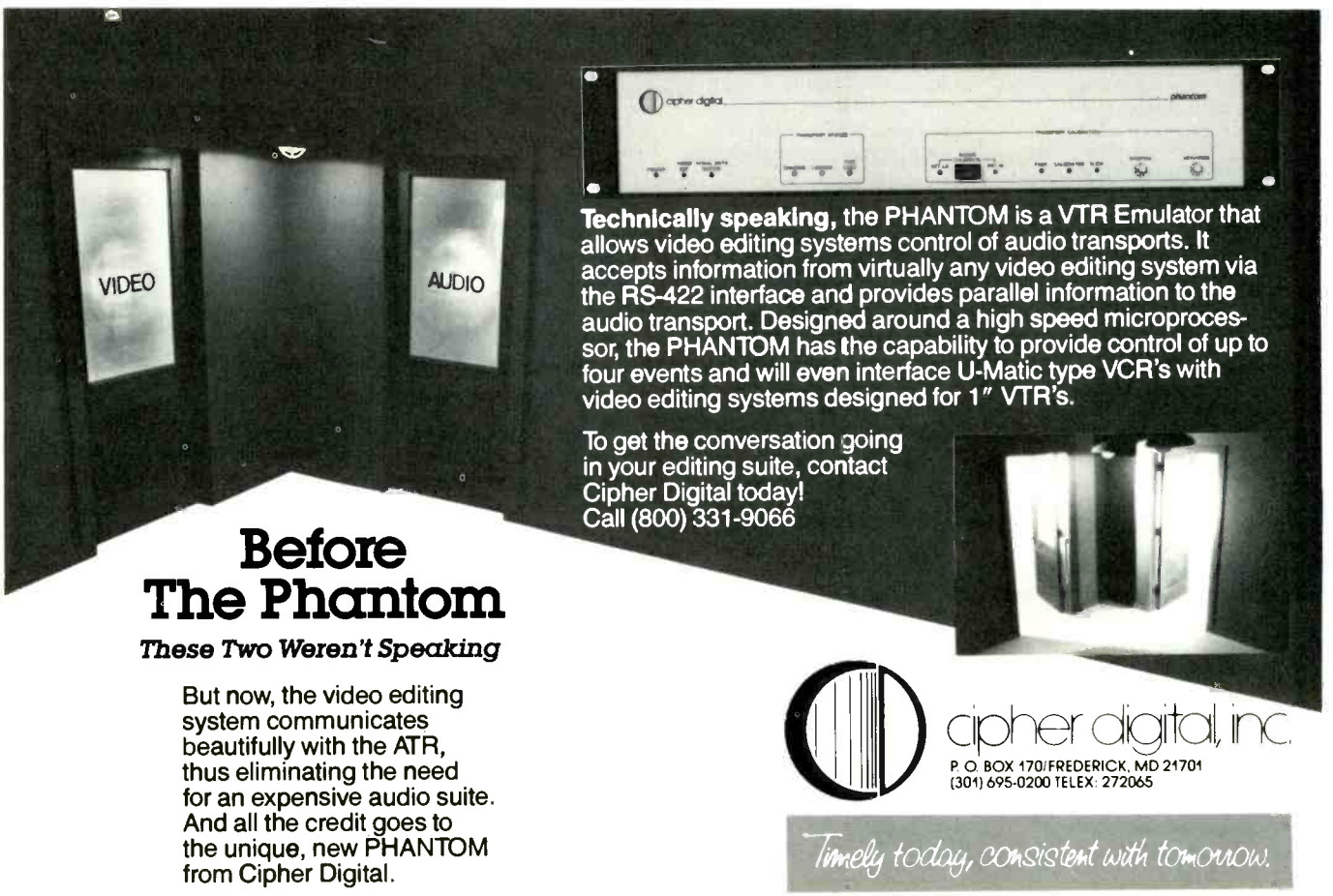
Comprehensive Video Supply is offering an adapter, model DCA-325-410, that effectively creates a camcorder by connecting a Sony DXC-325 camera and a JVC BR-S410U S-VHS VCR. The Sony DXC-325 offers excellent S/N ratio, high resolution and sensitivity, and variable speed electronic shutter. Price of the adapter to be announced. Delivery is 90 days.
Reader Service #248

COMPU ANIMATE PRESENTS 3D WORKSTATION

Built around an accelerated Amiga 2000 personal computer, CompuAnimate's Pixelmaster does animation/graphics, character generation, composition and rendering. Features include a 24-bit frame buffer/capture board producing 16 million colors, broadcast-quality genlock, single-frame controller, camera digitizing stand and a variety of 3D/2D paint, animation, character generation and presentation software. Price is $26,995. Other workstations to $5995.
Reader Service #249

CAT UNVEILS MAINTENANCE MANAGEMENT

Computer Assisted Technol-



Technically speaking, the PHANTOM is a VTR Emulator that allows video editing systems control of audio transports. It accepts information from virtually any video editing system via the RS-422 interface and provides parallel information to the audio transport. Designed around a high speed microprocessor, the PHANTOM has the capability to provide control of up to four events and will even interface U-Matic type VCR's with video editing systems designed for 1" VTR's.

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ogies offers BCAM, a maintenance management database system designed for the TV industry. Features include a general maintenance logging system, equipment inventory management system, and parts inventory system.
Reader Service #250

COMPUTER MUSIC PRESENTS INDEX SYSTEM
Scoremaster, a Macintosh-based music indexing and audition system developed by Computer Music Consortium, uses CD-ROM technology to play digitized samples of music from the indexed libraries. Supported libraries include Bruton, FirstCom Digital, MusicHouse, Network, Omnimusic and K.P.M. Hardware requirements are any Macintosh Plus, SE or Mac II model with hard disk for the index system, as well as a compatible CD-ROM drive (2 MB RAM recommended) for the audition system.
Reader Service #251

COMREX INTRODUCES FREQUENCY EXTENDER
Comrex's multiline frequency extender for dial-up phone lines is a two-unit encode/decode system. It provides a frequency response of 50 Hz to 10 kHz on three dial phone lines. Model 3XP encoder's specs include audio in level of +4 dBm at 600 ohms (balanced), line out level of -9 dBm at 600 ohms, and monitor out of 1 V. Model 3XR decoder has a line in level of -40 to -15 dBm (auto leveled to 0 dBm), audio out of 0 dBm at 600 ohms (balanced) and CMOS control logic.
Reader Service #252

CONRAC UPGRADES STUDIO MONITORS
Conrac has enhanced its 13- and 19-inch class-A color studio monitors, Model 6545, and its accompanying optional Model 6650 photometer. Model 6545 features a comb filter luminance/chroma separator, selectable from the front panel. The optional photometer captures colorimetric data directly from the screen and transfers it to a memory within the Model 6545 through an umbilical. The monitor processes the information to achieve desired white balance. List prices are $5650 and $5865.
Reader Service #253

CONTINENTAL UNVEILS COMPUTERIZED TRANSMITTER CONTROLS
Continental's computerized controls for AM and FM transmitters—AMDATATRAX and FMDATATRAX, respectively—feature menu-driven software to program such features as power on/off, power up/down and phasor pattern changes up to 12 months in advance. The station can also program limits and alarms for the transmitter.
Reader Service #254

CORPORATE COMMUNICATIONS OFFERS SUNBURST II
Corporate Communications' Sunburst II electronic color correction system features a 64-bit per pixel D-1 optional interface, 24-bit 4x subcarrier caps/laps systems, laser archival picture storage, full event and block editing functions, eight GPIs, nonlinear and linear pan, and resident diagnostics. The system is compatible with all TV standards.
Reader Service #255

CROSSPOINT LATCH INTROS BHK6129 SWITCHER
The BHK6129 switcher from Crosspoint Latch features five levels of video plus a matte keyer; two downstream keyers; four-input DSK, drop shadow and outline; three colorizers; two color keyers; four separate modes of editor control; 800-event memory; and two mix-effects systems. Some features above are available as options. List prices start at $10,995.
Reader Service #256

CROWN INTROS STEREO MIC
Crown's SASS-P features an electret condenser pressure zone microphone, frequency response of 20 Hz to 18,000 Hz in a reverberant field, omnidirectional pattern at low frequencies, unidirectional pattern at high frequencies, signal-to-noise ratio of 73.5 dB at 94 dB SPL. The mic uses a two-conductor shielded cable (one per channel) and three-pin professional audio connector (one per channel).
Reader Service #257

CUBICOMP INTRODUCES VERTIGO SERIES 9
Designed for production, post-production and corporate communications, the Vertigo Series 9 computer graphics system from Cubicomp offers high-volume, high-quality graphics production. The new system features 3D booleans, providing the ability to add together two objects or to subtract one object from another. Other new features include faster rendering and quick shading of 3D models.
Reader Service #258

CUBICOMP DEBUTS AUTOPAINT
AutoPaint is available as a stand- alone graphics system or as a software option for existing Cubicomp PictureMaker systems. It replicates the colors of any classical drawing or painting technique and also such modern styles as reflective chrome and refractive glass. Price for the system is $24,500; software only is $7500.
Reader Service #259

MAC 'N RAK AVAILABLE FROM CURRENT MUSIC
Current Music Technology's Mac 'n Rak Plus computer system consists of an Apple Macintosh Plus computer, 20 MB hard disk, MIDI interface with two MIDI in and six MIDI out ports, and optional SMPTE-to-MIDI time code convertor. A version for the Macintosh SE/30 is in development.
Reader Service #260

DAR ADDS NEW FEATURES TO SOUNDSTATION
SoundStation II from Digital Audio Research is a second-generation digital audio editing, recording, and production system. New features allow jog and shuttle commands to be sent from the console direct to video recorders, enabling location of picture events. A chase synchronization system provides rapid and accurate locking to all SMPTE timecode standards.
Reader Service #261

DATATEK UNVEILS D-2500 SERIES SWITCHERS
The D-2500 series of 20x10 routing switchers from Datatek operate independently, in combinations or as a level of the D-2400 series. The D-2500 series consists of the D-2511V video switcher, D-2520S stereo switcher, D-2513R relay switcher and D-2514 RS-422 data switcher. All are expandable to 20x20 matrix.
Reader Service #262

DIGITAL ARTS INTRODUCES REVISED SOFTWARE
DGS software version 3.0 adds new capabilities to this advanced 3D animation system. New capabilities include deformation with gravity and advances in rendering with new shading options. Surfaces such as wood, marble and chrome may be calculated without the use of texture images.
Reader Service #263

DIGITAL F/X ENHANCES DF/X 200 SOFTWARE
Version 1.20 of Digital F/X's DF/X 200 integrated digital production system offers a cut-and-paste enhance menu that includes automatic shadowing, extruding, embossing, outlining and fill. A new smudge brush feature acts like an artist's knife on wet paint, blurring the imagery underneath.
Reader Service #264

DI-TECH OFFERS NEW FRAME CONFIGS FOR 5860
Di-Tech is now offering a five RU frame configuration for its Model 5860 series of switchers. It has also introduced the Model 5616, a 16x16 stereo audio switcher. The two-RU unit features plug-in redundant power supplies and plug-in crosspoint and control cards.
Reader Service #265

DOLBY OFFERS SWITCHABLE UNIT
The Dolby Model 363 is the first unit to offer Dolby SR Spectral Recording and Dolby A-type noise reduction in switchable form. Both channels are equipped with built-in record/playback changeover capability. Other features include a set-up button, allowing quick alignment using internally generated Dolby tone for A-type or Dolby noise for SR. The Model 363 incorporates electronically balanced transformerless input and output circuits. SR-only and A-type only options are available.
Reader Service #266

DPS UNVEILS INFINITE WINDOW TBC/FRAMESTORE
DPS has introduced the DPS-275, a component, infinite window TBC/framestore. Features include freezing two frames or

NEW PRODUCTS AT NAB

DP to EL

any of four fields; variable strobe; ATR chroma noise reduction; and chrominance edge enhancement. The proc amp is digitally programmable with 10 nonvolatile memories and uses an LED status display. Distributed by Midwest Communications.
Reader Service #267

DSC UNVEILS DIGITAL DISTRIBUTION AMP

DSC's DD-4 digital distribution amplifier distributes both D-1 and D-2 signals. The signals can be mixed internally and processed automatically. Input signals can be eight- or 10-bit. The device also features a DA card that the user can configure to be a 1x8 or two 1x4 digital DAs as required.
Reader Service #268

DUBNER ADDS D-2 CONTROL

A new hardware option for the Dubner Paint Systems adds D-2 digital composite machine control as a built-in function. It is available on all new systems and as a retrofit on products in operation. The option is compatible with all Paint System software from versions V 3.5 and up.
Reader Service #269

DUBNER INTROS GF-50 GRAPHICS FACTORY

Combining the GF-30 character generator and the GF-40 Paint System along with additional software, Dubner's GF-50 adds 3D animation playback in real time to its Graphics Factory line. The GF-50 package includes a special function keyboard and a 300 MB fixed disk.
Reader Service #270

DX ANTENNA INTROS RECEIVER/DESCRAMBLER

The DIR-647 CATV integrated receiver/descrambler from DX Antenna features an integrated descrambling module; digital AFC; microprocessor control; 24 pretuned video channels with 10 kHz audio step tuning in C-band; 1 MHz video and 10 kHz audio step tuning in Ku-band, programmable up to 32 channel configurations; front-panel lock/unlock switch; 950-1450 MHz or 900-1400 MHz IF frequency; and field-changeable IF bandpass filters in 17, 22, 24, 27, 30 or 36 MHz.
Reader Service #271

DYNAIR INTROS DYNASTY-FIBER

Dynair has expanded the abilities of its Dynasty 30, 40 and 60 routing switchers into wideband fiber optics with the introduction of its Dynasty-Fiber line. Working with its Series 1200 line of optical receivers, Dynasty-Fiber provides fiberoptic input and output for all the company's switchers. Each frame can provide optical conversion for up to 10 router output buses. Power for the system is derived from the routing switcher power supplies. The frame occupies one standard 19-inch rack unit and is designed to be mounted behind a switch matrix frame. List price for the frame, including power regulator, is $850.
Reader Service #272

editor from Editing Machines Corp., the operator can view scenes in any order instantly. Up to eight hours of source material can be transferred into the system and stored digitally as low-resolution color images. Raw footage can be scanned at 16 times normal speed and changes to the beginning of a sequence can be made without losing work done beyond the edit point.
Reader Service #274

EDIT-TECH SHOWS EXPANDER/ROUTER

Edit-Tech's GPI Network 410 expands one to four GPI's to 10, and thereby gives the editor greater control over machines. The unit routes any single pulse to any output, triggers up to 10 devices with one pulse, or salvo triggers one device with four pulses. Price is $1595; delivery is six weeks.
Reader Service #275

EDITRON OFFERS SONY SYNC MOD KIT

During PCM recording, if time code is simultaneously recorded onto the analog audio tracks of the video recorder, there is no relationship between the time code frames and the PCM video frames. Editron's sync mod kit for Sony PCM recorders phase locks the PCM audio according to an external or color black reference input to establish full sync between the PCM video signal frames and the time code frames.
Reader Service #276

EEV UNVEILS NEW FIVE-CAVITY KLYSTRONS

EEV's K3755/K4755 klystrons have been designed to provide at least 74 kW using no more power than the current range of four cavity 60 kW tubes. Other specs include maximum drive power requirements of 10 W in conventional operation and 50 W in pulsed operation; power gain of 38 to 46 dB; beam voltage for 64 kW sync power of 24 to 26 kV; and modulating anode to cathode voltage of 17.0 to 21.5 kV.
Reader Service #277

DYNATECH

DYNATECH ADDS TOUCHSCREEN TO NEWSTAR

Using a new software option, Dynatech Newstar now offers a touchscreen option for its newsroom automation system. The software runs on PC/AT, PC-386 or PS/2 computers, along with the PC2 Newstar workstation software. Delivery is set for August.
Reader Service #273

EMC SHOWS DIGITAL OFFLINE EDITOR

With the Emc² random access

ELECTROHOME PRESENTS DIGITAL EFFECTS

Beginning in June, Electrohome will market two digital effects systems under the Jazz trademark. The designs are targeted to end users seeking cost-effective post-production or ENG applications. The rack unit model will sell for under $20,000 and the desktop model will be priced under $12,900. Both can be expanded through hardware and software upgrades.
Reader Service #278

ELECTRO-VOICE DEBUTS MIC/LINE MIXER

Flat frequency response, low distortion, and low noise characterize the model ELX-1R audio mixer. A single three-pin XLR-type connector accepts microphone and line level inputs via a mic/line switch. An LED indicator at each input lights if clipping occurs. Low-cut filters, switchable at each input, reduce low frequency handling and background noise.
Reader Service #279

EAR OFFERS NEW EBS RECEIVER

Emergency Alert Receiver has introduced the EAR Pro, an Emergency Broadcast System receiver available in AM or FM models. The Pro meets all specs for Parts 73.940, 73.941 and 73.942 for receiving and decoding the 853 Hz and 960 Hz signal. Input level on the two-tone decoder is 100 mV into 600 ohms; bandwidth is ±5 Hz. The AM receiver is crystal-controlled single frequency from 540 to 1620 kHz; the FM model is crystal-controlled from 88 to 108 MHz. Both feature an antenna input of 75 ohms, unbalanced.
Reader Service #280

EEC INTROS DOPPLER WEATHER RADAR

Enterprise Electronics Corp.'s DWSR-90CTV doppler weather radar system is designed to detect tornado-producing storms. The system has a frequency range of 5500 to 5650 MHz; peak power of 250 kW; and a pulse repetition frequency of 709-1063 PPS in doppler mode. Its receiver has a noise figure of better than 5.0 dB and a minimum receiving sensitivity of -106 dBm or better.
Reader Service #281

ESD UNVEILS TRUE VIEW

Environmental Satellite Data now offers True View Dimensional Weather, a software option for front-end systems. The system provides a 3D airplane perspective of clouds and developing weather.
Reader Service #282

EVENTIDE DIGITAL VIDEO DELAY MAKES DEBUT

The BD1000 Digital Video Delay from Eventide permits hassle-free obscenity deletion for live in-studio discussions and phone call-in TV programming, according to the manufacturer. The solid-state RAM-based device operates without tape, hard disks or moving parts and offers from one to 20 seconds of video delay. In the case of a necessary deletion, hitting the "dump" button puts video and audio into real time, while the "catch-up" feature rebuilds the delay in audio and video.
Reader Service #283

FAST FORWARD VIDEO HAS PORTABLE TCG

Claimed by Fast Forward to be the only truly portable time code generator in stock, the P-1 SMPTE time code generator/reader reads drop and non-drop frame time code and starts and stops with the camera while providing continuous time code. Price is $795.
Reader Service #284

FIDELIPAC INTROS NEW DYNAMAX MODELS

Fidelipac's Dynamax CTR10 and CTR30 Series cart machines incorporate, as standard equipment, three cue tones, with manual defeat of the automatic primary tone and manual recording of secondary and tertiary tones; geometrically correct noninteracting height and azimuth adjustments, integral tape guide adjustments and no-mar cart reference surface; and a cleaning switch. The CTR10 Series also features automatic fast forward.
Reader Service #285

FIRSTCOM PREMIERS DIGIFFECTS

FirstCom's Digiffects digital audio sound effects library consists of 23 CDs with over 2000 effects (including environmental cuts all at least five minutes in length) and a chronological and alphabetical catalog. The entire library is digitally recorded, mixed and mastered, says the company.
Reader Service #286

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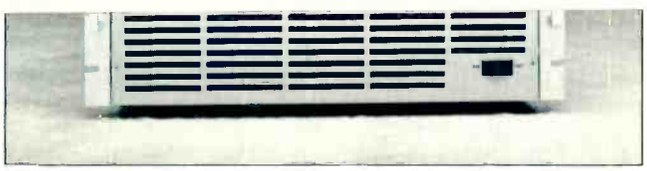
by the user, making the 1602 ideal for use at incoming inspection, alignment and troubleshooting stations. List price is $4295.
Reader Service #330

well. 208, 220 and 240 V. The fixture, measuring 36 x 36 x 48 inches, is constructed of clear anodized aluminum and weighs 125 pounds. Leonetti also says that the HMI reflector yields up to 25 percent more light than



LYON LAMB

INTERGROUP INTROS PRO- · FM antenna features an omnidi- · patch panel from Jem-Fab Corp. · **KANGAROO UNVEILS**

NEW PRODUCTS AT NAB

MA
MI

M&R DATA PRESENTS ELECTRONIC NEWSROOM

Designed to operate in a MS-DOS/Novell NetWare environment, M&R Data's NewsMaker Electronic Newsroom System is the first totally PC-based television and radio newsroom system, according to the manufacturer. Superior functionality is achieved by distributing the workload among many intelligent, low-cost PC workstations.
Reader Service #341

M/A-COM INTRODUCES MICROWAVE SYSTEM

Available in a wide variety of frequency bands, the K-line is a series of high-performance point-to-point microwave radios. The product family includes a KR receiver that supports both the KG remodulating and KJ heterodyne transmitters. Outstanding system gain is achieved by the low-noise front end in the receiver, and high-power output of both transmitters.
Reader Service #342

MAGNI PREMIERS COMBINATION MEASUREMENTS

Magni is offering a combination waveform monitor/vectorscope for component/composite measurements. The unit provides six video inputs for two full component signal sets or combination component and composite measurements. Model WV560 supports NTSC and 525/60 component standards and model WV561 adds PAL and 625/50 component standards.
Reader Service #343

MBI OFFERS MIXER

MBI's Series 16 stereo broadcast and production modular mixer is designed as a versatile yet cost-effective console for local and national broadcasters. Features include auto muting of loudspeakers and red light operation switchable to either local or distant, pushbutton start or fader remote start-stop, and RIAA preamplification for turntables if required. Penny & Giles faders are standard. Price is $10,000.
Reader Service #344

MCCURDY PRESENTS INTERCOM SYSTEM

Compact size and multiple integrated applications distinguish the CS9500 digital intercom system from McCurdy Radio Industries. The system's 50x50 matrix with dual redundant power supplies and controller card are contained in only three units of rack space. Features include programmable point-to-point communications, 16 programmable party lines, 24 programmable interrupt foldbacks, six programmable special lists, eight programmable relays for two-way radio use, camera isolation for up to 16 cameras and a telephone interface.
Reader Service #345

MCCURDY PRESENTS AUTO PHONE HYBRID

The TS2200A automatic telephone hybrid from McCurdy features analog audio circuitry and line matching that is microprocessor-controlled. No adjustments are needed for installation or operation, says the company. Other features include a built-in, fully protected line-holding coupler and an input for injection of DTMF dialing or control tones. Trans-hybrid loss is rated at 20 dB to 35 dB; harmonic distortion at 0.5 percent maximum; and noise at 70 dB below 0 dB output, maximum.
Reader Service #346

MEDIA TOUCH INTROS SEARCH 'N SYNC

Media Touch Systems has introduced a family of computer-based, touchscreen-controlled program systems, called Search 'n Sync, for post-production use. The system provides immediate access to production music and SFX libraries on compact disc. Options include putting proprietary music and SFX on DAT for access and sync of program material to predetermined in and out points. The company says the system controls any number of CD players or DAT machines.
Reader Service #347

MICRON DEBUTS CAMERA BOOMS

Micron Tool and Manufacturing has introduced the Cam Mate XL adjustable boom, which operates 80 pounds of camera at the 12-foot length or 40 pounds at the 20-foot length. Also available is a 12-foot version. The Cam Mate XL sells for $8799 and the dolly for $3295. Delivery is four to six weeks.
Reader Service #348

MICROTIME UPDATES IMAGEPLUS

Version 5.11 software for the ImagePlus 3D modeling and animation system adds hierarchical motion, autopage for page turn and scroll effects, 2D reflective maps, automatic shadows in 3D images, 3D bar charts for business graphics, grid transformation, and access to lighting coefficients. In addition, owners of the ImagePlus graphics system may now select either the TIPS paint program from Truevision or the Lumena program from Time Arts.
Reader Service #349

MICROTIME UNVEILS AB EFFECTS

Designed to complement all VTR formats, the AB effects system comes in four configurations: single framestore, single framestore with effects, dual framestore, and dual framestore with effects. In the dual-channel systems, each framestore can operate as a standalone TBC. Priced from $9000 to $17,500.
Reader Service #350

MICROWAVE RADIO PREMIERS MICROLINK II

MicroLink II, an 18/23 GHz video microwave system from Microwave Radio Corp., is designed as a broadcast quality, short-haul microwave link. It features a highly stable digital synthesizer in its 18 GHz version (optional at 23 GHz) and is compatible with 525- or 625-line systems. The system offers built-in test features to allow field-tunability across RF subbands and is available in simplex, full duplex and multiplex configurations.
Reader Service #351

MAGNI

WHY WTVH-TV'S BRUCE LEVY LOVES HIS EPO ROBOTIC CAMERA CONTROL SYSTEM.

For more than 20 years, WTVH-TV, the CBS affiliate in Syracuse, N.Y., has broadcast its news using EPO remote camera control systems. During that time, the systems have outlasted four sets of cameras—a clear testament to EPO's durability and reliability.

For most of those years, as Bruce Levy, the production chief at WTVH-TV, will tell you, the station was virtually alone among American broadcasters.

Now, of course, all that has changed. Americans are beginning to wake up to what their European brethren have known for some time—that **EPO Camera Control Systems can save them money. Lots of money!**

But even EPO Robotic Camera Systems don't last forever. Recently, when WTVH-TV's 20-year-old unit began to show some wear and tear, Bruce Levy confidently ordered three new ones from A.F. Associates, thereby continuing his and WTVH-TV's long association with the EPO systems.

If you would like to know more about Bruce Levy's favorite way to save money, call A.F. Associates. In the east: (201) 767-1201; in the west: (619) 277-0291.

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Regardless of camera generation, there's no gap. Conforming to the identical standards, these lenses are performance matched for total compatibility and interchangeability. For more information or a demonstration, call your nearest FUJINON location.

*Except for the A34 x 20.5 ESM, these 2/3" format lenses are also available in 1/2" format.

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A subsidiary of Fuji Photo Optical Co. Ltd

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NEW PRODUCTS AT NAB

editing. This PC-based edit management system builds a clear computer graphic display of a visual model of the edited tape, track-by-track, and conveniently captures all edit command information.

Reader Service #389

PERROTT UNVEILS BATTERIES

Perrott Engineering has introduced the Super 90, an all-in-one 12 V, 4 Ah nicad pack. It weighs four pounds and has a run time of one and a half to two hours. Molded Kydex case. Price $365. Also from Perrott, the new PE 441/14 discharger/charger is designed to accommodate up to four 14 V nicad packs. Price is $878.

Reader Service #390

PESA AMERICA PRESENTS CGS

Menu-free instant access to functions and ease of operation characterize the 4711 and 4722 character generators from Pesa America. Features include true 35 ns resolution, 128 true colors, eight on-line fonts in RAM, and PAL or NTSC encoding. In addition, model 4722 has time code subtitling facilities that can accept PC-assembled disks. The 4711 is under $10,000 and the 4722 is under $15,000.

Reader Service #391

PHILLIPS HAS NEW LAMPS

Philips Lighting Co.'s new MSR and MSR/HR lamps feature excellent color qualities and provide extremely high light output for the energy consumed, according to the manufacturer. Designed to produce a continuous spectrum, the lamps can be dimmed to 40 percent of their power and still retain constant color temperature.

Reader Service #392

PINNACLE INTRODUCES PRIZM

Pinnacle Systems' PRIZM video workstation is a broadcast-quality post-production system based on a fully modular mainframe platform. PRIZM digital optics, with true 3D perspective, rotation, warp and curvilinear effects, is the first in a series of modules that can be added to the workstation. PRIZM allows the operator to specify three levels of movement, source, object, and global. Prices start at $30,000. Also new from Pinnacle is the 2100 series workstation, priced at $15,000 and up.

Reader Service #393

PIONEER PRESENTS MULTI-PROJECTOR

The new multi-projection system from Pioneer consists of a wall of 40-inch monitors that displays a single picture. Each projection cube provides a 40-inch screen that may be used in a standalone configuration or combined to form a projection area of up to four units high and virtually limitless length. Each cube has 560 lines of horizontal resolution and virtually zero reflection.

Reader Service #394

PREMIER DEBUTS SYMBOLICS/IGES PROCESSOR

Premier Engineering is offering a processor that runs on Symbolics hardware and transfers a file created by the Initial Graphics Exchange Specification (IGES), a CAD system, into the Symbolics system. In this way, objects designed by IGES can be animated for design analysis or presentation by the Symbolics system. Immediately available at $5650.

Reader Service #395

PROGRESSIVE IMAGE OFFERS VIDEO CHARLEY

Progressive Image's Video Charley is a daughterboard that provides three essential desktop video functions: video genlock, RGB encoding and video overlay. This allows a user to superimpose PC-created graphics over any NTSC video signal. Price is $749.

Reader Service #396

PROGRESSIVE IMAGE PRESENTS SUPERGEN

Used in conjunction with an Amiga computer, SuperGen from Progressive Imageallows the user to produce broadcast-quality video with special effects graphics and titles. SuperGen encodes Amiga's RGB

PE to PR

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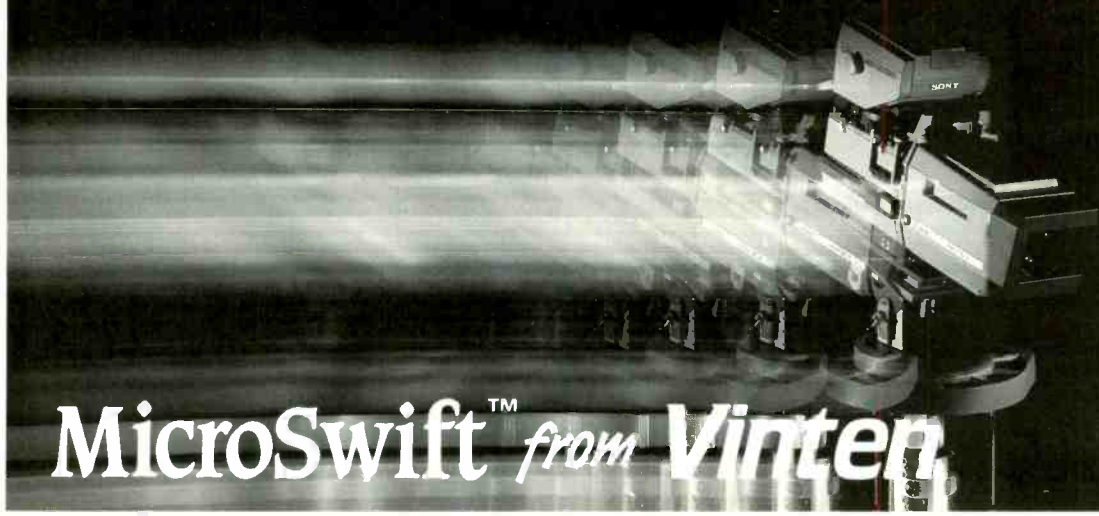

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NEW PRODUCTS AT NAB

signal into RS-170A and then overlays the encoded signal into the incoming video.
Reader Service #397

QSI HAS VIDEO SWITCHOVER

When a video feed falls below the user's limits for excessive noise, insufficient amplitude or loss of signal, the 5700 automatic video switchover from QSI switches cleanly to the backup video. Front-panel indicators monitor input and output states. Other features include local/remote override to either program or auxiliary source, adjustable hang and hold times and adjustable noise and amplitude windows.
Reader Service #398

Q-TV RELEASES INTERFACE

Q-TV's interface between a Basys CCU and one of Newsprompter's data ports allows Basys newsroom users to download stories and run orders to Newsprompter One. Rewrites and changes to run order can be transmitted at any time during a newscast. Similar interfaces for other newsroom computer systems are also available.
Reader Service #399

QUANTEL LAUNCHES PAINTBOX V-SERIES

Designed with high-density DRAMS and ASICs, the Paintbox V-Series from Quantel is a small, fast, more affordable version of the Paintbox. Modular design allows the user to upgrade simply with plug-in graphics. There are four models: the VI for illustrating, the VR for retouching, the VA for animation and the VE for effects. Immediate delivery. Prices start at $80,000.
Reader Service #400

RADIO SYSTEMS INTROS RS-1000 SYSTEM

Working under a license from Sony, Radio Systems has combined a DTC-1000 DAT machine with its own controller to create the RS-1000. The company says the controller's microprocessor is extensively interwired with the Sony circuitry for complete status feedback and control of all tape functions. The system can be programmed to play up to 30 cuts in random order. Features include industry-standard remote control

QUANTEL

connections, an automatic port that allows a single RS-1000 to mimic a multislot cart carousel, and a serial port for computer interface.
Reader Service #401

RANGERTONE INTRODUCES STUDIO PROJECTOR

Rangertone's Model HS-16/35 is a high-speed 16/35 mm combination studio projector with a microprocessor-controlled electronic intermittent pulldown that provides smooth transition from incremental mode to high-speed slew mode. List price is $31,000 to $43,000.
Reader Service #402

RANK CINTEL UNVEILS DIGITAL STILL STORE

Pocket, new from Rank Cintel, is an advanced 4:2:2:4 still store conforming to CCIR REC 601/656. The new dual-output channel still store provides compact, economical and high-quality storage of digital component video stills together with a full-bandwidth linear key signal. Pocket features both fixed and removable Winchester disk options.
Reader Service #403

RAPID DEPLOYMENT UNVEILS PORTABLE TOWER

The RapUp portable tower, from Rapid Deployment Towers, consists of three bands of flexible steel that are unrolled and guided together to form a triangular mast. As the shaft ascends, the three pieces are tightly wound with a cable which maintains structural integrity and gives the mast its strength. The mast can support up to 500 pounds of payload at any altitude from six to 150 feet. Price is $125,000 and delivery is four months.
Reader Service #404

R-COLUMBIA INTRODUCES WIRELESS INTERCOM

The TR-160 FM wireless intercom headphone from R-Columbia provides clear two-way voice communication to any number of similar headphones at distances up to one or two miles. The headphones are lightweight, noise attenuating, and have a built-in FM transmitter, receiver, flexible antenna, and rechargeable Nicad battery. Price is $770 without accessories.
Reader Service #405

RCS PRESENTS INTEGRATED DJ LOG

Master Control from Radio Computing Services is described by the manufacturer as the paperless studio. This software makes immediately available to the disk jockey the music log, the commercial log, live copy and tags, liners, jingles, promos, news, weather and traffic.
Reader Service #406

REBO UNVEILS FOUR HDTV PRODUCTS

Rebo Research has developed four products for the burgeoning HDTV market: ReFlect, a single-fiber high definition camera control system; ReLay, a single-fiber high definition optical transmission system; ReStore, a computer-based HDTV framestore; and ReScan, an HDTV-to-NTSC down converter. ReFlect's base station mounts directly on the camera, converting output signals to analog optical signals and vice versa. ReLay is a three-channel, 50 MHz optical transmission system for telecommunication and media production. ReStore operates with a Macintosh II computer to store, retrieve and manipulate HD images. ReScan accepts HD color video images and converts them to RGB and NTSC in real time.
Reader Service #407

RHODE & SCHWARZ HAS REMOTE MONITORING

Remote monitoring system RMS 100 from Rhode & Schwarz performs a multitude of broadcast-quality control measurements on transmitted and received signals without the need of added personnel. Features include complete local and remote diagnostics, headend parameter measurements, all-channel monitoring, real-time analysis of video parameters, and PC compatibility.
Reader Service #408

ROCKTRON OFFERS SIGNAL PROCESSOR

The Model 360 offers three simultaneous functions: program-dependant logarithmic compression, peak limiting and Rocktron's HUSH II noise reduction. Features include dual-channel mono, master/slave stereo and HUSH II-only modes. Model 360 is also available with single-ended noise reduction, making it excellent for stereo mixdown applications, according to the manufacturer.
Reader Service #409

ROSS VIDEO UPGRADES SWITCHER

A downstream multikeyer capable of putting eight different keys from six different sources on the screen at one time is the most recent option for the RVS 416 video production switcher from Ross Video. Each key has its own controls for key level, softness masking, invert, matte color, bordering and border edge intensity. Non-additive keying is available to add a distinctive keying effect.
Reader Service #410

RTS PRESENTS INTERCOM USER STATIONS

RTS Systems has two programmable intercom user stations. Model MCE is a four-channel intercom station that features a modular packaging technique. It can be used as a rackmount or portable headset station, as a rackmount or portable speaker station, or as a console-mounted headset station. Model BP325 is a two-channel unit that features enhanced analog performance and microprocessor support for digital switching functions. Price of the BP325 is $340.
Reader Service #411

SACHTLER UNVEILS LIGHTS

Sachtler's Reporter 100H is a portable tungsten light for use with CCD cameras or as eye light. It is powered by a 12 V battery. The Reporter 125D is a very compact HMI daylight fixture powered by battery or mains.
Reader Service #412

SAMSON PRESENTS RECEIVER

The MR-1 miniature wireless receiver, worn on the camera operator's belt, provides the source of audio to the camera. Any Samson transmitter can be used to pick up the sound and send it to the receiver. An adjustable level control provides either a balanced or unbalanced output to the camera. Delivery is 60 days at $600.
Reader Service #413

SBI PREMIERS LIGHT BELT

Synergistic Batteries' 7 Ah soft light belt consists of 24 1.25 V cells in series, providing 12 or 30 V, together with a charger for either fast or slow charging of the belt or a SB-90 12 V battery. Delivery is one to two days and the price is $500.
Reader Service #414

IMAGE STABILIZER OFFERED BY SCHWEM

The GX-3 image stabilizer from Schwem Technology is a fully integrated camera/image stabilizer system available with various CCD cameras for different applications. Stabilization takes place at the focal point, and the unit's small size allows unusual mountings for sports, etc. MOD is three feet and zoom ratio is 6x. The $16,500 unit (price varies according to camera selected) is available in June.
Reader Service #415

SELCO OFFERS METERS

A new range of meters called the Presentor is available in four forms of presentation, back-of-panel with and without bezel and front-of-panel with and without bezel. Also from Selco Products Co. is a full line of parts-per-million indicators, VU meters, control knobs and thermostats.
Reader Service #416

SHIMA SEIKI HAS IMAGE RETOUCHING SYSTEM

Shima Seiki's SDS-480SGX enables users to perform retouch work such as creative design, cut and paste, composition and elimination using a pen. The cordless pen can be adjusted for thickness and tone and modified for water color, air brush, chalk or marker. Up to 16.7 million colors can be displayed on the screen at one time.
Reader Service #417

SIGMA ELECTRONICS UNVEILS SYNC GENERATOR

The TSG-440 is an RS-170A sync generator with eight test patterns, audio tone generator, and many other functions. As a source ID, this unit can store up to 10 different IDs. Each can hold up to 20 characters, assignable from the front panel, and displayed over SMPTE bars or any color field.
Reader Service #418

SISCOM UPGRADES NEWSPRO

Closed captioning and on-air prompting are now options for Siscom's NewsPro newsroom automation system. The new features work via the on-air module, which orchestrates and monitors a show and the supporting functions, tracking every break and disentangling dialogue for the prompter from pretaped or caption-only material. With prompting and captioning machine-controlled, scripts can be modified right up to air time.
Reader Service #419

SKOTEL DEBUTS TIME CODE GENERATORS

The TCG-311 LTC generator/reader generates LTC time code and user bits independently in either free running or jam/slave mode. Price is $1650. The TCG-313 generator/reader has the added capability of simultaneously inserting time count and user bits into video on the display monitor. Price is $2150.
Reader Service #420

SNELL AND WILCOX ANNOUNCE CONVERTER

Snell and Wilcox have announced the ME 9910 four-field, four-line aperture standards converter incorporating advanced motion processing. This entry-level model completes the 9900 family of standards converters, offering economical access to advanced motion processing. The ME 9910 provides a full upgrade path to the top-of-the-line, fully featured ME 9900.
Reader Service #421

SONY INTRODUCES STILL STORE

Sony's new DNS-1000 series digital networked still store offers a number of features not found in other systems, including the ability to store 1600 still images on a transportable 12-inch write once read many (WORM) disk and 400 still images on a 5.25-inch rewriteable optical disc. Multiple users are tied together by Ethernet and can search the system via an innovative software system.
Reader Service #422

SONY PRESENTS SWITCHERS

Three mid-range switchers, the BVS-3100, BVS-3200 and BVS-3200C, offer diverse features and capabilities to meet the production needs of business and industrial users as well as broadcast studios and facilities. The three switchers have 10 inputs with a key bus and 18 wipes. The BVS-3100 has a box mask which enables a piece of keyed video to be wholly contained within a prespecified box area. An RGB color keyer permits keying a video object, not just titles, onto other video.
Reader Service #423

SONY INTROS HI8 GEAR

Sony Professional Video Products has introduced two Hi8 products, a feeder recorder and a camcorder. The Hi8 format adds time code and improves the specifications of 8 mm video, resulting in a high-quality

SONY

NEW PRODUCTS AT NAB

acquisition format, according to the company. The EVO-9100 is a single-chip, 4.9-pound, one-piece camcorder for gathering location footage. The EVO-9800 Hi8 feeder machine is designed for use with a U-matic SP editor such as the VO-9850.
Reader Service #424

SOUNDCRAFT INTERFACES VIDEO

The Soundcraft 200B/VE audio console now interfaces to video editors using the new VSA24 serial interface. The VSA24 allows the 200B/VE not only to match crossfades between the mixer and the video machines for true AFV, but also to control audio effects totally independently from the video edit. The unit "eavesdrops" on the communications link, listening for editor commands and alerting the console.
Reader Service #425

STANDARD COMMUNICATIONS HAS GENERATOR

The SatCom Division of Standard Communications Corp. (SCC) has announced the immediate availability of the CSG60 stereo generator, a BTSC stereo encoder system designed to provide MTS stereo within existing CATV systems. The unit uses true dbx companding, a video sync lock, and a 4.5 MHz modulated RF output to assure correct separation.
Reader Service #426

STRAND OFFERS LIGHTING CONTROL

Light Palette 90 from Strand Lighting is a desktop console offering a range of features, including the capability to control 4000 dimmers on 4000 channels and the ability to purchase only the processing power needed. The unit also offers up to 48 fully overlapping submaster fader pots or 24 submaster wheels and can store 600 average-sized cues.
Reader Service #427

STUDER REVOX HAS ANALOG RECORDER

Designed for film and video post-production work, the A827 multichannel analog recorder features internal SMPTE time code synchronizer and parallel and serial RS232/422 control ports for easy integration into editing systems. Features include 14-inch reel capacity, three tape speeds with varispeed controller, and phase compensated controlled amps.
Reader Service #428

STUDER REVOX

SUPERIOR SATELLITE PRESENTS DISH

The SSE-61RC remote steerable, computer-driven satellite

A2

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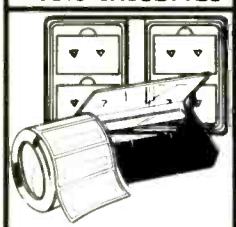

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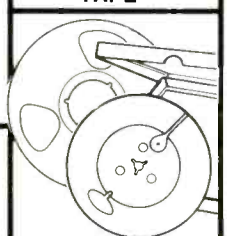

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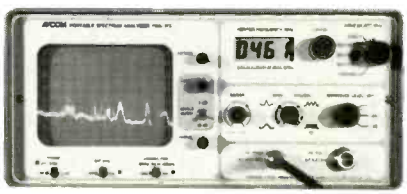
★ NEW ★

AVCOM PSA-37D PORTABLE SPECTRUM ANALYZER



AVCOM INTRODUCES THE NEW PSA-37D PORTABLE SPECTRUM ANALYZER WITH DIGITAL FREQUENCY READOUT. AVCOM'S NEW PSA-37D Portable Spectrum Analyzer has a 4 digit front panel frequency readout and is controlled by a rotary frequency adjustment control. Frequency ranges that the PSA-37D cover are 0 to 500 MHz, 500 to 1000 MHz, 950 to 1450 MHz, 1250 to 1750 MHz and 3.7 to 4.2 GHz. The PSA-37D Portable Spectrum Analyzer is lightweight, portable, battery operated, ideal for field test situations. A built-in DC block with a +18 VDC powers LNAs and BDCs with the flip of a switch. All other performance characteristics and features are the same as the PSA-35A which has become an industry standard for satellite communications work. $2475

AVCOM INTRODUCES A FULLY AGILE SINGLE CHANNEL PER CARRIER DEMODULATOR, THE SCPC-3000E, FOR VERSATILE AND ECONOMICAL RECEPTION OF SCPC SIGNALS. The SCPC-3000E Demodulator features a high-performance synthesized 50-90 MHz tuning module for maximum system versatility. Frequencies are tunable in 800 steps of 50 KHz each. Standard expansions are 3:1 and 2:1, other expander formats are available. Deemphasis is switchable between 0, 25, 50, and 75 micro-seconds. Selectable low-pass 15, 7.5, and 5 KHz audio filters are standard. AVCOM can customize the SCPC-3000E Agile SCPC Demodulator to suit specific receiver needs, contact AVCOM with your requirements. $1378

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antenna system from Superior Satellite Engineers is a vertex 6.1-meter antenna available in four feed configurations: C-band with dual polarization, Ku-band with dual polarization, duplex providing reception of both C- and Ku-bands with dual polarization of each, and Ku-band uplink. Price is $58,500 with two RS25V receivers. Immediate delivery.
Reader Service #429

SVS EXHIBITS DATA ROUTING SWITCHER

Sierra Video Systems claims the Series 42 RS-422 data routing switcher is the only RS-422 router that operates as a multiport, thereby allowing greater flexibility. Designed specifically to handle four-wire RS-422 signals and employing an intelligent control system, the Series 42 simplifies sharing of resources. The unit can operate on its own or in conjunction with the SVS 8/16 and Series 32 routers. Six versions are available: three port-oriented and three conventionally oriented.
Reader Service #430

SWITCHCRAFT UNVEILS NEW AUDIO PATCH PANEL

The new Switchcraft audio patch panels are 19-inch rack mountable, and all wired connections are made through Insulation Displacement Connectors (IDCs) at rear panel. Horizontal and vertical designation strips identify 48 premium-quality three-conductor jacks. Panel assemblies are completely cabled and shielded on all sides.
Reader Service #431

SWR INTRODUCES RF OUTPUT POWER STACK

This power stack from SWR allows easy access to amplifier tubes. Simply unbolt the elbow at the klystron and turn the stack 70 degrees. The stack will telescope up to clear the bullet, giving access to the tube and saving the trouble of dismantling the U link at the top of the transmitter.
Reader Service #432

SYMBOLICS ANNOUNCES MAC ANIMATION SYSTEM

Now in prototype and promised for September is the Macintosh II S-Paint software, described by the manufacturer as a high-end 2D animation and paint system for the desktop video production environment. Included in the system is the MacIvory coprocessor board. Features include 2D paint animation to any number of cel layers, unlimited selection of brush types and geometric shape operations such as gradient fill, diffusion, recoloring, stretching,and canvas resizing. Price is $49,500.
Reader Service #433

TANNOY HAS SMALL NEAR-FIELD SPEAKERS

Tannoy's PBM 6.5s are a two-way bass reflex system featuring a 6.5-inch poly cone woofer and a ¾-inch dome tweeter crossed over at 2.6 kHz. The speakers are rated at 90 dB with 1 W at one meter and a 100 W amplifier recommended. Price is $299.
Reader Service #434

TASCAM OFFERS REMOTE CONTROL UNIT

Tascam's new CD-701/RC-701 system integrates instant start-up, automatic cueing and error-free tracking to provide production and broadcast professionals with ultimate precision performance and no dead air.
Reader Service #435

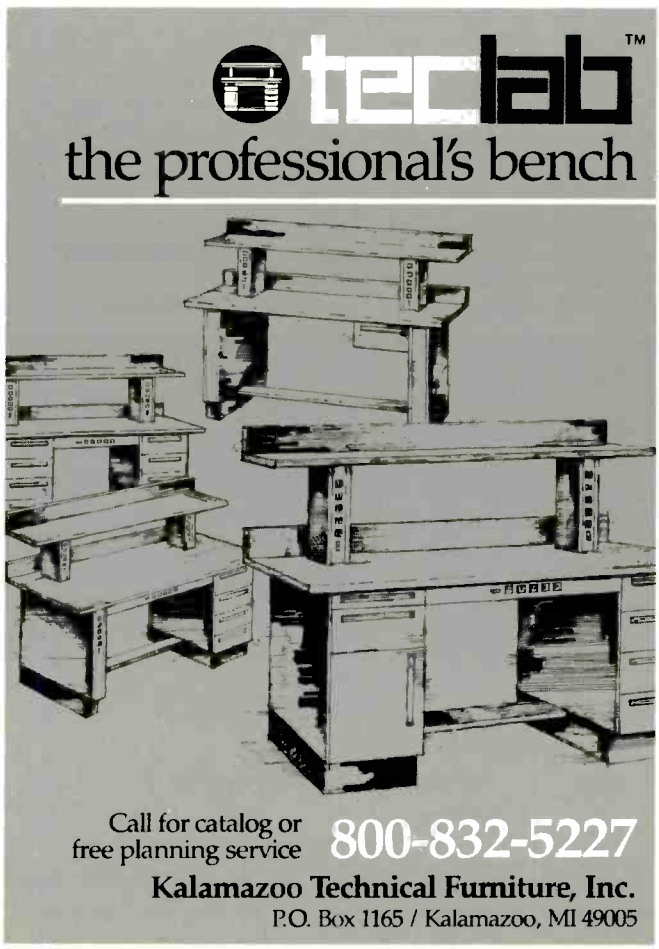
TASCAM PREMIERS SERIAL SYNCHRONIZER

The Tascam MT-100 MIDIiZER is the first three-function synchronizer to utilize serial port connections, according to the company. Designed for music production applications, it functions as an autolocator for transports, a MIDI machine-to-transport synchronizer, and a transport synchronizer that chases two transports. It reads and generates all time codes for 24, 25 drop frame and non-drop frame. Under $2000.
Reader Service #436

TELEVISION ENGINEERING OFFERS AUDIO CONTROLLER

Model IFB-19 features selection of eight IFB source inputs, four interrupt source inputs,

SV to TE



Circle 147 on Reader Service Card

Circle 148 on Reader Service Card

NEW PRODUCTS AT NAB

TE to VA

three isolated outputs, and individual gain control for IFB source, interrupt source, and headphone level. Also from Television Engineering are the model TEC-18 and model TEC-19 ENG vans.
Reader Service #437

TECHNALOGIX MODIFIES TRANSMITTER

Technalogix has added the Varian external cavity wideband multistage depressed collector (MSDC) klystron to the list of tubes available for its line of UHF transmitters. The MSDC klystron is incorporated into the TX-60-S transmitter, introduced at NAB. Distributed by Midwest.
Reader Service #438

TEKTRONIX INTRODUCES NEW GENERATOR LINE

Suitable for all aspects of high definition R&D, the new TSG-1000 series HD television generators are designed for equipment and system manufacturing and testing. The TSG-1050 produces 525-line progressive and 1050-line interlaced signals in GBR and Y, Pb, Pr formats for 1050/59.94 HDTV systems. The TSG-1125 and TSG-1250 provide for the 1125/60 and 1250/50 HDTV systems, respectively.
Reader Service #439

TEKTRONIX HAS COMPONENT/NTSC GENERATOR

Measurement flexibility in component/composite environments is provided by the new Tektronix TSG-370 component/NTSC generator. Component and composite test signals can be independently selected, useful in mixing format environments where simultaneous component and composite color bar signals are required.
Reader Service #440

TENTEL UNVEILS GAUGES

The Tentelometer tape tension gauge model T2-H7-UM is a universal, accurate method of measuring VCR holdback tension in VHS transports for proper tape interchange and VCR repair. Tentelometer calibration can be verified easily with the one-ounce weight included with each gauge. Price is $325.
Reader Service #441

THOMSON PREMIERS TRANSMITTER TUBES

A single TH 582 coaxial metal-ceramic tetrode, designed for transmitters of peak-of-sync output power of 22 kW for vision carrier only or 10 kW combined vision and sound carriers, has logged more than 22,000 hours of UHF TV operation. Other tubes from Thomson Tubes Electroniques are the TH 558 tetrode, which delivers 500 kW in short-wave power, and the TH 539 tetrode, which delivers 1.2 MW in long- and medium-wave power.
Reader Service #442

TOKO AMERICA PRESENTS AMPLIFIER

The HDA-5000 HDTV video distribution amplifier from TOKO America features three input channels and nine output channels to facilitate distribution of one signal to three different devices. This eliminates timing errors that might occur when using three separate distribution amplifiers. Frequency response is flat to 50 MHz.
Reader Service #443

TOSHIBA SHOWS COMPACT CCD CAMERA

The IK-T30C, new from Toshiba, is a compact, industrial-use color camera incorporating three 300,000-pixel, half-inch CCD sensors. It provides over 600 lines of horizontal resolution, Y-C and composite output terminals, auto white balance, bayonet lens mount and minimum illumination of 10 lux. Available now for $7995.
Reader Service #444

TRIMM INTRODUCES COAXIAL JACK

A new concept in tri monitoring coaxial jacks, the WECO BNC 89332 series from Trimm, provides three primary types of circuits. The first is automatic termination of both sides into 75 ohms upon insertion of a patch cord with the monitor position incorporating a -21 dB drop from source. The second omits the drop from source. The third omits the 75-ohm terminations.
Reader Service #445

TRI-TECH HAS REMOTE BROADCAST STUDIO

Remote broadcasting over a cellular telephone hookup is possible with the RBS 801 from Tri-Tech. One compact unit combines the functions of a microphone mixer, a cellular telephone and a standard telephone interface.
Reader Service #446

TSM PRESENTS AUTOMATED CONTROL PANEL

The Autocam ACP-8000 automated control panel from Total Spectrum Manufacturing permits one operator to control up to eight cameras. Options include AutoTrak, which locks the camera on the talent, a newsroom computer interface that establishes two-way communications between AutoCam and the newsroom computer, and the X-Y base for the SP-200 servo pedestal.
Reader Service #447

T-TECH HAS FIBER OPTIC TRANSMISSION

The T-Tech Audio-Fiber digital audio link is a complete two-channel professional audio transmitter and receiver system for converting analog signals to fiber-optic signals and back again. Applications include broadcast STL.
Reader Service #448

UNITED MEDIA PRESENTS EDIT CONTROLLER

United Media's UMI400 series is an expandable A/B roll time code videotape editing controller. Suitable for ENG and off-line editing, the unit features simultaneous but independent audio/video dissolves and the ability to generate industry-compatible EDLs on disk. Three models capable of handling from two to four VTRs range in price from $2850 to $5500.
Reader Service #449

ULTIMATTE UNVEILS IMAGE COMPOSITING

Forematte by Ultimatte Corp. is the first and only linear key generator to use Ultimatte's compositing algorithms. Designed as a peripheral for a switcher, Forematte processes the foreground to suppress the blue or green background and to eliminate any discoloration caused by spill from the background.
Reader Service #450

UNIMEDIA INTRODUCES TURBO-TELECINE

Unimedia's turbo-telecine offers a wide range of features, including an enhanced flying spot scanner and a high level of performance at a considerable reduction in price, says the company. In addition, Unimedia can apply its refurbishing program to older telecines.
Reader Service #451

UTAH SCIENTIFIC UNVEILS ROUTING SWITCHER

The AVS-2 routing switcher is the first implementation of the new Series 2 packaging technology, which provides for maximum reduction in the physical size of circuitry. Although similar to the AVS-1B switchers, surface mount technology allows for denser crosspoint packaging and improvements in signal specifications.
Reader Service #452

VAL OFFERS MICROKEY 1300

Video Associates Labs' Micro-

UNITED MEDIA

Key 1300 is a tool for broadcasters and producers who need to record computer-generated or interactive video materials onto videotape. The unit is designed to mix, dissolve and add special effects using an IBM PC-compatible computer, switcher or efx unit.
Reader Service #453

VALLEY OFFERS DIGITAL AUDIO PROCESSOR

The Digital Dynamics Processor (DDP) from Valley International is a multiple-function audio signal processor operating on a 16-bit linear PCM format. The user creates the on-air sound by altering the setpoints of each band of frequencies independently. This makes the DDP useful for enhancing less than ideal recordings by dynamically equalizing the program. $9000 for the five-band model; $12,000 for the eight-band model.
Reader Service #454

VALLEY HAS DIGITAL COMPRESSOR/EXPANDER

Valley International has introduced a stereo compressor/expander for digital recording and mastering applications. The unit operates entirely in the digital domain at up to 15 million instructions per second. Price is $3250.
Reader Service #455

VARIAN HAS SATCOM AMPLIFIER

Model VZU-6992A6 is a compact and modular 125 W Ku-band, high-power amplifier for satellite communications from Varian Microwave Equipment Div. The travelling-wave tube-based amplifier is designed for satellite newsgathering, emergency communications, and radio transmission. The amplifier may be controlled remotely by computer. Price is $26,000. First delivery in June.
Reader Service #456

VDP ENHANCES VIDCAD

Video Design Pro has added 3D capability to its video computer-aided design system, VidCAD. This system allows an engineer to design a video and audio production facility or TV station without being a computer expert. VidCAD can be used for flow diagrams, cable planning, rack layouts, ergonomic planning, media room design, documentation, diagramming signal paths, and label printing.
Reader Service #457

VEAM INTROS FIBER-OPTIC MIC SNAKE

A new fiber-optic mic snake from Veam Div. of Litton Systems transmits as many as 52 analog signals digitally with no hum or crosstalk. Modular plug-in construction enables the user to configure the mic snake to any application; the quad channel transmitter and receiver modules can be interchanged for bidirectional operation.
Reader Service #458

VGV INTRODUCES DIGITAL SWITCHER

Model D2500 is a composite digital production switcher from VGV. Features include all-digital design with 16-bit internal signal processing, 10 to 20 inputs, five to 10 external key inputs, three priority transitionable layers over a full two-source background transition level, fade to black, and five wipe generators plus one assignable advanced wipe generator with hybrid matrix patterns.
Reader Service #459

VIDEOFONICS UNVEILS EDITING SYSTEM

In conjunction with NEC America, Videofonics has introduced VUES, a fully integrated digital editing system built around the NEC VSR 10 digital video sequence recorder, which holds up to 136 seconds of moving video in RAM and contains a digital production switcher. Use of the VSR 10 eliminates the need for a production switcher, B-rolls, multiple source machines, or multiple channels of digital video effects in building complex sequences and transitions.
Reader Service #460

VIDEO INT'L INTROS STANDARDS CONVERTER

The DTC-4500 digital standards converter from Video International converts among NTSC, PAL, PAL-M, PAL-N and SECAM standards. It features 4:2:2 digital processing, digital noise reduction and four-field movement interpolation. Sampling frequency is 13.5 MHz for luminance and 6.75 for the color difference signals. The unit is available now and costs $100,000.
Reader Service #461

VIDEOLAB WILL OFFER TIME CODE HEAD

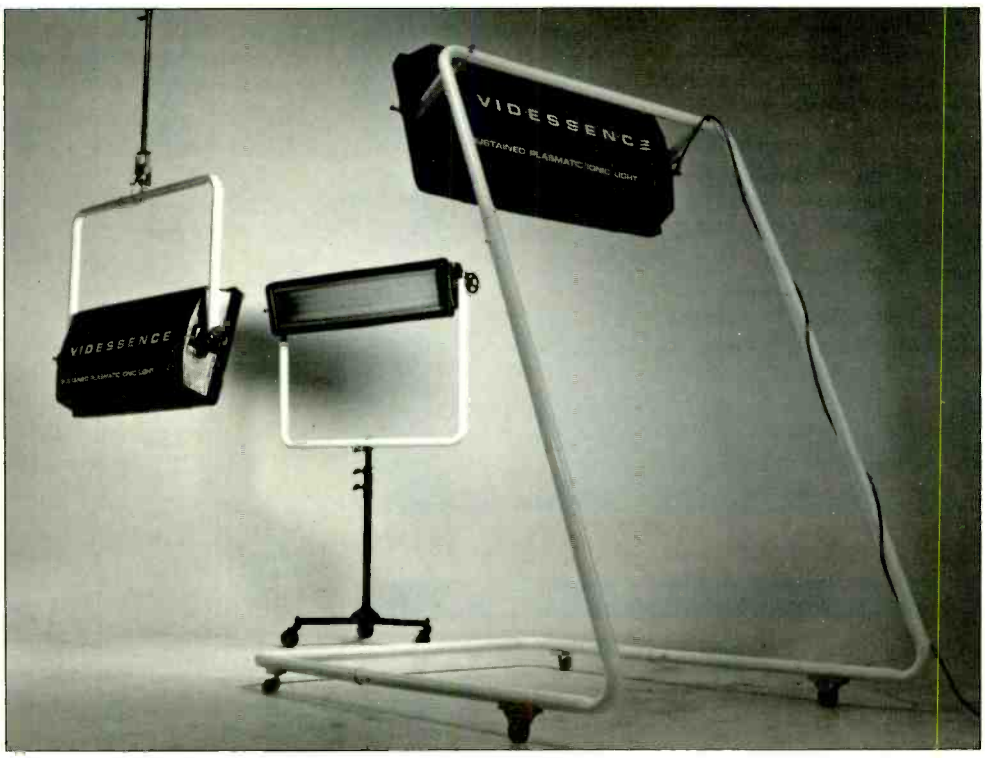
Model TCR-579, now in prototype, will ensure a proper interface with ¾-inch VTRs and avoid tracking misalignment, tape path error, track height problems, erasure of time code during video insert and incompatibility with other machines, according to the manufacturer.
Reader Service #462

VIDEOTEK DEBUTS FRAME STORE/SYNCHRONIZER

Videotek's new four-field frame store/synchronizer, the VDP-8400, provides transparent signal processing plus stable, jitter-free lockup of noisy feeds from satellite, microwave, ENG and remote broadcasts. The VDP-8400 can be programmed to view a single line of a particular field of video. This line is repeated throughout the frame in order to display a bright line select on any monitor.
Reader Service #463

VIDESSENCE PRESENTS NEW LIGHTING

"Sustained plasmatic-ionic light," described as the industry's first full-spectrum light, is offered by Videssence. The light source operates at 3400 degrees Kelvin. Each fixture generates high lumen readings, yet requires low amperage to operate. The light increases the apparent resolution of the film or video medium beyond the perception of the human eye, ac-



VIDESSENCE

NEW PRODUCTS AT NAB

cording to the company.
Reader Service #464

VIDEOMEDIA INTRODUCES EDITING SYSTEM

Expandable from a two-machine editing system for $9500, through an A/B roll system for $10,500, up to a 16-machine multilevel transition model for $24,500, the VLC-32 controls up to 31 devices and six tracks of audio. It can also sync roll up to six source transports and four multiple record transports per single event. The unit provides unified, complete control of transports, switchers, graphics systems and editing systems over the V-LAN network. Features include multilevel transitions, assignable bus structure, and full edit list management.
Reader Service #465

PEDESTAL, REMOTE CONTROL FROM VINTEN

The Vision Pedestal, new from Vinten, is a fully portable, lightweight unit with a height range from 25 to 58 inches, 44-pound carrying capacity and a self-charging system for easy payload adjustment. Also new from Vinten is a prototype tracking pedestal for the MicroSwift remote camera control system. Self-contained internal circuitry eliminates studio clutter and operational limitations and gives the MicroSwift total control over remote cameras, production switches and character generators.
Reader Service #466

WBC UNVEILS LIGHT HANGER

Walter Brewer Corp. has introduced the newest model of its telescoping light hanger. Described as the only heavy-duty hanger that can be vertically adjusted from the studio floor, the unit has undergone major improvement. Contact with the studio floor is no longer necessary, and the hanger now has an electrical motor that powers the high-torque, oil-cooled gear box that raises and lowers the hanger.
Reader Service #467

WAVEFRAME INTROS HARD DISK MODULE

New hard disk recording modules for the AudioFrame digital audio workstation will be available as four- or eight-channel plug-ins that will occupy one slot and expand to up to 32 channels. WaveFrame disk recording will be switchable to either 16- or 24-bit modes. The new module will permit random access with non-destructive editing. A four-channel version of the module will be available late summer for $10,000.
Reader Service #468

WEATHER NETWORK OFFERS GRAPHICS SYSTEMS

WXNET systems, designed to receive and display graphics from the Weather Network library, produce quality, 16-bit, 512 x 486-resolution graphics with a choice of more than 32,000 colors. The WXNET 2000 includes a paint system together with an IBM AT-compatible computer and features a real-time frame grabber and a built-in video keyer.
Reader Service #469

WHEATSTONE DEBUTS MASTER CONTROL CONSOLE

Model TV-500 is a true stereo television console, complete with stereo subgroups, stereo

Circle 149 on Reader Service Card

sends, twin stereo outputs, a derived mono output for compatible transmission and a channel-assignable mono bus for SAP requirements. The TV-500 console is available in 16- to 56- input mainframes and may be configured as a four stereo subgroup subsystem or as an eight-bus system.
Reader Service #470

WARD-BECK PRESENTS INTERCOM

MiniCOM is a compact, high-performance programmable matrix that is compatible with Ward-Beck's MicroCOM II. The unit features a 24x36 matrix in a package requiring only five units of rack space. MiniCOM provides the flexibility of a digital programmable intercom system at a modest cost.
Reader Service #471

WHEATSTONE UNVEILS RADIO CONSOLE

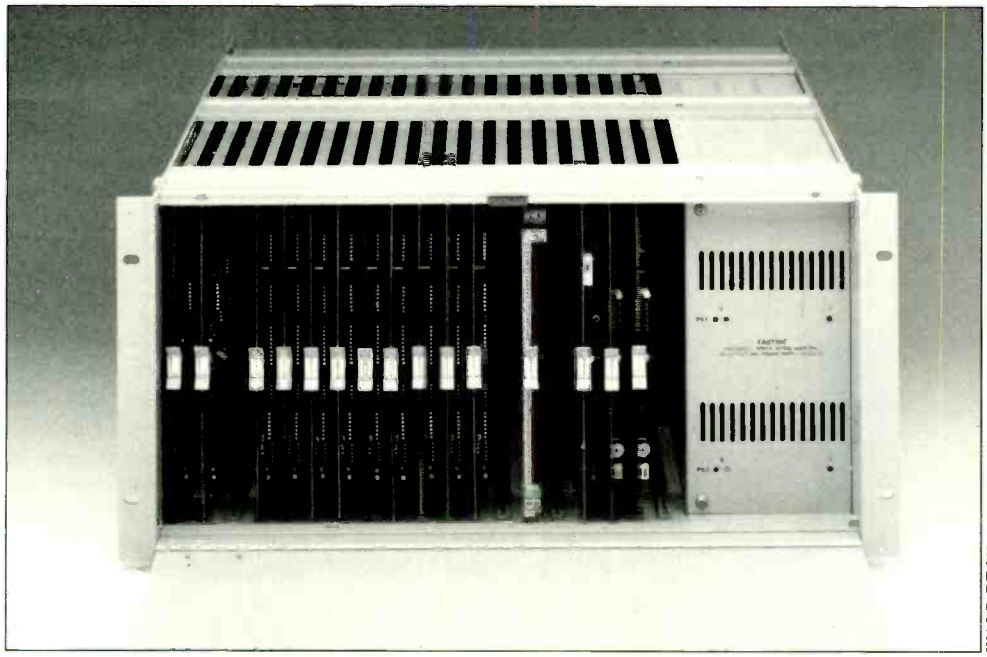
Modular construction, a fully regulated rackmount power supply, logic follow, full machine control and gold-contact interfaces characterize the A-20 radio console, new from Wheatstone. Other features include two mic channels and eight stereo line channels, each with A/B source select and program/audition bus assign, program and audition VU meters, digital timer, and a monitor module for control room and headphone functions.
Reader Service #472

WHEELIT PRESENTS PROJECTOR STAND

Wheelit's three-tube projector stand accommodates projectors up to 25 inches wide by 29 inches deep. It features a specially pivoted center platform that allows quick operator adjustment of projector vertical angle. The top shelf offers space for VCRs.
Reader Service #473

NEW ENG VANS FROM WOLF

Featuring 100 inches of clear space for electronics, the Ford E-350 features a 120V/12V power panel, a TMD 42-foot Will-Burt mast, crew seating for three, 13,500 BTUs of air conditioning, 5000 BTUs of heat and a 4 kW Onan generator. Other models include a GM suburban and the Wolf Coach B-series, an all-aluminum box on a GM C-3 chassis.
Reader Service #474



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Debugging Studio Sound: Calculate Its Acoustics

By Ronald F. Balonis

Last month, we discussed ROOMODE.BAS, designed to help calculate the resonant modes of a studio, given its particular size and shape. But having a studio of the right size and shape is only part of what it takes for a studio to have a "good" sound. For a given size, shape and application, a studio's reverberation time must be such that it is neither too "live" nor too "boomy," too dull or too dead.

This month's Compute program, ACOUSTIC.BAS, calculates a studio's reverberation time for six ⅓-octave bands.

Reverberation is the persistence of sound as it bounces and reflects in a studio until its energy is dissipated by absorption. Moderate amounts of reverberation make a studio sound vibrant and alive. Excessive amounts, however, reduce intelligibility and cause fatigue in both the listener and the performer. The reverberation time for a studio depends upon two main variables—its volume and the sound-absorbent qualities of its surfaces. Both are controllable, but the easiest way to control a studio's reverberation times is by the application of sound-absorbent materials.

There are a number of ways for calculating reverberation time, but two have found the most application. The first formula is an empirical one devised by W. C. Sabine around the turn of the century. It's most accurate for fairly reverberant rooms with low average absorption coefficient values and is coded in line 560. The other formula, derived mathematically by C. F. Eyring, gives more accurate results in less reverberant rooms, and is coded in line 580.

Using this program requires some planning. First, you need to know the studio's height, width, and length, along with the kind of surfaces and their sizes that make up the room or studio. Then you have to calculate or estimate them as a percentage of total wall, ceiling, or floor areas. Enter them to build the analysis on the screen.

Enter H:W:L first; at the prompt type in the numbers in sequence separated by colons. On a valid H:W:L entry, the program displays the volume, total surface area, and the optimum reverberation time. It then prompts for surface areas, starting with the ceiling. Be aware that, to keep the analysis on the screen, the program allows only nine different surfaces in any combination of ceiling, wall, and floor.

```
ACOUSTIC.BAS              +++ Calculate Room Acoustics +++

DIMENSIONS <H:W:L> (Feet): 11:13:16.5       VOLUME= 2359.5  AREA= 1078.0
                                            OPTIMAL REVERB TIME= 0.36 S.
Surface  Tot.Area  S.Area#  Percent  <Type>   Surface
CEILING     214.5     [ 1]    100.0  <  2 >  Fiberglass-2in
WALL        649.0     [ 2]      5.0  < 19 >  Glass-plate
                      [ 3]      5.0  < 28 >  Wood
                      [ 4]     90.0  < 15 >  Paneling-3/8
FLOOR       214.5     [ 5]    100.0  < 29 >  Tile-lin/asph



++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

OCTAVE BAND    (Hertz):      125      250      500     1000     2000     4000
REVERB. TIME   (Sabine):    0.53     0.38     0.37     0.43     0.42     0.42
REVERB. TIME   (Eyring):    0.48     0.32     0.31     0.37     0.36     0.36

<C>hange a Surface's TYPE or <R>estart: R


ACOUSTIC.BAS              +++ Calculate Room Acoustics +++

DIMENSIONS <H:W:L> (Feet): 11:13:16.5       VOLUME= 2359.5  AREA= 1078.0
                                            OPTIMAL REVERB TIME= 0.36 S.
Surface  Tot.Area  S.Area#  Percent  <Type>   Surface
CEILING     214.5     [ 1]    100.0  <  4 >  Tile/drop ceil
WALL        649.0     [ 2]     20.0  <  1 >  Acoustic-tile
                      [ 3]      5.0  < 19 >  Glass-plate
                      [ 4]      5.0  < 28 >  Wood
                      [ 5]     70.0  < 15 >  Paneling-3/8
FLOOR       214.5     [ 6]    100.0  < 30 >  Carpet on con.



++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

OCTAVE BAND    (Hertz):      125      250      500     1000     2000     4000
REVERB. TIME   (Sabine):    0.40     0.41     0.36     0.30     0.28     0.30
REVERB. TIME   (Eyring):    0.34     0.36     0.30     0.24     0.22     0.24

<C>hange a Surface's TYPE or <R>estart:
```

***Figure 1.** Demo screens for ACOUSTIC.BAS.*

To picture this, see the demo screens. At the Percent Of (ceiling, wall, or floor) prompt, a null enter enters the remaining surface area for it (enter smaller surfaces first). For an area with only one surface, enter 100 or just enter and then the number of the surface type from the table on the bottom half of the screen. Repeat the sequence until all of the surfaces have been entered—ceiling, wall, and floor. After that, the program displays the reverberation times across the octave bands by both formulas and waits for either a surface <C>hange or a <R>estart instruction.

This is the same example studio used for last month's ROOMODE.BAS. The top screen (Figure 1) shows its reverberation times before the application of additional acoustic materials. The bottom screen shows the studio with acoustic tile applied to the back wall, a drop ceiling, and a wall-to-wall rug installed. Notice the improved reverberation time and profile of near-uniform times across the bands.

Reverberation time and its calculation can be found as a subtopic in many texts on acoustics. Again, the *Handbook for Sound Engineers: The New Audio Cyclopedia* provides, in Chapter 5, "Acoustical Design of Audio Rooms," an excellent source. And, again, some words of caution about the uses and applications to which the program and its results are put: The formulas employed are statistical in nature. The coefficients were determined under varying test methods; depending on use, they can vary. Consider the program as a tool for modeling an approximation of acoustic reality. In final judgments and decisions, the ear should always prevail. ■

Balonis is chief engineer at WILK, Wilkes-Barre, PA.

```
0  'ACOUSTIC.BAS ++ Calculate Room Acoustics ++
5 'By Ronald F. Balonis  on about February 2, 1989
10 '
30 RESTORE:READ COEFS:CLR$=SPACE$(80)
40 DIM SURF$(COEFS),COEF(COEFS,6),S(10),SC(10),A(3),A$(3)
50 TLE$="          +++ Calculate Room Acoustics +++"
95 '
100 CLS:PRINT "ACOUSTIC.BAS  ";TLE$:PRINT
105 KR=CSRLIN:GOSUB 600:'--Save Place then show Surfaces & Coefs
150 '
200 LOCATE KR,1:HWL$="":PRINT "DIMENSIONS <H:W:L> (Feet): ";
205 LINE INPUT HWL$
210  IF HWL$="" THEN STOP
215   H=VAL(HWL$)
220    I=INSTR(HWL$,":"):    IF I=0 THEN RUN 0:'--- Restart on
225   W=VAL(RIGHT$(HWL$,LEN(HWL$)-I))
230    I=INSTR(I+1,HWL$,":"):IF I=0 THEN RUN 0:'--- an Error
235   L=VAL(RIGHT$(HWL$,LEN(HWL$)-I))
240   IF H<=0 OR W<=0 OR L<=0 THEN RUN 0
245    A$(1)="CEILING":A(1)=W*L       :VOL=H*W*L
250    A$(2)="WALL    ":A(2)=2*H*(L+W):RT=.15*LOG(VOL)/LOG(10)-.15
255    A$(3)="FLOOR   ":A(3)=W*L       :AREA=A(1)+A(2)+A(3)
260    LOCATE CSRLIN-1,44
265    PRINT USING"VOLUME=#####.#  AREA=#####.#";VOL;AREA
270    PRINT TAB(44);USING"OPTIMAL REVERB TIME=##.## S.";RT
275 '
300 KR=CSRLIN:S=0:'-Get surface types on Ceiling, Walls, & Floor
305 PRINT"Surface  Tot.Area  S.Area#  Percent  <Type>   Surface"
310 FOR I=1 TO 3
315  SUM=0:PRINT USING"\       \ #####.# ";A$(I);A(I);
320  S=S+1:PRCNT$=""
325  LOCATE KR+S,18:PRINT USING"    [##]    ";S;
330  LINE INPUT PRCNT$:PRCNT=VAL(PRCNT$)
335   IF PRCNT$="" THEN PRCNT=100-100*SUM/A(I):'-- Null = % left
340   IF 3-I+S=9   THEN PRCNT=100-100*SUM/A(I):'-- 9    = % left
345   IF PRCNT=<0 THEN RUN 0:'------- Restart on Nothing or Less
350    SA(S)=A(I)*PRCNT/100:SUM=SUM+SA(S)
355    LOCATE KR+S,26
360    PRINT USING"    ###.#     ";100*SA(S)/A(I);
365    LINE INPUT TYPE$
370    IF TYPE$="" THEN 355 ELSE S(S)=VAL(TYPE$)
375     IF S(S)<1 OR S(S)>COEFS THEN 355 ELSE LOCATE CSRLIN-1,38
380      PRINT USING"< ## >  ";S(S);:PRINT SURF$(S(S))
385      IF SUM<A(I) THEN 320
390 NEXT I
395 '
400 GOSUB 500:'--- Calculate, Display, & Prompt What To Do Next
405 LOCATE CSRLIN-1,1:PRINT CLR$:LOCATE CSRLIN-1,1:X$=""
410 LINE INPUT "<C>hange a Surface's TYPE or <R>estart: ";X$
415  IF X$="R" OR X$="" THEN RUN 0 ELSE IF X$<>"C" THEN 405
420   LOCATE CSRLIN-1,46:N$=""
425   LINE INPUT "Surface Area # : ";N$
430    IF N$="" THEN 405 ELSE N=VAL(N$)
435     IF N<1 OR N>S THEN 405 ELSE GOSUB 600
440 '
445 LOCATE KR+N,38:PRINT "       ";:LOCATE KR+N,40:TYPE$=""
450 LINE INPUT TYPE$
455  IF TYPE$="" THEN 445 ELSE S(N)=VAL(TYPE$)
460   IF S(N)<1 OR S(N)>COEFS THEN 445 ELSE LOCATE CSRLIN-1,38
465    PRINT USING"< ## >  ";S(N);:PRINT SURF$(S(N)):GOTO 400
470 '
500 '------------ Calculate and Display Reverb TX by Octaves
505 FOR I=15 TO 23:LOCATE I,1:PRINT CLR$;:NEXT I:' CLEAR SCRN
510 LOCATE 16,1:PRINT STRING$(71,"+");:PRINT
515 PRINT "OCTAVE BAND    (Hertz): ";:FRQ=125/2
520 FOR I=1 TO 6
525  SC=0:SC(I)=0:FRQ=FRQ*2:PRINT USING"  ##### ";FRQ;
530  FOR II=1 TO S
535   J=S(II):SC=SC+SA(II)*COEF(J,I):'-- Average Coefficient
540  NEXT II:SC(I)=SC/AREA
545 NEXT I:PRINT
550 PRINT "REVERB. TIME  (Sabine): ";
555 FOR I=1 TO 6:
560  PRINT USING"  ##.## ";.05*VOL/(AREA*SC(I));
565 NEXT I:PRINT
570 PRINT "REVERB. TIME  (Eyring): ";
575 FOR I=1 TO 6:
580  PRINT USING"  ##.## ";.05*VOL/(-AREA*LOG(1-SC(I)));
585 NEXT I:PRINT:PRINT:PRINT:RETURN
590 '
600 '---------- Display Surfaces to Select Sound Coeficients
605 LOCATE 15,1:RESTORE:READ COEFS
610 PRINT STRING$(34,"+");" Surfaces ";STRING$(34,"+")
615 FOR I=1 TO COEFS
620  READ SURF$(I):PRINT USING" <##> ";I;:PRINT SURF$(I);
625  FOR II=1 TO 6:READ COEF(I,II):NEXT II
630 NEXT I:RETURN
700 '------- Surface ---- Sound Absorption Coefficients
710 DATA 31:'Octave Band= 125  250  500  1000 2000 4000
712 DATA "Acoustic-tile ",.050,.220,.520,.560,.450,.320
714 DATA "Fiberglass-2in",.220,.820,.990,.990,.990,.990
716 DATA "F.Glass-rll2in",.170,.550,.800,.900,.850,.800
718 DATA "Tile/drop ceil",.700,.660,.720,.920,.880,.750
720 DATA "Fbr spryon.5in",.050,.150,.450,.700,.800,.800
722 DATA "Fbr spryon.7in",.100,.300,.600,.900,.900,.950
724 DATA "Fbr spryon 1in",.160,.450,.700,.900,.900,.850
726 DATA "Brick-unpaintd",.030,.030,.030,.040,.050,.070
728 DATA "Brick-painted ",.010,.010,.020,.020,.020,.030
730 DATA "Con. Blk-unpnt",.360,.440,.310,.290,.390,.250
732 DATA "Con. Blk-paint",.100,.050,.060,.070,.090,.080
734 DATA "Plaster/brick ",.013,.015,.020,.030,.040,.050
736 DATA "Plaster/lath  ",.020,.030,.040,.050,.040,.030
738 DATA "Gypsum board  ",.290,.100,.050,.040,.070,.090
740 DATA "Paneling-3/8  ",.280,.220,.170,.090,.100,.110
742 DATA "Sonex-2in     ",.060,.250,.560,.810,.900,.910
744 DATA "Sonex-3in     ",.120,.440,.965,.975,.980,.990
746 DATA "Sonex-4in     ",.210,.740,.980,.980,.980,.990
748 DATA "Glass-plate   ",.180,.060,.040,.030,.020,.020
750 DATA "Glass-window  ",.350,.250,.180,.120,.070,.040
752 DATA "Glazed-tile   ",.010,.010,.010,.010,.020,.020
754 DATA "Fabric/Drapes ",.030,.040,.110,.170,.240,.350
756 DATA "Drapes-medium ",.070,.310,.490,.750,.700,.600
758 DATA "Drapes-heavy  ",.140,.350,.550,.720,.700,.650
760 DATA "PolyUFoam-.5in",.090,.110,.220,.600,.880,.940
762 DATA "PolyUFoam-1in ",.130,.220,.680,1.00,.920,.970
764 DATA "Concrete      ",.010,.010,.015,.020,.020,.020
766 DATA "Wood          ",.015,.011,.010,.070,.060,.070
768 DATA "Tile-lin/asph ",.020,.030,.030,.030,.030,.020
770 DATA "Carpet on con.",.020,.060,.140,.370,.600,.650
772 DATA "Carpet on foam",.080,.024,.057,.690,.710,.730
775 '---- End of Sound Absorption data and the Program.
```

Figure 2. ACOUSTIC.BAS, a program to calculate room acoustics.

Appeals Courts Affirm Comparative Preferences, Nix Distress Sales

By Harry Cole

The hot news on the communications law front this month comes from the U.S. Court of Appeals in Washington, which late in March declared the FCC's minority distress sale policy unconstitutional. While the particular decision doesn't involve technical engineering issues, its potential effect on broadcast operations and management warrants discussing it here. (In the interest of full disclosure, we're pointing out up front that Bechtel, Borsari, Cole & Paxson represents the appellant in this case.)

The issues raised come from the court's decision in *Shurberg Broadcasting of Hartford, Inc. v. FCC* ("*Shurberg*"), which dealt with a Hartford, CT, television station. Reduced to simplest form, the case involved a company owned by a white male who filed a construction permit application against the station's then-pending renewal application. The station licensee, however, asked the FCC for permission to sell its license to a supposedly minority-controlled entity in line with the Commission's minority distress sale policy. In December 1984, the Commission granted the licensee the right to invoke that policy. The first applicant filed an appeal in which it claimed that the FCC's decision to preclude it from applying for the station in order to permit a minority distress sale represented unconstitutional reverse discrimination.

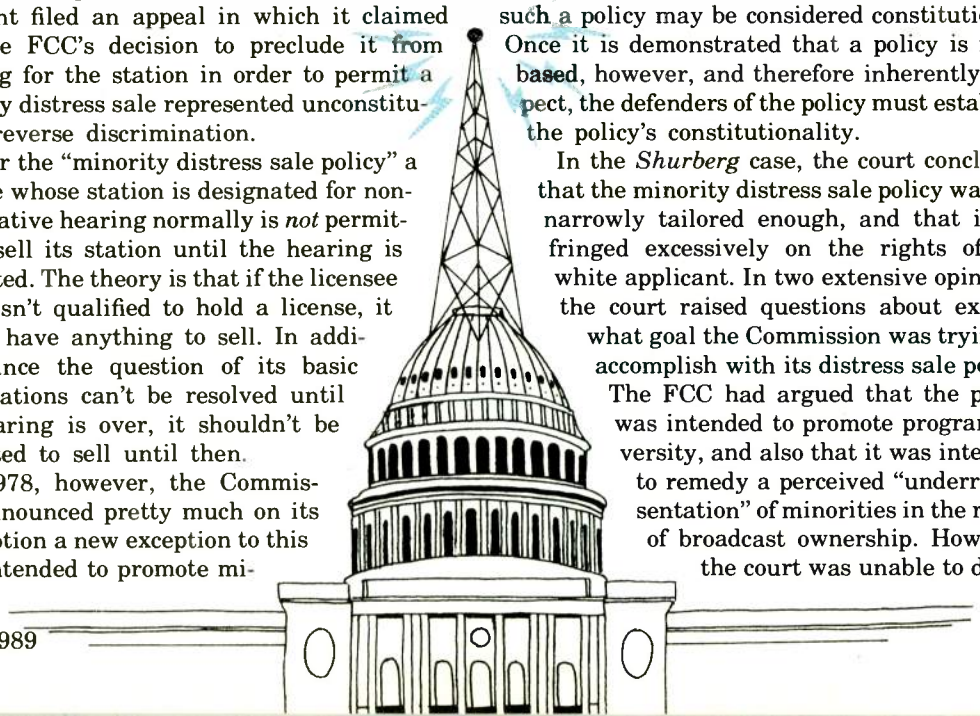
Under the "minority distress sale policy" a licensee whose station is designated for noncomparative hearing normally is *not* permitted to sell its station until the hearing is completed. The theory is that if the licensee really isn't qualified to hold a license, it doesn't have anything to sell. In addition, since the question of its basic qualifications can't be resolved until the hearing is over, it shouldn't be permitted to sell until then.

In 1978, however, the Commission announced pretty much on its own motion a new exception to this rule. Intended to promote minority ownership of broadcast stations, the exception allowed licensees designated for noncomparative hearing to avoid the hearing procedure. Under the Commission's exception, licensees who first sold their stations to a minority-controlled entity for no more than 75 percent of the station's fair market value did not have to have a hearing.

The minority distress sale policy is available *only* when the proposed buyer is minority-controlled. Thus, it is clearly a race-based governmental policy which absolutely excludes nonminority applicants. Such policies are deemed to be inherently suspect by the courts, since the Constitution specifically prohibits governmental discrimination on the basis of race. In some cases a policy may be upheld by the courts, but it generally must be shown to be what is defined as the most "narrowly tailored" means of accomplishing a legitimate governmental goal. That is, if the government can establish that it had no other way of accomplishing its goal, such a policy may be considered constitutional. Once it is demonstrated that a policy is race-based, however, and therefore inherently suspect, the defenders of the policy must establish the policy's constitutionality.

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

In the *Shurberg* case, the court concluded that the minority distress sale policy was not narrowly tailored enough, and that it infringed excessively on the rights of the white applicant. In two extensive opinions, the court raised questions about exactly what goal the Commission was trying to accomplish with its distress sale policy. The FCC had argued that the policy was intended to promote program diversity, and also that it was intended to remedy a perceived "underrepresentation" of minorities in the ranks of broadcast ownership. However, the court was unable to deter-



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mine how the distress sale policy was a narrowly tailored means of achieving either goal.

The court also considered whether other non-discriminatory methods might achieve both goals. Finally, it noted that the impact of the distress sale policy on the non-minority appellant in the particular case of the Hartford television station was substantial and direct. For these reasons the court concluded that, at least in the context of the Hartford situation, the minority distress sale policy was unconstitutional.

The minority distress sale policy is available only when the proposed buyer is minority-controlled. Thus, it is clearly race-based.

What does all this mean to you? To the extent that the court's holding in the *Shurberg* case is limited to the particular facts, arguably very little. Some observers believe, however, that the *Shurberg* decision signals the beginning of the end for some of the Commission's minority ownership policies. In addition to distress sale, both tax certificate and comparative preference are designed to achieve similar goals and are race-based. To the extent that the court in *Shurberg* arguably was not convinced that those goals were sufficient to justify race-based governmental action, *all* minority ownership policies could be found similarly deficient. For the same reason, the FCC's belief that minority ownership inevitably leads to increased program diversity could also be called into question.

It is not, however, a foregone conclusion that all minority ownership policies must fall in the wake of the *Shurberg* decision. The comparative preference policy, for example, is not an absolutely exclusory policy; it may therefore not have as substantial an impact on non-minorities as the distress sale policy in the *Shurberg* case.

To precis, the comparative preferences policy simply accords minority applicants—and, to a lesser degree, female applicants—a preference in comparative proceedings. Because the comparative preferences policy is one of a number of preferences which are available and because it does not absolutely exclude non-minorities, a non-minority applicant could conceivably assemble enough additional preferences to outweigh a minority preference. From this perspective, the comparative preferences policy may be more constitutionally sound than the distress sale policy. Indeed, a different three-judge panel of the U.S. Court of Appeals in Washington affirmed, by a two-to-one vote, the constitutionality of the comparative preferences policy only three weeks after the issuance of the *Shurberg* decision.

The tax certificate policy might also survive the *Shurberg* decision. Under that policy, a licensee which sells its station to a minority-controlled entity can defer the tax consequences of the transaction if the proceeds of the sale are invested in some other communications property. While the tax certificate policy appears to be exclusory in the same sense that the distress sale policy excludes non-minorities, it's hard to imagine how a non-minority would ever be in a position to challenge the actual issuance of a tax certificate. A licensee obviously has the option of selling its station to just about anyone it chooses. Once the proposed sale is presented to the FCC, the FCC is prohibited from considering other potential buyers. Thus, if Seller and Buyer strike a deal, they file their application, obtain a grant, and consummate the sale; if Buyer happens to be minority-controlled, Seller can then seek a tax certificate.

Under this scenario, it's difficult to see how any non-minority could frame an attack on the tax certificate policy, since such a non-minority would first have to demonstrate that it is an "aggrieved party." Such a demonstration would be tough to make.

In any event, the *Shurberg* decision is by its own terms limited to the facts that were before the court. Thus, any further challenges to the comparative preferences or tax certificate policies will have to come up via other cases.

Bear in mind, though, that the *Shurberg* decision may be appealed. Second, that decision did not address the FCC's equal employment opportunity policies. As we've said in past columns, the Commission continues to enforce its EEO policies vigorously. Moreover, those policies have generally been viewed with approval by the courts in general as well as the Supreme Court. Thus even if the *Shurberg* decision is read as broadly as possible, it's extremely doubtful there will be any change in the Commission's EEO policies.

If anything, the FCC's enforcement of those policies has recently increased. As a result, licensees should continue to recruit, hire and promote on completely nondiscriminatory bases; they should also document their efforts. ■

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BUSINESS BRIEFS

Bruce M. Allen has been appointed president and CEO of **Atlantic Satellite Communications, Inc.**, Northvale, NJ. Allen was previously vice president, operations and productions at Reiss Media Enterprises. . .**Julius Barnathan** has been promoted to senior vice president, technology and strategic planning at **Capital Cities/ABC.** Replacing him as president, broadcast operations and engineering is **Robert Siegenthaler** . . . **Wesley S. Williams, Jr.**, a partner and practicing attorney with Covington & Burling, Washington, DC, has been elected chairman of the board of directors of **Broadcast Capital Fund, Inc.**

Zack Electronics, Milpitas, CA, supplied 500 miles of **Belden** custom-made audio cable for **Sprocket Systems**, the post-production facility of LucasFilm . . . **Group W Videoservices** has acquired a **Quantel** Satin digital standards converter. Satin is an advanced bidirectional broadcast quantity TV standards converter to handle PAL and NTSC signals and other color standards . . . **AF Associates**, Northvale, NJ, has designed and built a complex of three editing suites for **USA Cable Network** . . . **Marshall Productions**, a Nashville, TN-based computer animation firm, has installed **Cubicomp Corp.**'s Vertigo V2300 system. Marshall is placing the system in the facility of **Post-Masters, Inc.**...In an effort to strengthen its news operations, KTAL, Shreveport, LA, an NBC affiliate, is converting its ENG operations to the half-inch MII format with **Panasonic Broadcast Systems Co.** equipment.

Midwest Communications Corp., Edgewood, KY, has opened a branch office in Chicago, headed by **Scott Kieffer** . . . **Blair Television**, New York City, has restructured its Los Angeles office. "The new organization maintains a four-team structure in this office with no staff reductions, but realigns station and team assignments and introduces a regional sales manager," said **Floyd J. Gelini**, senior vice president and director of regional sales. The regional sales manager is **Jeff Burnton** . . . **Centel Corp.** has signed agreements for the sale of several of its cable television properties in central Florida, Illinois, Michigan and Ohio. The Florida properties will be acquired by **American Television and Communications Corp.**; the Illinois systems by **Jones Intercable, Inc.**; the Michigan operations by **C-TEC Corp.**; and the Ohio operations by **Warner Cable Communications, Inc.**

The **Southern Cable Television Association** has scheduled its 1990 Eastern Cable Show for September 16-18, 1990 in Washington, DC, at the Washington Convention Center. The headquarters hotel will be the Grand Hyatt. For information, call (404) 252-2454.

The **National Association of Broadcasters** has released a new publication, *Telco Fiber & Video Market Entry*, offering an unrestricted panorama of the issues and ideas regarding telephone company fiber-optic plans and future video market entry prospects. The book is available through NAB Services at $45 for members and $90 for nonmembers.

Marine Office of America Corp., New York City, offers a comprehensive property insurance policy for broadcasters and cable TV operators. The policy covers towers and accessories, transmitters and studio equipment, mobile equipment, cable systems, film and record libraries, and valuable papers up to $2500. ■

Broadway Video, New York City, has opened a state-of-the-art digital compositing suite. "Our goal was to design and build the most powerful environment possible for the compositing of video and graphic elements," said company president Peter Rudoy. Among the features of the new facility are realtime digital compositing, detailed tracking of each step as completed, easy access for all video formats (one-, half- and ¾-inch) and integrated control of all devices.

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Radio Broadcasters: Rally for Digital Audio

By Chip Morgan

Some people might say radio broadcasters have their heads in the sand. While audio systems change all around us, radio seems content with technology first developed by telephone companies in the 1920s. The first radio stations were wired by telephone engineers, and today we still use audio standards based on telephone circuits.

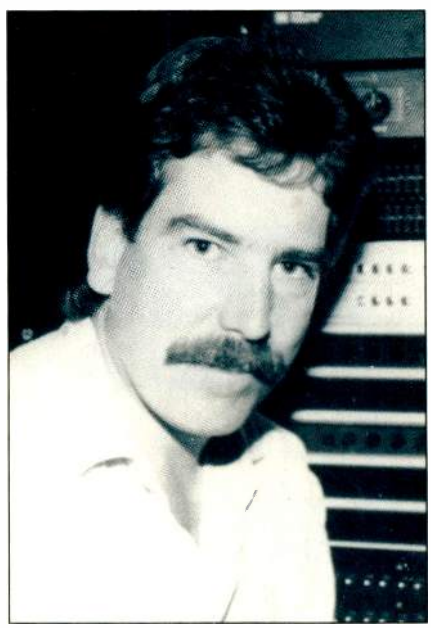
In the future, radio systems will still be compared to telephone systems. In 10 years, 50 percent of the U.S. workforce will be working from home and broadband ISDN (Integrated Services Digital Network) will be in place. When listeners can choose between dialing their phones for "digital quality" audio (just as they will choose video, phone service and data) or listening to "old fashioned analog" radio on a receiver, the choice will be self-evident.

Yes, radio will still be free and portable and local, but telco—or cable—service will sound better, and it will probably be interactive. Telco and cable will easily be able to provide "digital quality" audio to the home. If cable companies can hang on to their share of the market, we could see an "A" system (AT&T) and a "B" system (local BOC or cable company) fighting for users. When the mass audience insists on having digital quality in its cars, radio will be history.

Audio-only broadcast services haven't had a major technical improvement since FM stereo was introduced 28 years ago in 1961. With the upcoming reallocation of spectrum in the UHF and VHF TV bands, now is the time for digital modulation standards for broadcast audio. I'd like to challenge the best technical minds in the country to propose systems for digital radio so we can remain competitive in the future.

Such a "DM" or "Digital Modulation" system could be multiplexed on a single DM transmitter located at the best TV transmitter site in a particular market. In order to comply with CCIR Recommendation 601, allowing compatibility with existing and probable future formats, a sampling rate of 48 kHz with 16 to 20 bits for the audio channels (probably four per DM station) could be used. We also might consider an extra couple of data channels with each DM station to allow stations to provide additional services.

Current technology could also allow receivers to scan for specific frequencies allocated to each area, allowing DM stations to use unbuilt or unallocated frequencies in each area. Each receiver could also have programming for auto EBS tuning to a spare channel in the system. This EBS channel could allow only public service programming such as time, temperature, PSAs and emergency announcements. Data channels could be used to control "smart homes." In addition, home and car receivers could transmit tuning feedback on a data channel to provide continuous real-time listening habit information.



Let's not even consider using existing TV station subcarriers or guardbands. We can't bet the future of radio on the future of TV.

Radio broadcasters need to rally to find a way to implement a new band for the transmission of digital audio. It will take many years to implement such a system, so discuss this with your general manager and your associates now. We must work together to fight for our industry's survival. ■

Morgan is president of Chip Morgan Broadcast Engineering, Sacramento, CA.

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