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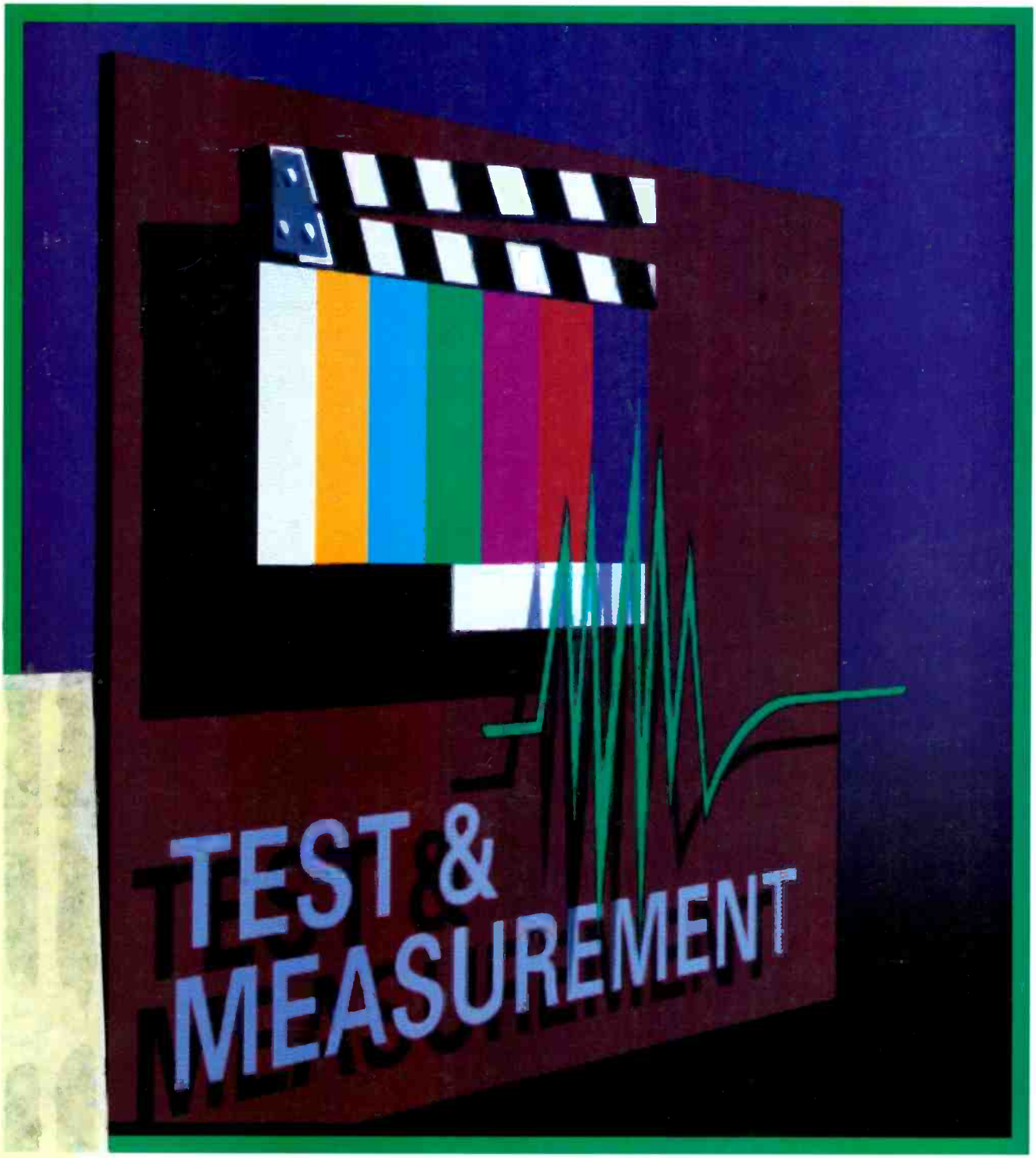
BROADCAST MANAGEMENT/ENGINEERING



Also in this issue:

- SMPTE Preview
- AM Stereo
- Earth Station Testing
- Acoustic Analysis

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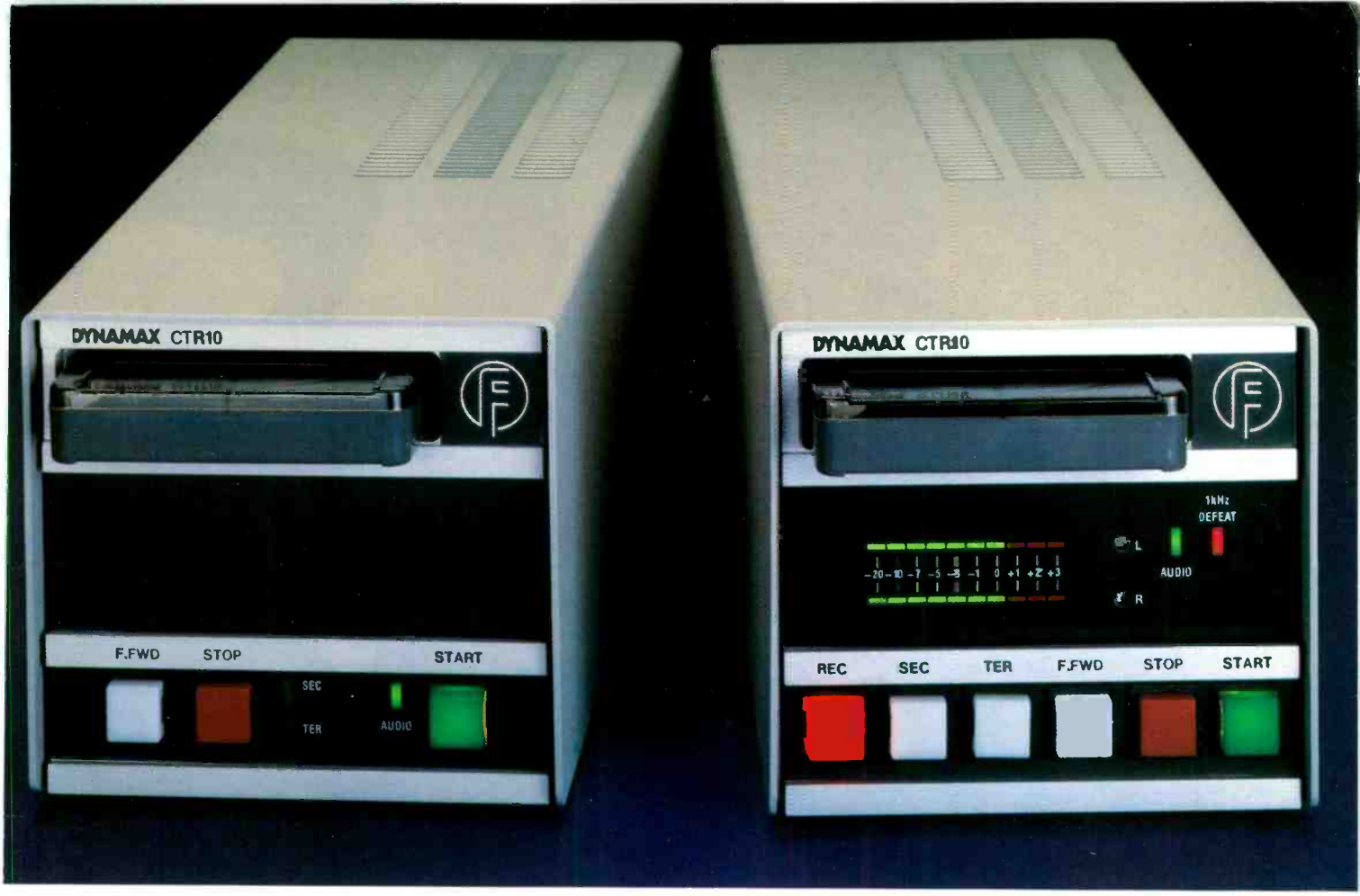

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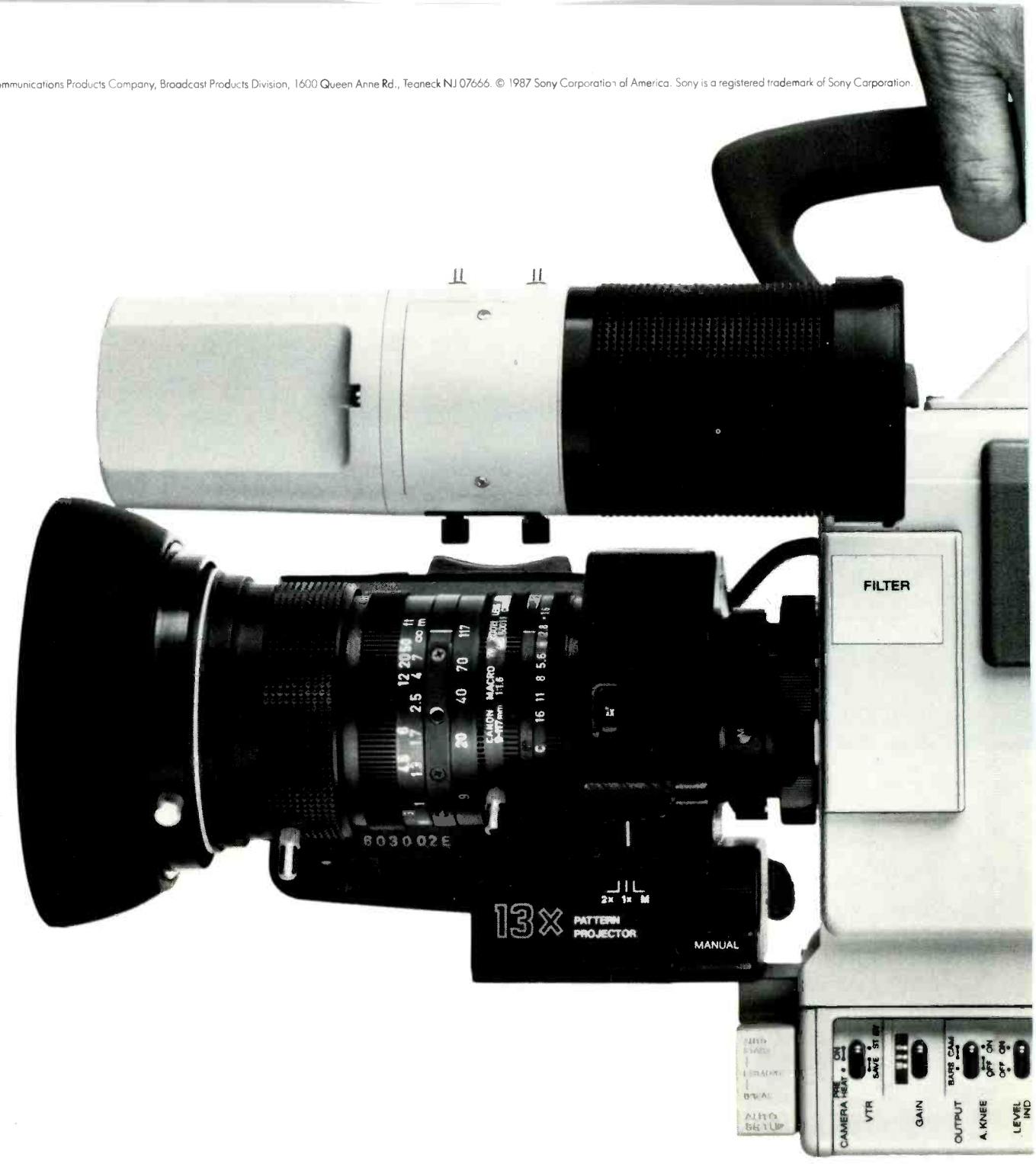

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(212) 685-5320, Telex 64-4001
Also publishers of:
BM/E's **World Broadcast News**
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ABP BPA BM/E BROADCAST MANAGEMENT ENGINEERING (ISSN 0005-3201) is published monthly by NBB Acquisitions, Inc. BM/E is circulated without charge to those responsible for station operation and for specifying and authorizing the purchase of equipment used in broadcast facilities in the U.S. and Canada. These facilities include AM, FM and TV broadcast stations. CATV systems, ETV stations, networks and studios, audio and video recording studios, teleproduction facilities, consultants, etc. Subscription prices to others $36.00 one year, $50.00 two years. Foreign $50.00 one year, $75.00 two years. Air Mail rates on request.

Second class postage paid New York, N.Y. and additional mailing offices.
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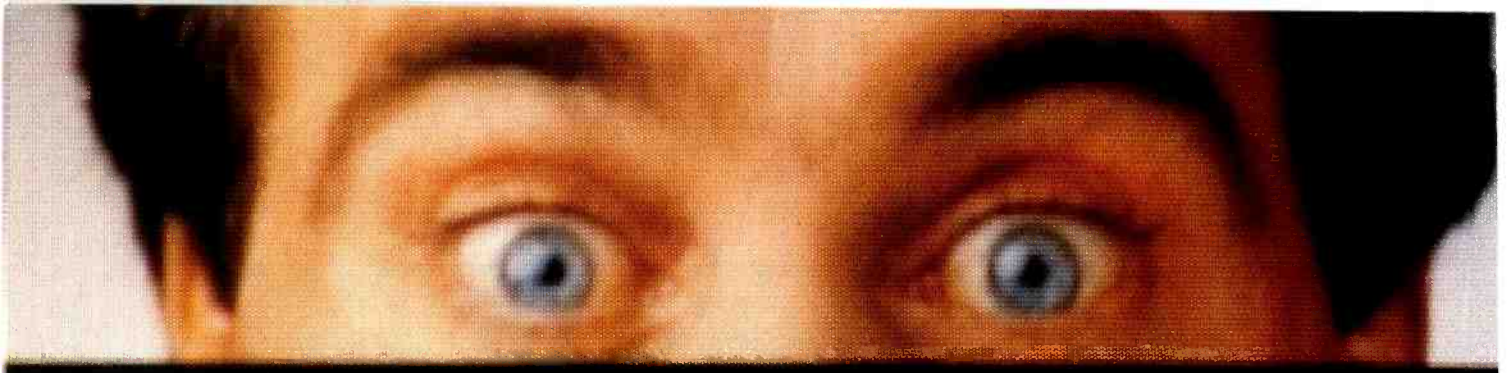

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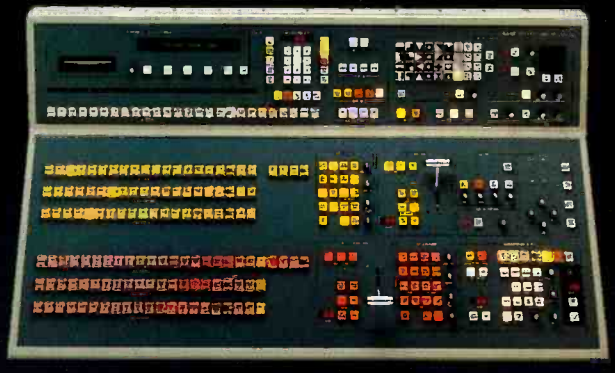

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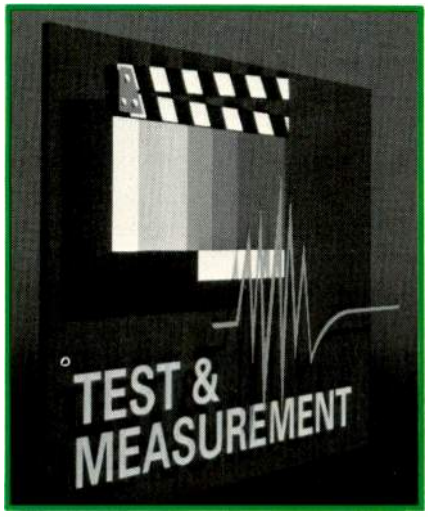

BM/E
BROADCAST MANAGEMENT/ENGINEERING

OCTOBER 1987 VOLUME 23/NUMBER 10

58

70

Features

25 TV Engineering & Production
Dealing with Differential Nonlinearity in Digital Video
With digital processing of video signals on the increase, distortions unique to digital video have become a significant concern. Proper test procedures help to eliminate distortion . . . *by John Edwards*

37 Audio Engineering & Production
Acoustic Analysis for Broadcast Production 37
Creating a balanced acoustic environment is essential for quality sound in TV and radio. Thus, the room itself is commanding center stage in many facilities' audio upgrades . . . *by Steven Schwartz, Radio/Audio Editor*

AM Stereo Equipment Performance Measurements and Procedures 47
In the world of radio today, AM stereo remains one of the most popular topics. Checking system performance is critical to a successful transmit plant . . . *by Thomas Wright, Chris Wilk, and John Bisset*

55 Transmission/Distribution Engineering
Testing the Earth Station
For broadcasters, satellite earth stations have become indispensable. Keeping them up to spec is essential, and the work involved depends on how they're used . . . *by Brian McKernan, Television Editor*

65 Broadcast Management
SMPTE '87—Imaging and Sound: Today and Tomorrow
The accent at the 129th technical conference is on examination and discussion of the essential issues of new and evolving television technology . . . *Staff Report*

Departments

10 Editorial
Maintaining the Rules

14 Industry News
Radio '87 highlights

89 FCC Rules & Regulations
Minority Ownership Update

92 New Equipment

97 Business Briefs

98 Advertisers Index

Cover:
Artist David Kervinen designed this month's cover on a Pinnacle Systems Video Workstation at Penrose Productions.

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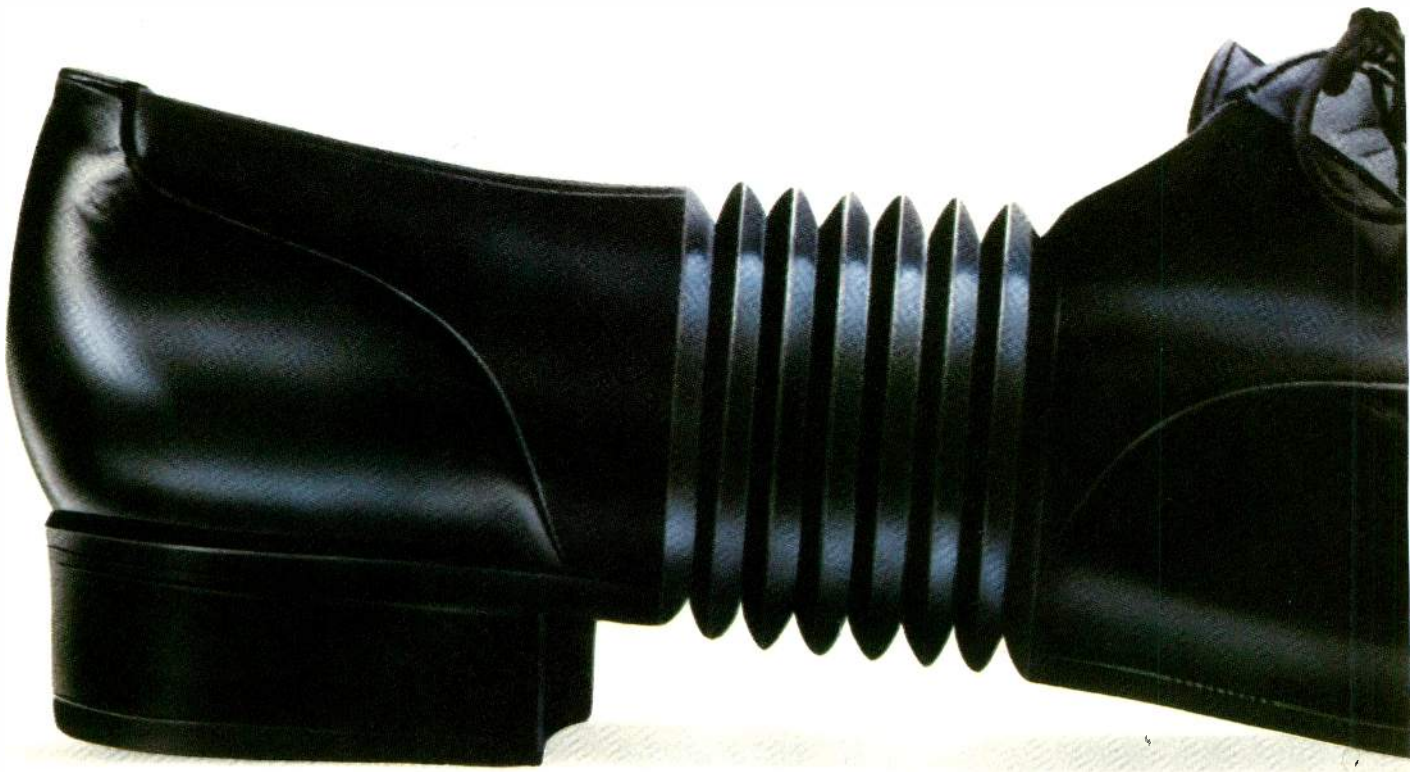

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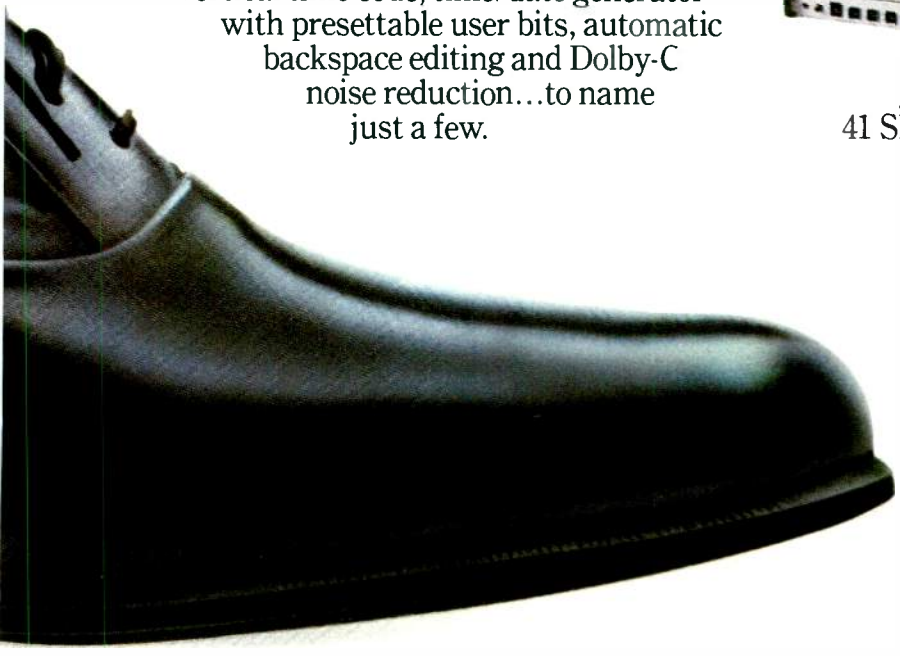

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Maintaining the Rules

"The current fervor over editorial rules and personal attack seems off the mark."

Recently, a coalition of media groups has asked the FCC to repeal its personal attack and political editorial rules on grounds that they are unconstitutional. The NAB was among the groups and released a document stating its position urging the FCC to repeal the rules or to, in effect, place the rules under its existing repeal of the Fairness Doctrine.

Congress, supposedly composed of constitutional scholars, decided that the Fairness Doctrine was constitutional and tried to pass it into law. It was later vetoed by President Reagan. Broadcasters rejoiced.

In a previous editorial, I stated my opposition to the Fairness Doctrine based on a certain clause, which states that the broadcaster must air controversial issues and not only provide opposing viewpoints, but find the opposition if one does not materialize. This seems patently absurd to me and certainly an infringement on First Amendment rights. The current fervor over editorial rules and personal attack, however, seems off the mark.

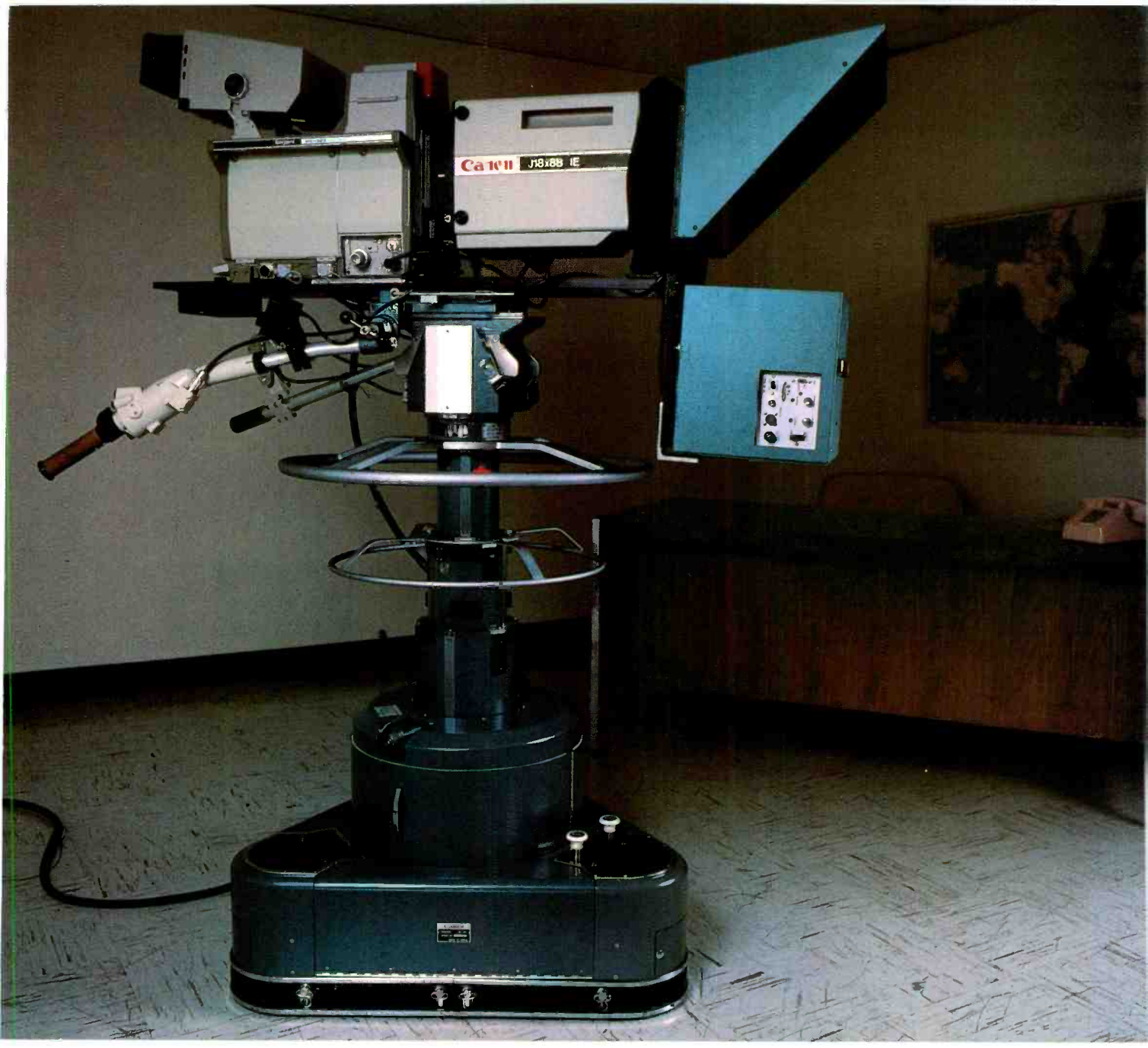
It is now the fashionable thing for any organization that wants the sympathy of the public, or that lacks a more clearly defined reason for its actions, to hide behind the very broad skirt of the First Amendment. That seems to be the case here. I do not see the personal attack rule as precluding a broadcaster from airing certain programming, nor is it intended to force a broadcaster artificially to broadcast a type of programming. It merely requires a broadcaster to notify, after the fact, a person who has been attacked on the air within 24 hours. The editorial rule requires the broadcaster to air opposing points of view if, and when, it endorses a candidate for office.

I contend that the editorial rules and personal attack rules fall outside the broad stroke of the Fairness Doctrine. I also maintain that the two former dicta are an integral part of the responsibility a broadcaster inherits along with the prestige and power of the media. We must admit that the broadcast media hold a unique influence over society and therefore require unique principals within which to execute the power and responsibility. It is too often convenient for broadcasters to hide behind the rhetoric of "First Amendment Rights" while conveniently forgetting the Public Trust part of their responsibility as licensees.

Eliminate the Fairness Doctrine, keep the personal attack and political editorial rules as separate guidelines (it can be done), and let's proceed in a fair manner executing the responsibilities and reaping the benefits of that Public Trust.

Tim Wetmore

Tim Wetmore
Editor



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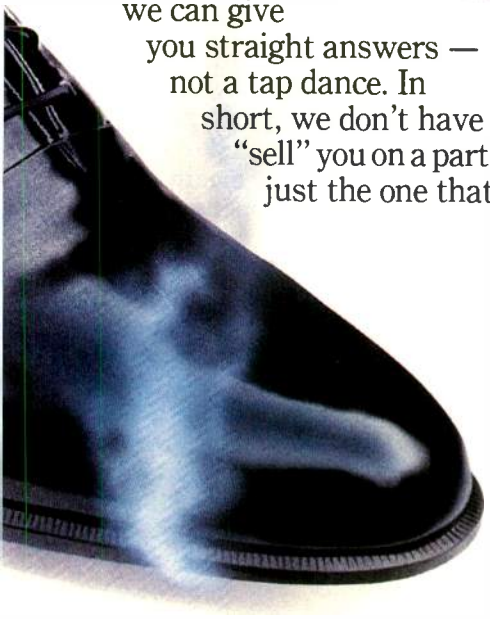

For example, while some manufacturers are starting to walk away from ¾" technology, we keep bringing out new products to support our ¾" customers.

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CBS Black for Six Minutes

More than half of the 204 CBS affiliated television stations had to cope with six minutes of dead air on the evening of September 11, when the network went black following the conclusion of CBS Sports coverage of the U.S. Open tennis tournament.

The affected stations were those that broadcast the network's 6:30 p.m. (EDT) feed of the news, which was originating in Miami as part of CBS's coverage of the visit of Pope John Paul II.

The problem occurred after the tennis game ran into the time slot of the *Evening News* by two minutes. During that time, anchor Dan Rather left the set to phone CBS News president Howard Stringer. Rather called to protest the decision to shorten the newscast.

The anchor was still absent from the set when tennis coverage ended at approximately 6:32, and did not return until 6:39 after being urged to do so by executive producer Tom Bettag. According to a *New York Times* report, the anchor believed that CBS Sports would fill the gap between programs.

Affiliates, meanwhile, had to cope with the dead air. Some stations broadcast local news, and Miami's WTVJ-TV put on a game show. KCTV, in Kansas City, MO, filled the time with a PLEASE STAND BY slide.

"We thought it was a switching problem at first," said KCTV VP/GM Phil Jones, who is also chairman of the CBS affiliate advisory board. "We've had a history of things going remarkably well with the network. It's a peculiar situation that is unlikely to happen again. But anchors in such a position should stay anchored. Rather was standing up for news, but it was a case of bad judgment. He blew it."

As for Rather himself, he was quoted as saying: "I would never . . . even think of deliberately allowing the network to go black." On Monday, September 14, the 6:30 feed of the *CBS Evening News* was totally pre-empted by tennis, and Rather anchored a slightly shortened 7 p.m. version without incident.

Crystal Radio Awards for excellence in local achievement were presented to 10 stations at the NAB's Radio '87 Convention, held last month in Anaheim, CA. Earlier this year, NAB Radio mailed forms to all stations, calling for entries in the Crystal Awards competition. The contest sought stations with a record of long-term community commitment, both in programming and active involvement in civic affairs. A total of 185 entries were received. Fifty finalists were chosen by NAB Radio, with the 10 winners selected by a panel of public-relations professionals. Runners-up received honorable mentions and certificates of achievement.

The winners are (front row, l-r): NAB Radio Senior VP David Parnigoni; former Miss California Seelchen Fiebush; Dirk Christensen, KGFW-AM, Kearney, NE; Tom Busch, KNOM, Nome, AK; Dave Robbins, KMOX-AM, St. Louis, MO; George Hyde, WQBA, Miami, FL; Jim Kokesh, KHAS, Hastings, NE; and emcee Gary Owens.

Second row (l-r): John Fieseler, WFMD-AM, Frederick, MD; Eileen McCarthy Griffin, WMAL-AM, Washington, DC; Frank Newell, KJMO/KWOS, Jefferson City, MO; Steve Shulman, WVMT, Colchester, VT; and Tish Henslee, KPAL-AM, Little Rock, AR.

The Crystal Awards are named after the old-time crystal set radios.

AM Improvement Continues

Audio and bandwidth standards set forth by The National Radio Systems Committee (NRSC) to improve the sound quality of AM radio are working even better than anticipated, recent tests have disclosed.

This fact was announced at Radio '87, in Anaheim, CA, last month. The NRSC standards are designed for use both in AM stations and in new AM receivers. The standard was meant to improve AM sound on new radios, while leaving the audio quality of existing receivers unchanged. But listeners to NRSC-compliant stations reported that they heard improved sound even on older radios.

Circuit Research Labs of Tempe, AZ, confirmed the listener claims. The NRSC also proposed additional voluntary standards at Radio '87, specifically the so-called RF mask technology to reduce splatter. These new standards would complement the current NRSC recommendations

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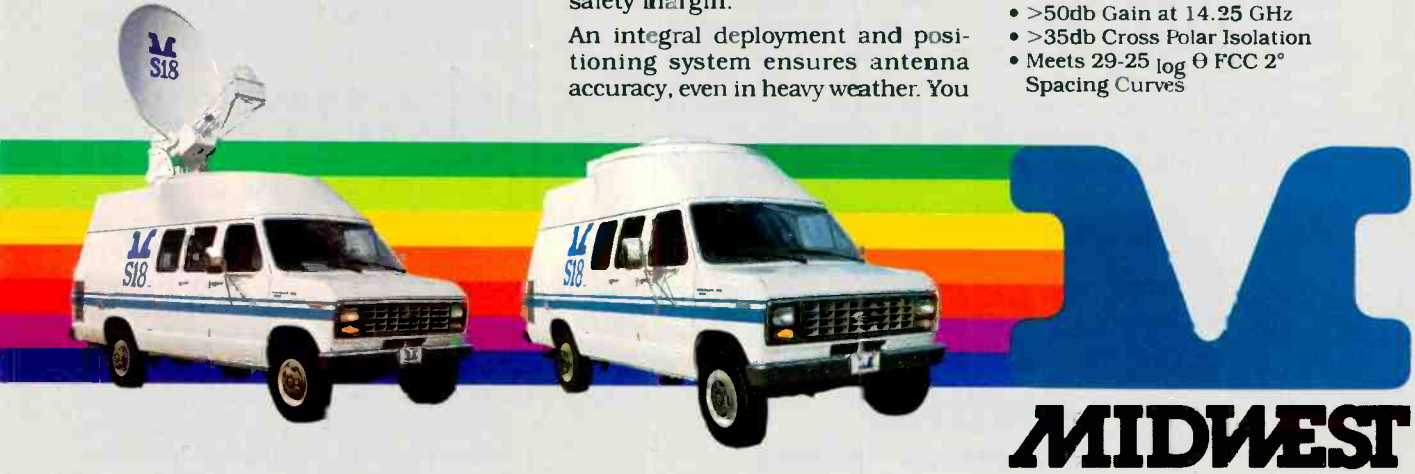

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of a 75 millisecond preemphasis curve and 10 kHz "brick wall" filter now being implemented by more than 700 radio stations.

"Together with the NRSC audio standard adopted earlier this year, adoption of the new emission limitation standard will virtually eliminate AM splatter interference, resulting in a significant technical improvement in the AM band as a whole," said NAB radio board chairman Jerry R. Lyman, president of RKO Radio. The NRSC is a joint committee sponsored by the NAB and the EIA.

Other Radio '87 Developments

In addition to presentation of Crystal Awards and developments in NRSC standards for AM improvement (see above), there were numerous other significant events at Radio '87. The three-day convention, September 9 to 12, drew an estimated six thousand participants to the Anaheim Convention Center. The equipment exhibit covered more than 27,000 square feet of space.

In his opening address, NAB president Eddie Fritts spoke of radio's responsibility to the public and also noted, "to look at radio as just another enterprise or tax write-off is contrary to the very principles that have built our industry."

Fritts also urged the radio industry to rally with a unified voice on such issues as codification of the fairness doctrine, ad tax deductibility, and campaign reform.

Individuals receiving awards at this year's convention included veteran CBS broadcaster Douglas Edwards, who was presented with the 1987 Radio Award, and NAB president Fritts, who was awarded the Health and Human Services (HHS) distinguished public service award. Given by HHS assistant secretary Stephanie Lee-Miller, the award recognizes the NAB's and the broadcast industry's "outstanding contribution in serving the needs of the public" with regard to the nation's health issues.

Digital technology continued to be a popular show subject, highlighted by the debut of a professional CD player from Shure Brothers and new syndicated material on both CD and DAT.

Florida Broadcasters Push Hard to Ax Tax

The intensive campaign waged by the NAB, FAB (Florida Association of Broadcasters), RTNDA, advertisers, the print media, and others against the state of Florida's five percent service tax on advertising is meeting with success.

Since the July 1 introduction of the tax law, over 60 media groups have canceled meetings scheduled for the state. Action has included everything from cancellation of an NBC affiliates meeting and Arbitron's annual sales management conference, to a resolution

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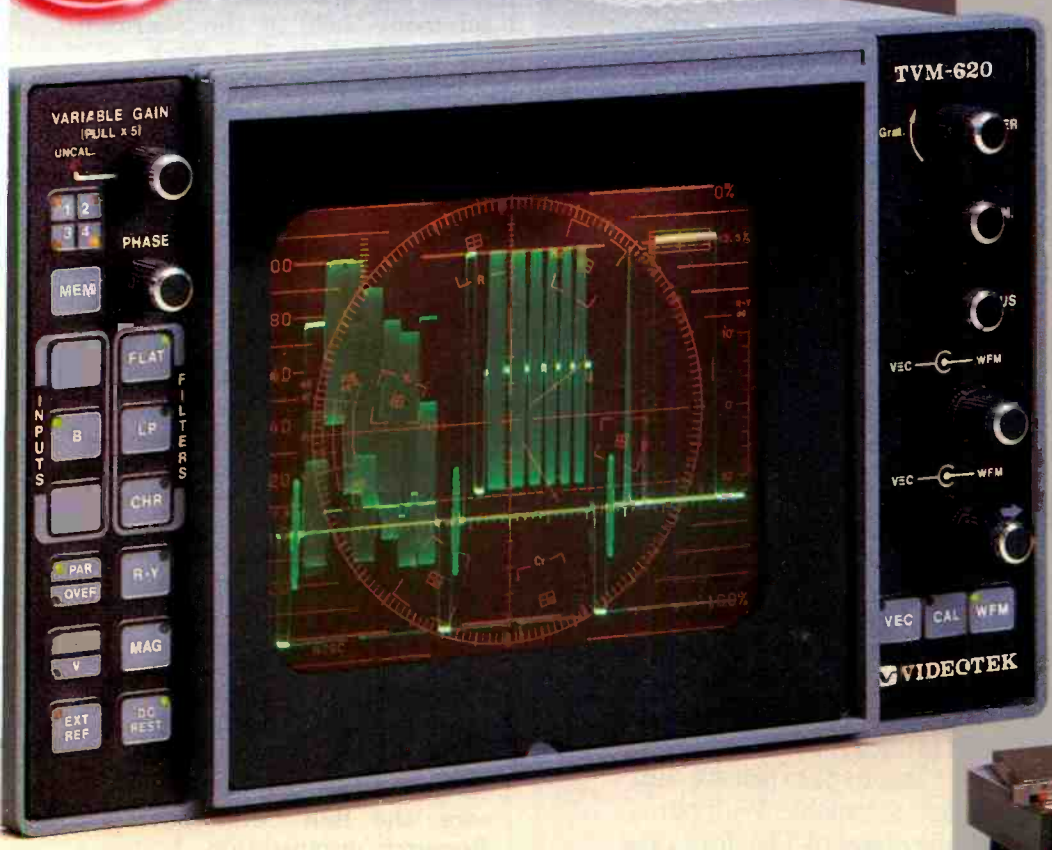

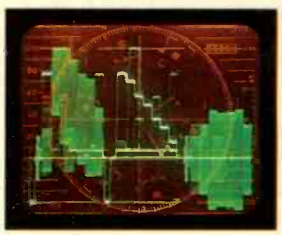

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by the New York State Broadcasters Association that its members avoid all business activities that will benefit the state of Florida until such time as the tax is rescinded.

That time may be close at hand as this issue goes to press. Responding to intense antitax pressure, Florida Governor Robert Martinez, author of the unpopular law, has called for a special session of the state legislature on September 21-23 to review the tax. "The tax has been disastrous to broadcasters in Florida," said William J. Brooks, president of the FAB and VP/GM of WPTV, West Palm Beach. "National advertisers have boycotted the state, and this has left stations with open inventory, so the tension in the market to sell decreases, and cost per thousand rates are depressed."

It is estimated that the law has cost the state additional tens of millions of dollars from cancelled conventions and meetings. Observers agree that some type of change in the tax is likely soon, whether it be referendum, revision, or outright repeal.

NATAS Scientific and Engineering Awards Announced

The recipients of this year's Emmys for outstanding achievement in engineering development were presented with their statuettes on September 16, at the tenth annual NATAS (National Academy of Television Arts and Sciences) engineering and scientific awards ceremony, held at the Sheraton Centre Hotel, in New York.

Dubner Computer Systems, Color Systems Technology, and Colorization, Inc., each won an Emmy for video colorization technology. SMPTE and the EBU (European Broadcasting Union) both received awards for their roles in developing the CCIR 601 component digital video recording standard. NASA and the Communications Research Centre of the Department of Communications of Canada were both honored for pioneering research on the application of Ku-band satellites. And the Public Broadcasting Service also was awarded an Emmy, for contributions made in the development of more efficient UHF transmitter technology.

Fiber Forum Held

Efforts to advance the use of fiber optics in broadcast television were furthered last month when Bellcore, the Bell Communications Research organization, hosted a technology requirements industry forum on the subject, in Los Angeles.

The forum, held September 16 and 17, brought together representatives of the broadcast and telecommunications industries for the purpose of discussing equipment requirements for new land-based customer-controllable multipoint digital fiber optic networks for television. Bellcore ar-

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gues that fiber is a practical, cost-efficient, digital "alternative or companion" to the analog satellite systems now used for distribution of most television programming.

In attendance at the forum were representatives of ABC, CBS, Fox, and PBS to voice their concerns on technical standards, such as the need for fiber switching controls to provide specialized or regional programming. ABC is currently evaluating an AT&T fiber optic link between its Washington, DC, news bureau and New York master control facility. Howard Meiseles, manager of ABC technical quality control for broadcast operations and engineering, delivered a paper on the network's experiences with the fiber link.

Representatives from local, regional, and long-distance telephone companies were also in attendance at the forum, a primary focus of which was cross-compatibility among fiber optic equipment manufacturers.

Bellcore engineers presented and discussed several technical advisories, known as TAs, outlining proposed fiber standards and equipment requirements. The TAs are meant to assist manufacturers in developing fiber optics hardware and avoiding future incompatibility problems.

An announcement was made at the forum that extensive regional trials of broadcast video on fiber will be conducted in late 1988 or early 1989, and that they will involve broadcasters, manufacturers, and phone companies.

Aussies to Air on APR

American Public Radio (APR) has been named as the exclusive North American distributor of programming for the Australian Broadcasting Corporation, an agreement that will offer American listeners a wide range of Australian programming, produced expressly for them.

APR serves 323 affiliate stations nationwide, and currently distributes over 210 hours of programming each week.

"We find that there is enormous interest in North America about Australia," observes Roger Grant, Australian Broadcasting Corporation GM for North America.

"There is an awareness and a curiosity about who we are, where we come from, what we think, why we are different, and where we are going," Grant says. "We are very keen for Australian artistic, dramatic, and cultural expression to be heard throughout North America. We are delighted that our old friends at APR have joined us in this agreement."

Australian programs to be broadcast on APR include an *Australia Week* special set for January 1988, to coincide with Australia's Bicentennial celebration. Other broadcasts will be drawn from news and current affairs programs, and cultural events.

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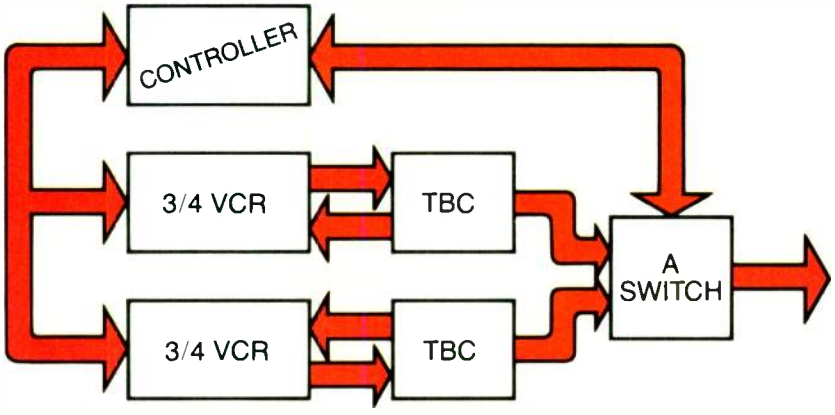

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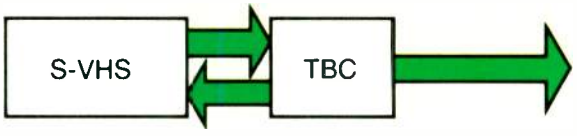

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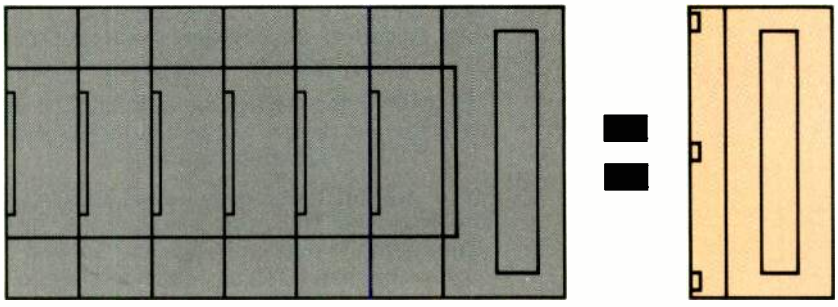

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Dealing With Differential Nonlinearity In Digital Video

With digital processing of video signals on the increase, distortions unique to digital video have become a significant concern. Proper test procedures help to eliminate distortion.

By John Edwards

Edwards demonstrates "shallow ramp" testing on a Tektronix 1485R waveform monitor.

New technologies bring with them new capabilities, but also new problems. In the case of digital video, distortions can occur in such areas as memory errors, aliasing, and differential nonlinearities. This last area is the focus of this article. Differential nonlinearities can cause visible distortion, especially in scenes with subtle luminance or chrominance and gradation. You can test for differential nonlinearities with conventional methods or with a new test signal called "shallow ramp." We'll take a look at these tests and their relative advantages, but first, a quick review of differential nonlinearities and how they distort the signal is in order.

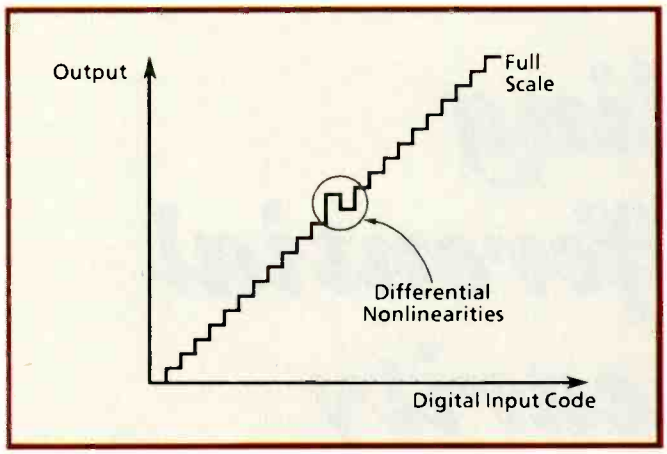

Figure 1: Differential nonlinearity.

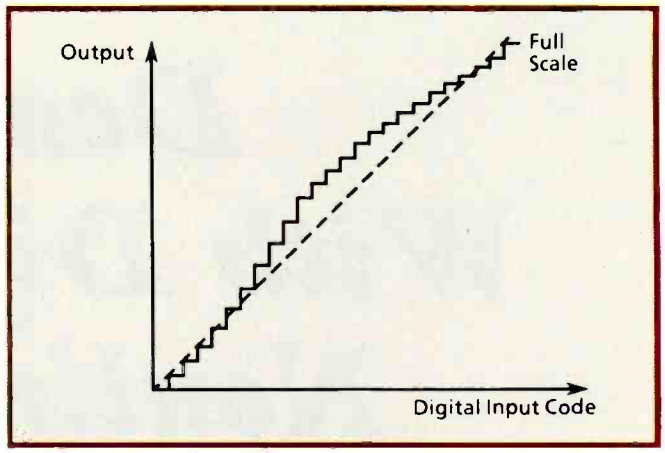

Figure 2: Absolute linearity error.

Differential nonlinearities defined

Although a bad data word from any digital device can cause a differential nonlinearity, ADCs and DACs are probably the most common offenders. These converters represent an analog voltage with a finite number of steps or LSBs. In theory, each LSB is equal in amplitude to all the others. But in reality they can vary, sometimes quite dramatically. Differential linearity tells you how much these LSB sizes vary and in which direction. Differential linearity is quite different from absolute (or integral) linearity. Whereas differential linearity measures individual step variation, absolute linearity measures the overall converter output (See Figures 1 and 2).

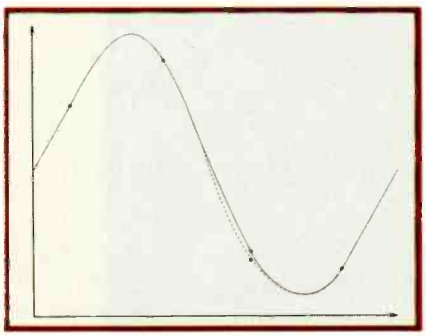

Figure 3: Differential nonlinearity causes shift in third sample of subcarrier.

The effect of differential nonlinearity on composite systems is different from that in component systems. These differences can be summarized as follows:

Differential nonlinearities in a composite system can shift subcarrier phase and gain, causing a shift in hue and saturation. Figure 3 shows an example of this. Looking at the subcarrier, you can see a nonlinearity has offset the signal level at the third sample. As a result, reconstructed subcarrier is shifted in phase and amplitude at this sample point. The error becomes more significant as subcarrier is reduced in amplitude.

The effect of this offset is the same as changing the value of the R-Y or B-Y signals that modulate the subcarrier: the resultant chrominance vector is shifted in phase and amplitude thus shifting hue and saturation (see Figure 4). You'll see later that this gives the familiar differential gain and phase errors.

Differential nonlinearities also affect component signals. But since phase in component signals isn't decoded into color information (as it is with subcarrier in composite systems), phase errors are less critical. On the other hand, gain distortion is more critical. It can directly affect color information, and the extent of the effect varies from format to format.

For component signals in GBR format, the effect of differential nonlinearity is straightforward. If, for example, the blue channel has a positive-going nonlinearity, the blue component of the signal dominates and casts a blue hue on the picture for the duration of the nonlinearity.

For component signals in Y, B-Y, R-Y or YQI format, however, the effect of differential nonlinearity depends on which channel has the error. An error in the Y channel, when decoded to GBR, affects all channels by the same amount. So it simply changes color saturation in the picture without affecting hue. But a nonlinearity error in a color difference channel is spread unevenly over the channels. For example, say a red field signal is fed to a multiformat system with a positive-going nonlinearity in the R-Y channel. The signal, when decoded to GBR format, will have an increase in the value of red and decrease in green.

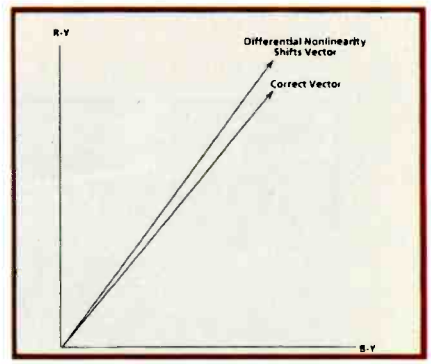

Figure 4: Differential nonlinearity error shifts phase and amplitude of chrominance sine wave. Result: hue and saturation error.

Testing

Two conventional signals for testing differential nonlinearities are the familiar modulated ramp

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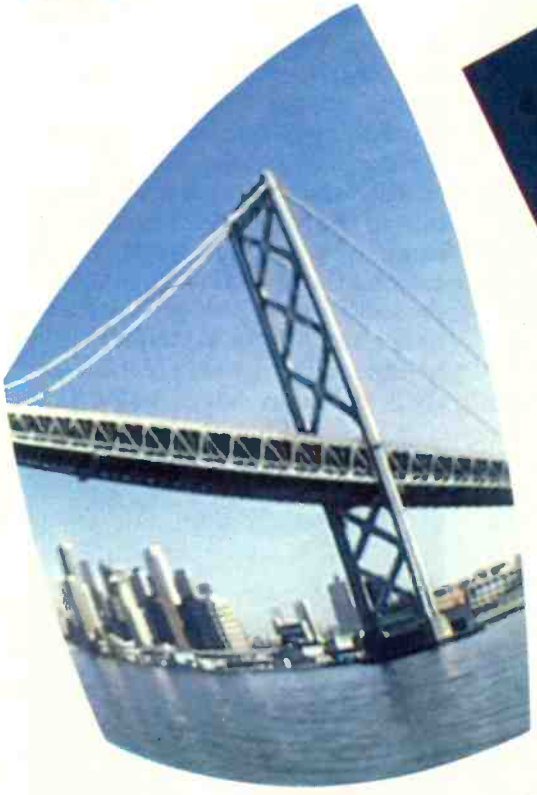

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(Figure 5) and luminance ramp (Figure 6) most commonly used in composite systems. A third option is a signal called shallow ramp (Figure 7). This signal tests differential nonlinearity in both composite and component systems.

As mentioned earlier, differential nonlinearities in a composite system cause differential phase and gain errors on a subcarrier. This makes the modulated ramp ideal for checking differential nonlinearity. The procedure is

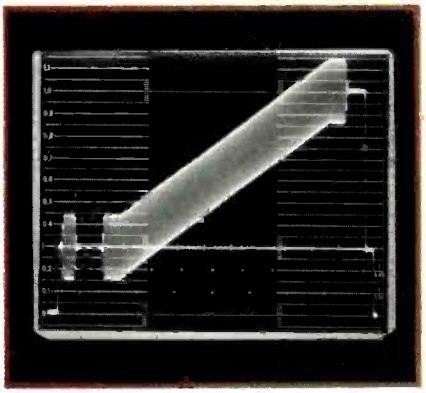

Figure 5: Modulated ramp.

simple. Just send the ramp through your system and look at the resulting differential phase and gain on a vectorscope. Looking at Figures 8 and 9, you can see a differential phase and gain display of a nonlinear DAC. In composite systems, the differential phase display is especially useful since phase errors on subcarrier translate to objectionable hue error on the picture.

(By the way, for analog systems, differential phase is commonly measured by noting the phase at the beginning and end of the active line and calling the difference between these points the differential phase error. But for a digital system, you get a more meaningful measurement by checking differential phase at all points on the line. Look again at Figure 8. At the center of the line you can see a one-degree error, whereas a start-of-line to end-of-line measurement indicated essentially zero error.)

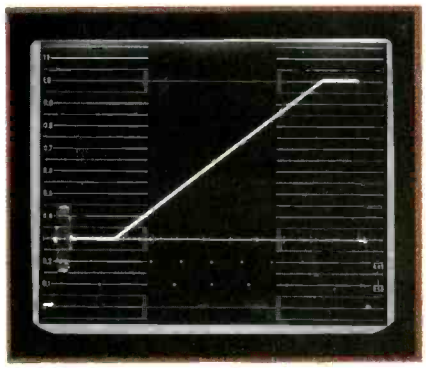

Figure 6: Luminance ramp.

While the modulated ramp provides a good quick check of the differential linearity performance of a converter, it doesn't characterize the nonlinearities well. It won't tell you what the error looks like, or which bit has the wrong amplitude. And since it also doesn't tell you how large the error is, it doesn't indicate whether or not your converter meets the usual manufacturer spec of a half-LSB differential linearity. In contrast, a luminance ramp does a better job of characterizing nonlinearities, as long as the linearities extend for several samples.

The linear shape of the luminance ramp makes nonlinearities stand out clearly. This, and the fact that it spans the full range of video, makes the luminance ramp a good test for differential nonlinearities. To test for differential nonlinearities with a luminance ramp, simply feed the ramp through your system and display it on a waveform monitor. Nonlinearities show up as a brief distortion in the ramp. With luminance ramp, you can see which bit is causing the error and what the error looks like. However, the luminance ramp fails at displaying a nonlinearity when the nonlinearity is caused by, say, a single data

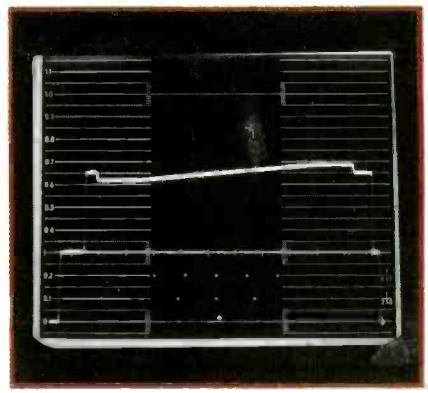

Figure 7: Shallow ramp.

word instead of several consecutive data words.

The problem is, the luminance ramp is so steep that a nonlinearity caused by a single data word distorts the ramp for only a very

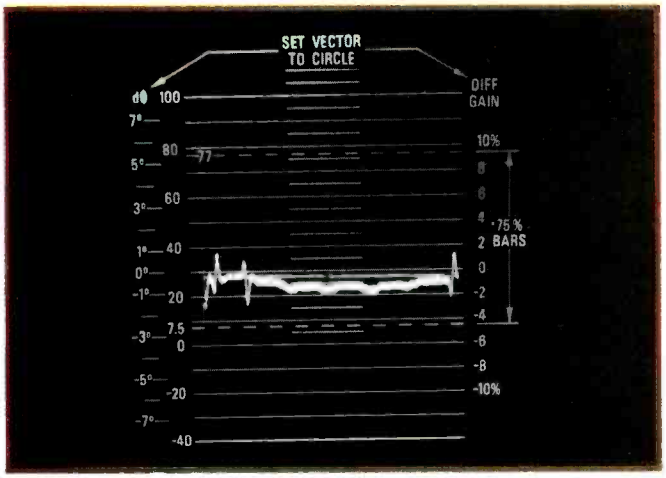

Figure 8: Differential phase.

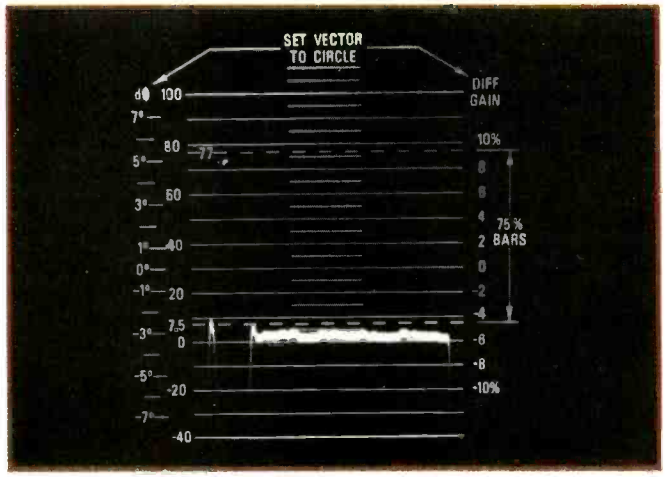

Figure 9: Differential gain.

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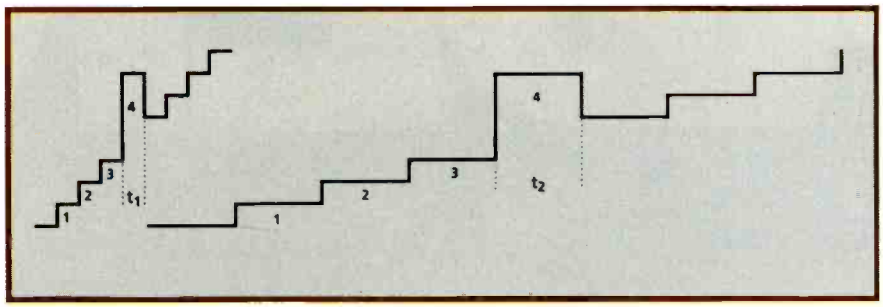

Figure 10: Differential nonlinearity at fourth step distorts the step ramp for only a short duration (t_1) but distorts the shallow ramp for much longer (t_2).

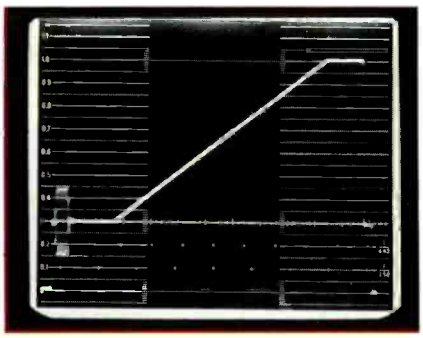

Figure 11: Luminance ramp.

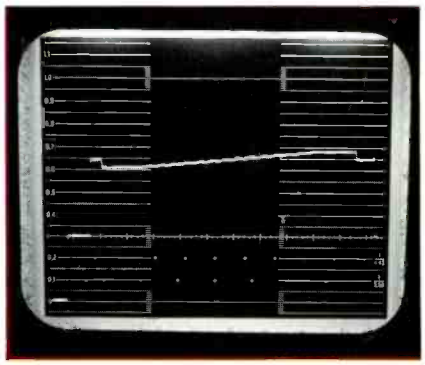

Figure 12: Nonlinearity in second LSB.

short duration. Figure 10 illustrates this. Spectral energy in the nonlinearity of the steep ramp in Figure 10 is located mostly in the higher frequencies. Since output antialiasing filters (which almost always follow DAC outputs) reject higher frequencies, they tend to hide such short nonlinearities. Of course, if the nonlinearity is extreme, some of it will get through an output filter and show up on the ramp. But clearly, the steep slope of the luminance ramp limits its ability to show short-duration nonlinearities.

Generated with 10-bit data and a high-accuracy DAC, the shallow ramp can display differential nonlinearities of both long and short duration. You can test differential nonlinearity with the shallow ramp in the same way as with a conventional luminance ramp. The only difference is that you move the shallow ramp up and down on a variable pedestal to test the full dynamic range of

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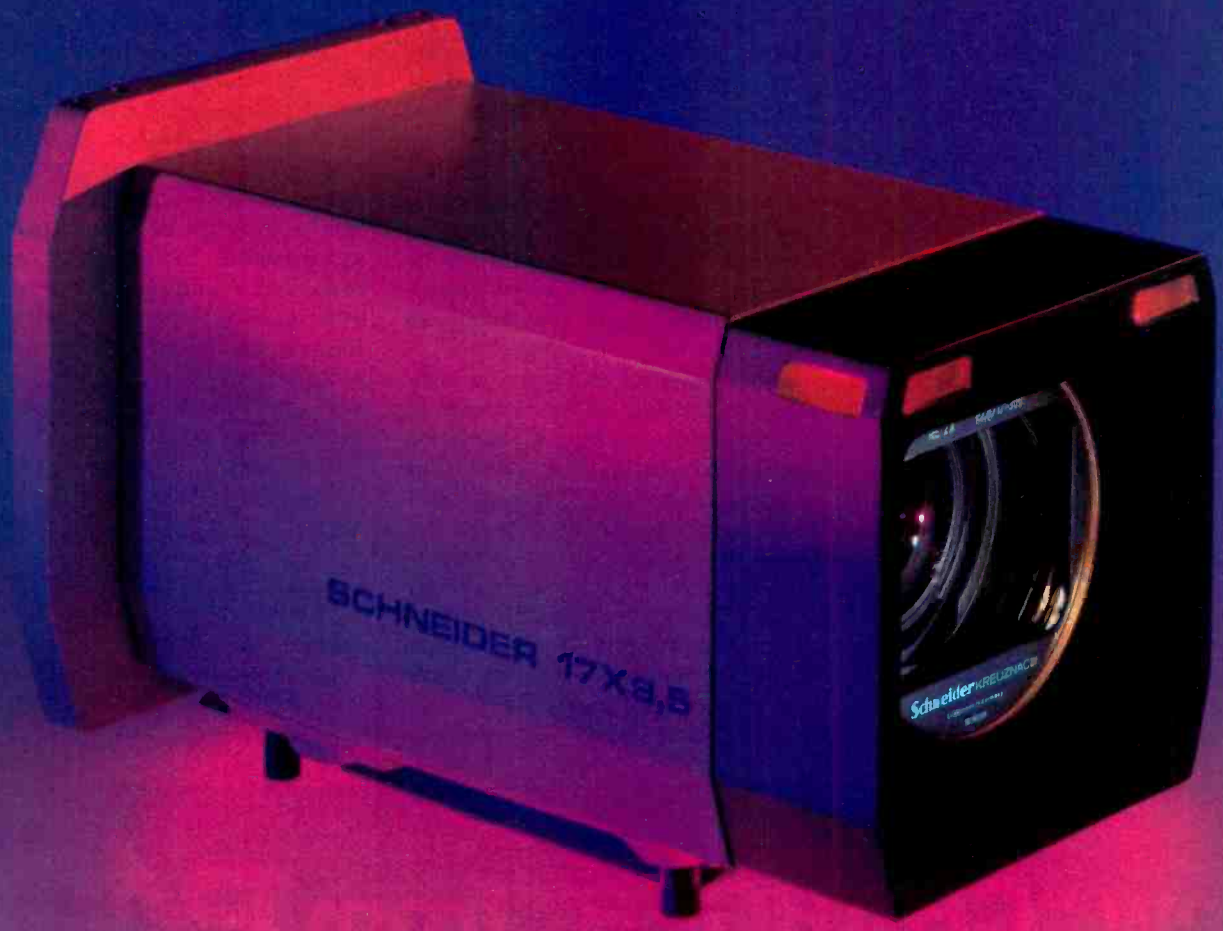

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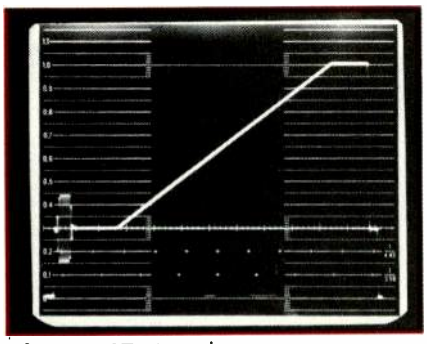

Figure 13: Luminance ramp.

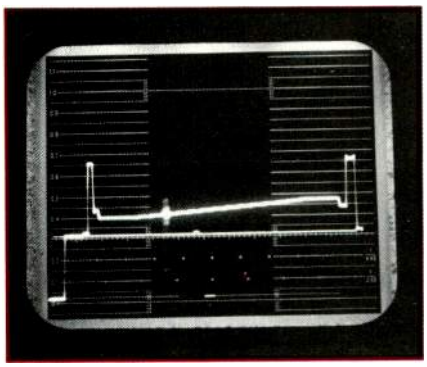

Figure 14: Data word nonlinearity.

your system.

To compare the conventional ramp and shallow ramp, look at the two examples in Figures 11 and 12. In the first, you see a conventional ramp fed through a system having a differential nonlinearity in its second LSB. Comparing this with a shallow ramp fed through the same system (Figure 12), you can see the shallow ramp indicates the nonlinearity while the conventional ramp indicates your system is just fine.

In the second example, a conventional ramp is fed through a system with a serious differential nonlinearity caused by a bad data word. Again, the conventional ramp shows no error (Figure 13), while the shallow ramp indicates a nonlinearity (Figure 14). The reason the shallow ramp works so well is quite simple. Its gentle slope effectively extends the duration of the nonlinearity error (see Figure 10), placing the spectral energy of the error mostly in the lower frequencies. This allows the error to pass through the output filter unattenuated.

Differential nonlinearities are an increasing problem. Modulated ramp and luminance ramp are both useful tests for differential nonlinearities. Luminance ramp characterizes the signal nonlinearities better, making it more useful for interpreting errors. But it only displays nonlinearities that have a relatively long duration, (i.e., for several samples.) With shallow ramp, you can detect nonlinearities of both long and short duration, which makes it a more versatile differential linearity test signal. **BM/E**

About the author:
John Edwards is a member of Tektronix's Television Signal Processing Engineering Group.

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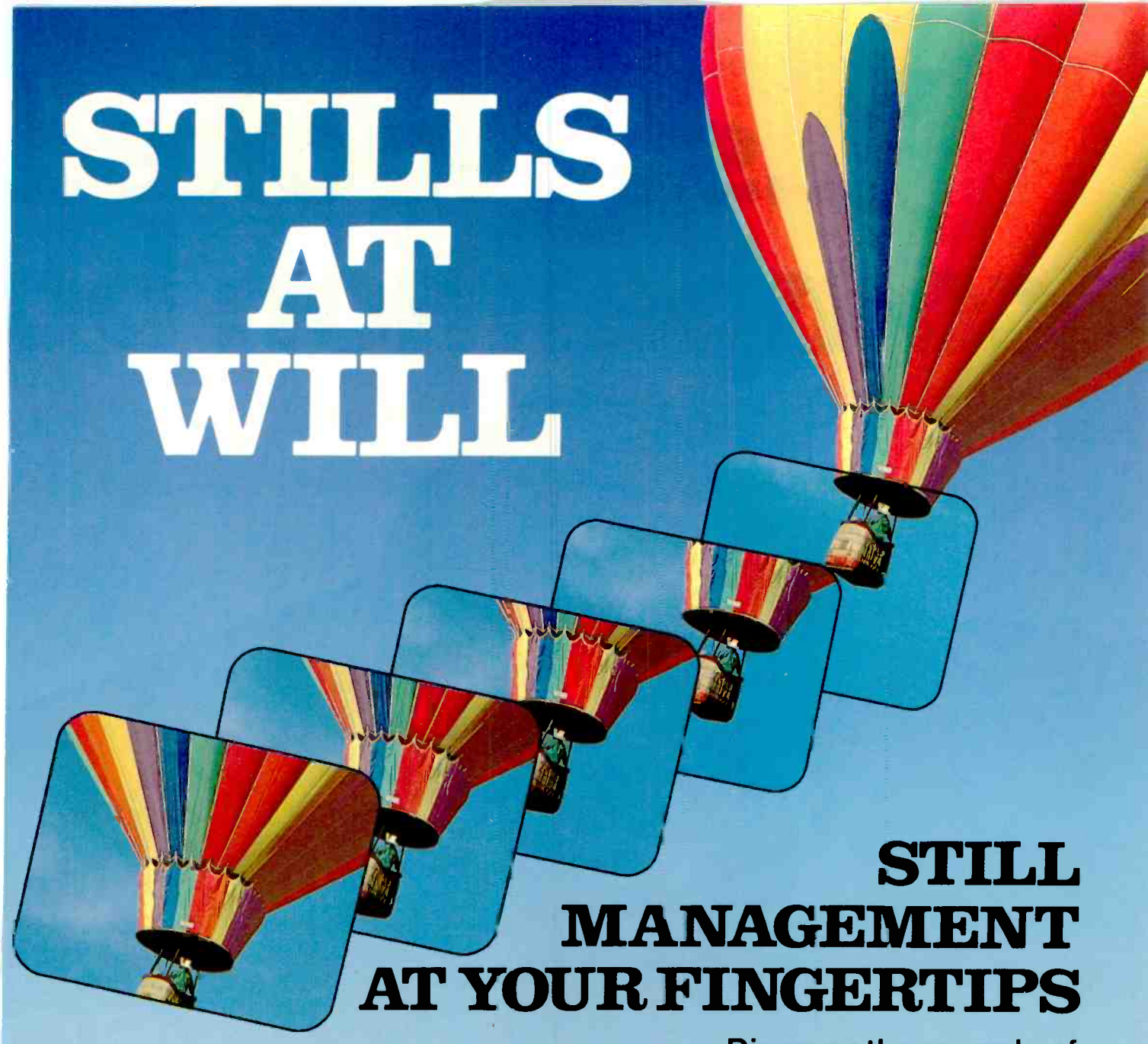

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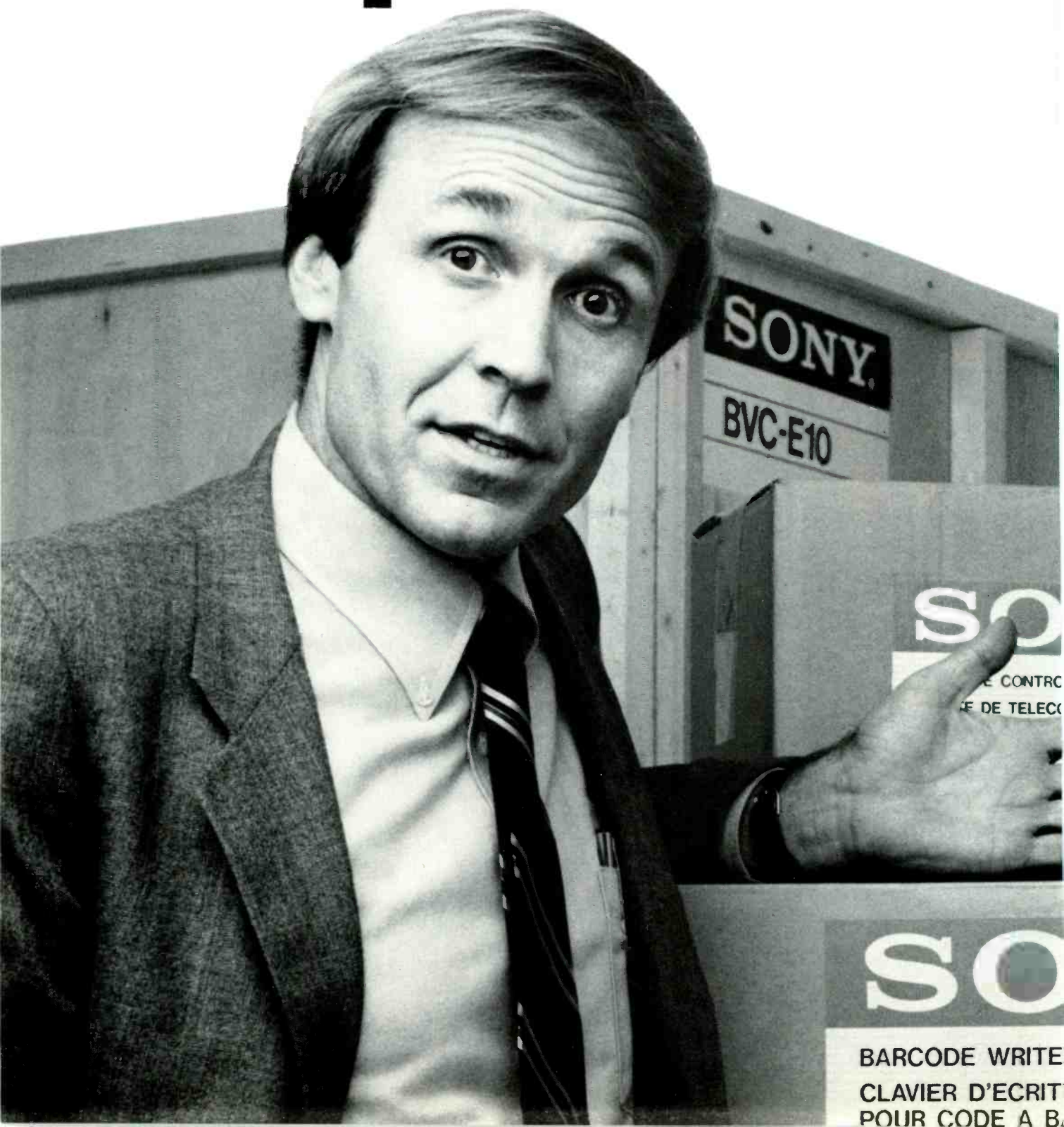

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The audio editing/sweetening room at Dallas's TeleImage video production facility features an acoustic treatment by Russ Berger.

Acoustic Analysis for Broadcast Production

By Steven Schwartz

Creating a balanced acoustic environment is essential for quality sound in TV and radio. Thus, the room itself is commanding center stage in many facilities' audio upgrades.

The impact of MTS, an audio-conscious public, and quality standards set by digital equipment has brought about some dramatic changes in the broadcast environment. In addition to equipment upgrades and new miking and mixing techniques, studio acoustics are now acknowledged as having an equally important role in determining the audio quality of stereo—and even non-stereo—TV programming. Consequently, more stations and video production studios are relying on the services of acoustical consultants in the design of new rooms and for retrofitting existing facilities.

The study of acoustic analysis is firmly grounded in the laws of physics, based on the precise measurement of soundwaves and their actions and interactions within a contained space. One of the most far-reaching concepts in the field today is a technology called Time Delay Spectrometry (TDS), which was first described in a 1967 *Audio Engineering Society Journal* paper by its discoverer, the late Richard C. Heyser of the Jet Propulsion Labs in California. Simply put, TDS is a time-sensitive measuring technique that allows on-location transfer function analysis of acoustic signals in a two-port testing system. Its ability to measure time as well as frequency permits each signal to be studied independently (ranging in time from the direct sound to the reverberations) and to ignore all ambient interference.

Two companies, Bruel and

Kjaer and Techron Industrial Products (a division of Crown International), are currently licensed to manufacture testing instruments utilizing TDS technology. Because of its "luggable," self-contained design, Techron's computer-based TEF (Time, Energy, Frequency) system, has become especially popular with many acoustical consultants. The instrument introduces a calibrated sweep signal into a "device- (or environment-) under-test" (DUT), which is then projected to a receiving transducer coupled to the DUT through a transmitting medium. The TEF signal can also be repeated with a slightly increased time offset for each sweep; the resulting graphs are displayed on the device's built-in CRT and can be stored on disk for future reference.

Furthermore, the system's software-driven architecture allows it to be continually updated for new applications (software is compatible with both the original TEF System 10 and the newer System 12). It also enables the device to perform a multitude of crucial, time-based calculations for acoustic measurement, including ETC (energy time curve), an energy (amplitude) vs. time display that identifies signal amplitude and the distance of reflections; EFC (energy vs. frequency display); PFC (phase-angle vs. frequency display); and a 3D or TEF display that combines three axes of information (time, energy, and frequency) consisting of 32 individual measurements, each taken at a slightly altered time in relation to the reference signal.

Sound designs

An industry leader currently using TEF analysis as an integral part of his work is acoustical consultant Chips Davis. Davis, who is widely known for pioneering the live-end-dead-end (LEDE) principle of acoustical design in several world-class recording studios, has similarly become a pivotal figure in the success of MTS. He has been working closely with NBC for the last two years on the network's extensive audio upgrades at its Brooklyn and Burbank facilities (see "Redesigning TV Sound: From Burbank to Brooklyn", *BM/E*, January 1985, p. 39), and is currently in the process of constructing a new control room for *The Tonight Show Starring Johnny Carson*. The association is likely to continue through additional upgrades at the Burbank studios anticipated in the near future.

The LEDE concept figures prominently in all of Davis's control room designs. This consists of a set of criteria for controlling early reflections and adding energy back into the mix position far enough back in time so they don't convolute the direct response. It is achieved via precise diffusion in the "hard" rear end and a "soft," front end with a anechoic path between the speakers and the mixing position. Davis points out that although he constructs LEDE-type rooms, the LEDE trademark is held by Don Davis at Synergetic Audio Concepts (Syn-Aud-Con) in Bedford, IN, and only certified studios can be deemed as "true" LEDE designs.

Manager of studio operations Joseph Kolb (left) and Rich Jacob, audio mixer for "The Cosby Show," in the Chips Davis-designed control room at NBC's Brooklyn 2 facility.

The classic LEDE room must meet a range of stringent requirements, including a symmetrical inner shell, a hard-surfaced rear wall, rear ceiling, and rear side walls temporally spaced to provide interwoven comb filter patterns, phase-coherent or time-aligned speakers driven by amps of sufficient power to ensure efficient voice coil control, cone damping, and adequate headroom; consistent polarity throughout the audio chain, and the elimination of reflections off the console into the mixing position—to name but a few.

Another important element in Davis' design scheme is the effective elimination of the perception of the first reflection coming off of the hard back wall. This is accomplished by use of the Haas effect, which states that the brain masks reflections arriving within approximately 10ms to 25ms after the direct sound. In large LEDE-type rooms, Davis extends the "Haas zone" by placing reflectors at an intermediate distance between the speakers and the rear wall. Room ambiance is provided by careful control of the overall energy reflecting from the rear walls, which involves temporal spacing and "appropriate" use of diffusion.

The aim is to create an effective reference listening zone for consistent mixing and accurate quality judgements. Still, assuming that a room meets all of the LEDE requirements, what would happen when additional equipment is introduced into the environment? Davis explains: "That's the importance of keeping the front of the room soft and eliminating the early reflections so that they're not causing major frequency changes. After the wave has past you, you want to diffuse the rear area so that anything that's coming back—and back into the Haas zone—has very little effect on what you're hearing.

A change of perspective

About the only thing that Davis and all other acoustical consultants agree on is that acoustic treatment today represents a radical departure from the way audio was traditionally handled in the TV studio. "There used to be this attitude of: 'Absorb everything; keep the room totally dead.' But you can't do that because it sounds completely unnatural and the reflections off the equipment can really cause serious problems," says Davis. "There has to

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be a balance of diffusion and absorption. What people don't understand is that what happens in a control room is the same thing that happens to microphones on the other end. It's essentially the same principle turned around."

"The temptation has been to throw hardware at it, because that's all you really need for upgrading video," adds Russ Berger of the Dallas-based acoustic consulting firm, The Joiner-Rose Group. "Most stations have traditionally been able to apply hardware to solve any video problems in the facility, rather than take a facility solution to solve them. But audio is an aural experience, and the room has to be figured in whenever any changes are considered."

Berger sees several areas where acoustic measurement is vital to studio design. He states that in building a new facility, one must first examine the environmental noise impact on the site. Tests are taken to determine what kind of noise levels are appropriate for the internal spaces and to dictate what kind of construction is required. These measurements produce a frequency spectral representation of the ambient noise in the space and are reduced down to a single number: the NC or noise criteria. For a studio space, it's a common goal to have a measurement of NC 15 or NC 20 (perhaps as high as NC 25). In control spaces levels between NC 20 and NC 25 are acceptable.

Vibration is another important part in the environmental noise chain. Instruments such as accelerometers are placed on the ground to gauge the amount of acceleration, displacement, and velocity occurring at the site from cars, trucks, trains, or nearby industrial noise. These measurements are used to determine how the floor is to be constructed. Sometimes the situation calls for a floating floor, which can range in price from a few dollars per square foot to as much as $60 a square foot. Thus, it's important to know what the vibration level is before initiating construction and to determine what is acceptable in the way of transmitted noise into the space.

Another essential measurement is transmission loss of walls, which is taken by generating noise in one space, measuring the ambient noise there and then measuring the sound energy that is coming through the wall on the other side. It is measured over a broad band of frequencies using ASTM (American Society for Testing and Materials) standards, which take into account the wall area and the reverberation time of the space being measured. Once again, the measurements are reduced to a single number known as the STC or Sound Transmission Class.

"Though that's a number that's very common in the industry, and most people can relate to an STC number for a degree of quality of a wall, it's somewhat inappropriate for broadcast facilities, because the STC number is really more appropriate for giving the quality of a speech transmission," says Berger. "It was originally developed to evaluate the quality of an office partition, meaning that it's primarily weighted in the mid-range area—which is primarily speech—while in broadcast facilities you have a much broader range of frequency content."

Techron's TEF System 12 provides time-based measurements for acoustic analysis.

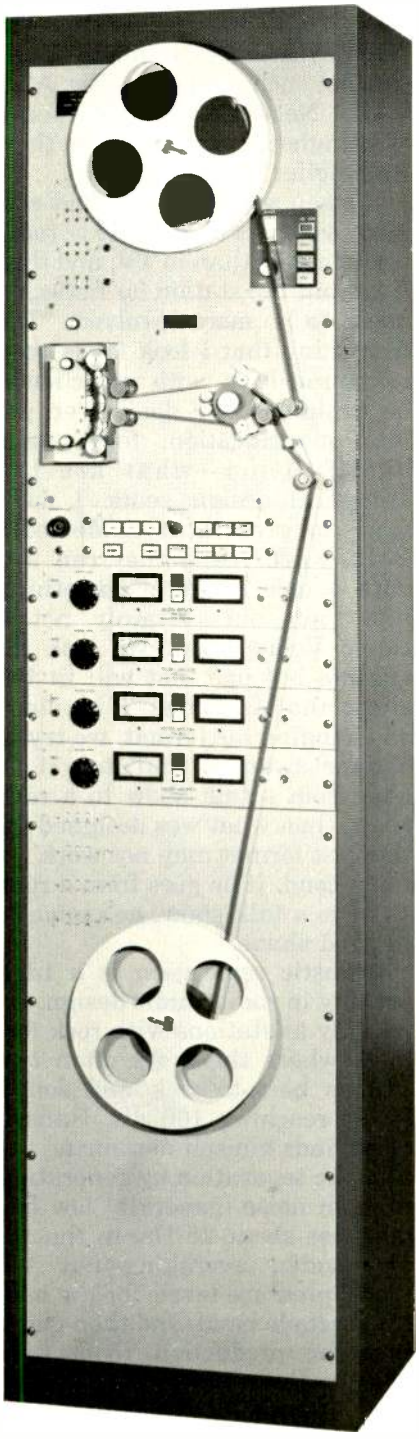
Reverb or decay time in the room is also an important consideration, although in "acoustically small" rooms (i.e., a control room), the lack of a statistical reverberant field may make it difficult to take accurate measurements. Often the readings may be so low that you wind up measuring the filters on the analyzer rather than the reverberant field. A more crucial measurement relating to decay is the temporal distribution, or the reflection patterns in a room, which can combine with the direct source to create spectral aberrations at the microphone position in the studio or at the listening position in the control room.

Some of Berger's recent designs include video production houses such as Spectrum Studios in Portland, OR, and Limelight Studios in Miami—as well as the largest independent TV affiliate in the U.S., KRON-TV in San Francisco. He points out that virtually all of the TV and video facilities that he has worked on for the last several years have been gearing up for stereo production.

"MTS has brought on radical changes. Just the nature of stereo requires that you have a lower noise acoustical floor—which involves better design, more care in construction, and usually more dollars, too. An improved noise floor is needed in both the control room and the studio, because you're usually a little bit further away from the source in stereo miking where you're allowing a bit more ambient sound into the mix to create a sense of air and image. And you've got to be very careful of what you let in to that. In addition to the lower noise floor, the monitoring end in the acoustic environment is much more critical; symmetry in the room is extremely important or your stereo imaging is lost."

Music in real time

Although Berger is also a major proponent of TDS technology, he points out that a wide variety of testing gear is often required for a thorough analysis of the studio environment. Real-time analyzers, for instance, are commonly used for measuring frequency response from speakers and other devices. A new product introduction in this category is dbx's RTA-1, a PC-interfaceable, ⅓-octave spectral analyzer, which is capable of using either pink noise or nontest signals for analysis of system frequency response.



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"There are many advantages to this approach," explains dbx research engineer and creator of the RTA-1, Don Boettger. "In a broadcast studio, it allows you to determine frequency response without having to shut down part of the system and run test signals through it. The RTA-1 can even operate with music by using a differential measurement from a reference signal—just about any broadband signal—and that would also be the input to the system that you want to test."

Berger, however, adds that there are substantial differences between real-time analysis and TDS: "RTA is time blind—it knows how much, at what frequency, but it doesn't know when in time it comes. It's very appropriate when you have a periodic or single-ended source; it's the only way you can measure some things. For instance, if you have something like degenerating noise in a room, or an air conditioning noise, it's very appropriate to use RTA to measure those types of signals—and, indeed, that's what we and others use. But the TEF machine shows you the temporal distribution, that is, where in time these reflections are coming from, and it will also indicate their relative energy levels."

At the same time, Davis notes that engineers can build their own TEF machine (one that only displays ray theory) by getting a one-foot square mirror and laying it down on top of the console. If you can see a speaker in the mirror when you're sitting in the mixing position, that's a major reflection. It will also work if you've got a set of small speakers on the meter bridge and big speakers back behind them. Put the mirror on the top or side surface of the little speaker, if you can see the big speaker, you're getting an early reflection from the large speakers.

Reflections in radio

Although much of the drama in acoustic analysis these days is focused on MTS production, the radio environment also requires an accurate acoustic balance. A leading specialist in the field of broadcast acoustics, Robert Hansen of Robert Hansen and Associates in New York, has more than 20 years experience designing facilities for such clients as the ABC Radio Network, RKO General, Westinghouse, and, NBC (in their Rockefeller Center studios).

Hansen acknowledges that economics plays a bigger role in radio assignments than in TV, and thus feels that the station (or network) needs to be more involved. "The first thing that I look for is good communication with my client," he explains. "We don't even get into quantification, first comes qualification—what are the acoustical design goals. I don't want to give them a Mercedes Benz, when really they can live with a nice Buick or something like that—but certainly not a cheap Volkswagen. We look for quality, but one that will fit the client and his format. If he plans on changing his format, we try to become aware of that, too. If he goes from a talk show to a rock show, then what was designed for the first format may not work for the second. If he goes from a rock show to a talk show, he's usually in good shape."

Acoustic separation is a high priority in radio studio design, especially at stations with rock formats where there are often two studios back-to-back and sound levels reaching 100 dB. Hansen often finds himself measuring the acoustic separation by generating random noise (generally low frequencies about 25 Hz) in the on-air studio, averaging out the sound pressure levels for the one-third octave band, and then going into the production room next door and repeating the process. The difference between the two provides him with the level of noise reduction. "We don't use STCs," he adds. "If you can manage to satisfy the requirements for the low frequencies, you'll be able to do it at 1000 and 4000 Hz. You can be up at 80 dB at 4000 Hz, which basically means you won't hear a thing."

He then examines the HVAC (heating, ventilation, and air con-

ditioning) system to make sure that it not delivering any noise into the studio. After that comes frequency response and speaker placement. He points out, however, that frequency response is much more of a concern in the production suite than in the on-air studio, and notes that the correct amount of absorption is critical to obtaining good results. Hansen also believes that speakers should be at ear level and placed on pedestals wherever possible.

Hearing and believing

It should be obvious by now that there are some rather sophisticated scientific principles at work here—as well as a high level of expertise and experience. Simply stated, there are no acoustic panaceas that will work in every room. It is also worth noting that correcting mistakes in acoustic design can be more costly than the original work—a situation that arises all too frequently according to Russ Berger. Consequently, unless you're extremely well versed in the laws of acoustics, it is advisable to use a qualified acoustical consultant. A good place to start is with the National Council of Acoustical Consultants, a nonprofit organization located in Springfield, New Jersey.

Before selecting a consultant, a station or studio manager should determine the technical and financial needs of his or her facility. For instance, what is the technical quality of the hardware you intend to use in the room? Does it really pay to build a state-of-the-art studio from scratch or can you modify an existing structure to meet your requirements? Will the market support the level of quality you desire? What kind of return can you expect from the investment?

The answers to these questions will provide you with some direction in acoustically treating your facility. Whatever your ultimate goals may be, bear in mind that acoustic awareness is an essential component of quality audio in broadcasting today. Or, to put it bluntly, what you can't hear *can* hurt you. **BM/E**

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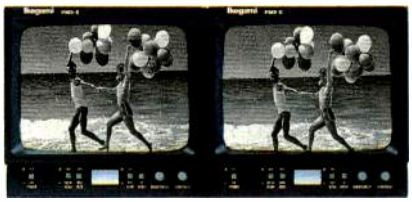
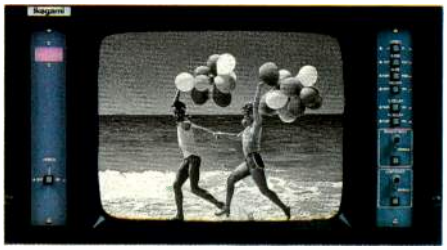


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AM Stereo Equipment Performance Measurements And Procedures

By Thomas Wright, Chris Wilk, and John Bisset

In the world of radio today, AM stereo remains one of the most popular topics. Checking system performance, above and beyond FCC requirements, is critical to a successful transmit plant.

Ask most engineers about audio equipment performance measurements or proofs and they'll tell you they are no longer necessary. For FM and monaural AM stations, it may be true that the FCC rules no longer require the extensive testing of a few years ago, however the rules still exist with respect to AM stereophonic stations. Section 73.40, *AM Transmission System Performance Requirements,* details the measurements required by the FCC of every AM station operating in stereo.

Although these proofs are not federally required of FM and monaural AM stations, station management would be advised to encourage routine measurement of these parameters by their engineering staff. This is particularly true for the struggling AM station. The last thing you want is to sound bad, while trying to survive the competition with the other stations in your market. Furthermore, it doesn't do any good to implement things like AM stereo or the NRSC equalization and bandwidth standards if the station transmits a noisy and distorted

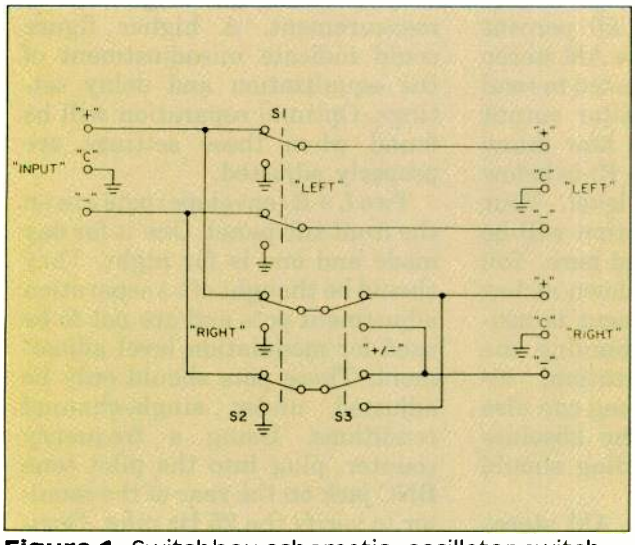

Figure 1: Switchbox schematic: oscillator switching unit.

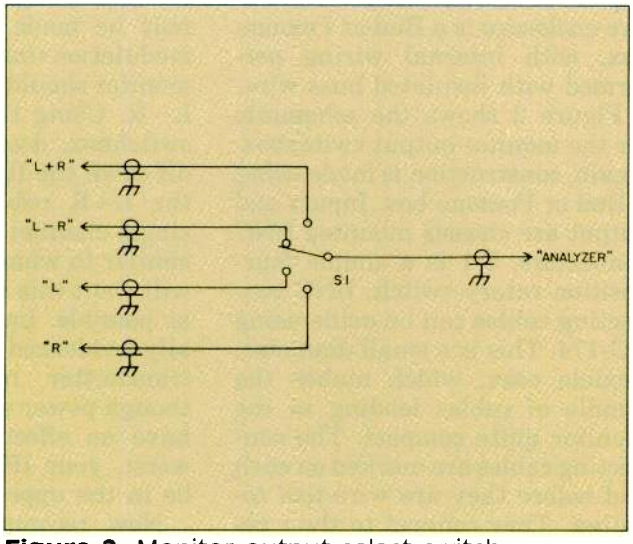

Figure 2: Monitor output select switch.

signal.

A yearly proof of an AM transmitter is much like the yearly physical for humans. A battery of tests are conducted that will determine whether the station is operating properly. For AM stereo stations, many of these tests involve procedures that are new for the engineer—especially if the AM is not co-owned with an FM. There are guidelines for the station engineer, logical step-by-step procedures for conducting these tests. The procedure detailed here has been developed after years of practical field experience by Delta Electronics as we've installed Motorola C-QUAM AM stereo systems.

Switchbox construction

The tests described may be facilitated through the construction of two switchboxes. The first, the oscillator switchbox, takes a monaural signal and provides separate left and right outputs. It facilitates left only and right only measurements, in addition to providing a means of reversing the phase to the right input for L-R signal injection. The second switchbox connects your 'scope or audio analyzer to the AM stereo modulation monitor. This box eliminates BNC cable changing.

Figure 1 shows the schematic for the audio oscillator switchbox. S-1, S-2, and S-3 are simple double-pole, double-throw toggle switches. The input and output appear on barrier strips. The entire enclosure is a Bud or Pomona box, with internal wiring performed with insulated buss wire.

Figure 2 shows the schematic for the monitor output switchbox. Again, construction is made using a Bud or Pomona box. Inputs and output are chassis mounted BNC connectors. S-1 is a simple four-position rotary switch. BNC connecting cables can be made using RG-174. This is a small diameter, flexible coax, which makes the bundle of cables leading to the monitor quite compact. The connecting cables are marked on each end before they are wire-tied together. They connect to their respective L, R, L−R, and L+R ports on the AM stereo modulation monitor. The audio analyzer is attached to the wiper of the selector switch, also via BNC jack.

With switchboxes in hand, the proof commences. Since the outcome of these measurements depends so much on the "health" of the transmitter, now is a good time to install new transmitter tubes. While inside, a cleaning of the rig may also be in order. Clean cotton rags and 97 percent alcohol can be used to remove the grime and residue that have found their way inside. Whenever working inside a transmitter, remember to contact all high-voltage points with a grounding stick, and ensure that the transmitter power supply circuit breakers are off. Disabling the remote control to the "local" or "maintenance" position is also advised.

A full mono proof of just the transmitter may now be conducted. This test should be performed using the transmitter's internal oscillator and feeding the audio signal directly into the transmitter. In this manner, any potential problems within the transmitter itself may be isolated. Although a complete mono proof may be overkill, a cursory check of hum and noise levels, frequency response, distortion, IPM, and carrier regulation will provide you with a firm foundation.

IPM checking

While operating the transmitter in this mode, a check of IPM may be made. With 50 percent modulation (mono), the AM stereo monitor should be selected to read L−R. Using the monitor output switchbox, determine how many dB down the IPM (L−R) is below the L+R reference level. Your single channel separation will be similar to what is read here. You will want this figure down as low as possible. Improvement is usually evidenced by trimming the transmitter neutralization, although power supply sag can also have an effect. At the absolute worst, your IPM reading should be in the upper 20s.

Now, reconnect the AM stereo exciter. Drive the exciter with 50 percent L+R (exciter L+R meter reads 50 percent) and check that the monitor shows a 50 percent L+R modulation reading. At this point, the front panel "balance" pot should be adjusted for a null on the exciter's L−R meter. Measure the IPM (L−R) level in dB using the analyzer and monitor output switch box referencing to the L+R level. The value should be approximately where it was during the "mono" test. If this figure changes significantly, a problem with the exciter is suspect. Should the IPM figure increase, try turning the stereo on/off switch off, and see if the IPM figure improves. If it does, the exciter must be adjusted.

The next step is to check for proper audio phasing to the transmitter. Set the switch box for a left only 1 kHz signal reading 50 percent modulation on the exciter meter. Set the modulation monitor to read right only to verify there is no signal on the right channel. This verifies that your phasing is all right. Should the phasing not be correct, the left and right monitor outputs should be observed with a scope in the x-y mode. Improperly phased audio will show a characteristic banana shaped display.

Proper exciter setup may now be verified by measuring the relative dB level of right channel referenced to left channel using the monitor output switch box and analyzer. The value read should be very close to the original IPM measurement. A higher figure could indicate misadjustment of the equalization and delay settings. Optimal separation will be found when these settings are properly adjusted.

Two L+R (envelope) pots are on the front sub panel. One is for day mode and one is for night. They should be thought of as separation adjustment pots and are not to be used for modulation level adjustment. These pots should only be adjusted under single-channel conditions. Using a frequency counter, plug into the pilot tone BNC jack on the rear of the monitor to verify the 25 Hz pilot. Deviation must be ±0.05 Hz. Pilot

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level may be checked using the front panel carrier/pilot meter. With the meter switch in the pilot position, the meter should read in the black band. As a secondary check of pilot level, remove all external modulation and verify that the monitor L – R meter reads just below –26dB. The sync output jack on the exciter will allow measurement of the operating frequency.

Test verification

Having made all these tests, you have verified that the exciter is adjusted properly, and the actual stereo proof measurements may begin. The stereo proof should be conducted with the pilot switched out.

Although the FCC requirements are for left only and right only for 75 percent, 50 percent and, 25 percent modulation, blanks are provided for L + R and L – R measurements as well. Measured distortion figures are tabulated above the diagonal line in each of these blocks; separation figures are recorded below the line. Distortion figures in excess of 3 percent are not acceptable for stereo. Higher figures may point to the modulator tubes, or misadjusted processing.

The single-channel separation figures will be limited by the IPM of the transmitter. To measure separation such as left 50 percent, drive the left only input (using the switch box) with a level to produce 50 percent modulation. Using the monitor switchbox, read the signal level in dB on your analyzer. This value can also be read off the monitor selecting the right channel and depressing the range buttons to obtain a reading. Note, however, that the monitor employs quasi-peak detectors, which will show typically worse separation numbers than external RMS detectors.

Since this figure is limited by IPM, figures of from the mid 20s to low 30s will not be uncommon. Under ideal circumstances, 40 dB may be measured.

The same procedure is then followed for the right channel. When measuring the separation at 75 percent modulation, the results will deteriorate somewhat. This is due to the fact that at this higher level of single-channel modulation, you are reaching a higher angle. The feedback circuits of C-Quam decoders, including the modulation monitor, are not as accurate under high angles.

After measuring the distortion and separation on your transmitter, frequency response may be checked. Again, the switch box is helpful in efficiently obtaining these figures. Depending on the transmitter, the response may deviate ±2 dB. These measurements are conducted using 1 kHz as the reference.

Crosstalk is measured by feeding 95 percent modulated L+R signal at all the frequencies listed. As this is done, the L – R meter on the AM stereo monitor is selected, and using the range switch, a reading is obtained. Crosstalk figures are generally in the mid to high 20s. L – R crosstalk is measured the same way, feeding 95 percent modulated L – R signal at the frequencies listed. This figure is always better than the L + R crosstalk, typically running from the high 30s to low 40s. The earlier measured IPM value and pilot and carrier frequency value can be transferred onto the proof form.

Carrier regulation (carrier shift) is measured by feeding 400 Hz at 95 percent L + R into the transmitter. Prior to injecting this tone, the carrier meter should be adjusted to zero (center scale) with no modulation. The percentage of carrier shift is then read from this meter when the tone is applied. The FCC rules require that the carrier shift be maintained within 5 percent.

Additional information may be obtained from the FCC rules, section 73.40. Through properly maintained AM stereo transmission equipment, quality on a par with that of FM may be maintained. **BM/E**

About the authors:
Wright, Wilk, and Bisset are employees of Delta Electronics, Inc., Alexandria, VA.

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TESTING THE EARTH STATION

For broadcasters, satellite earth stations have become indispensable. Keeping them up to spec is essential, and the amount of work involved depends on how they're used.

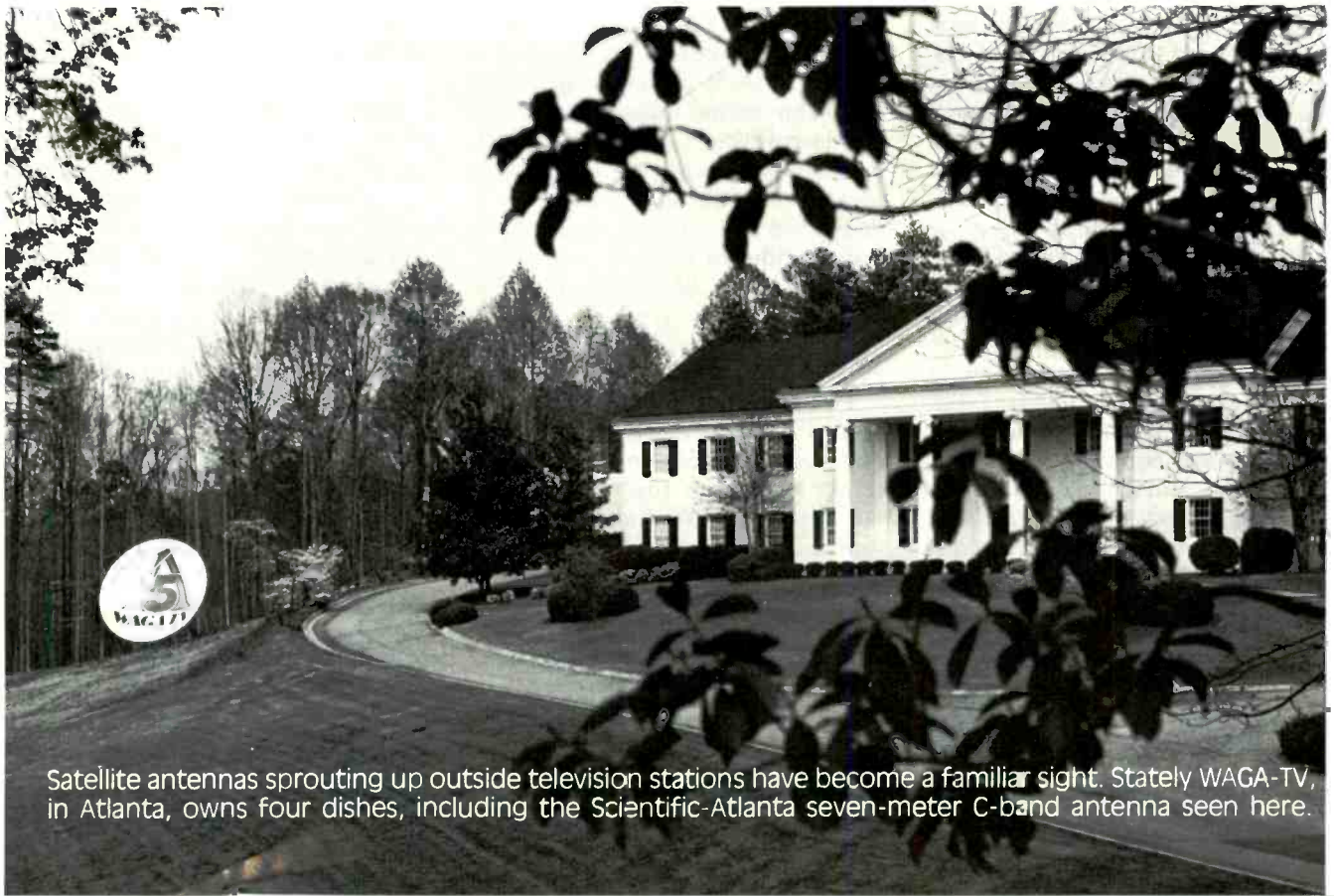
By Brian McKernan

Is there any television station in the United States that doesn't have a satellite earth station? The answer, according to a recent NAB survey, is probably not. Furthermore, the survey found that the average television station owns a total of 3.73 satellite antennas, and that doesn't even include dishes carried aboard SNVs. Receiving program and other material via satellite has long since become widespread in the television—and radio—industry, and today an increasing number of stations are getting into video uplinking as well, using both nonmobile antennas and SNVs.

Earth stations are a vital part of the modern broadcast plant, an environment in which test and measurement serves as the first defense against failure for all equipment. But despite the sophistication of the technology involved in satellite communications, operating an earth station can be a fairly simple thing from a test and measurement point of view, especially if it's a receive-only installation. After all, even the consumer today can operate an effective TVRO with little technical knowledge.

Typical testing

"We really don't do much testing of our downlink, most of that



Satellite antennas sprouting up outside television stations have become a familiar sight. Stately WAGA-TV, in Atlanta, owns four dishes, including the Scientific-Atlanta seven-meter C-band antenna seen here.

equipment today either works right or not at all," explains Lothar Merker, broadcast engineer at KOB-TV, in Albuquerque, NM. An NBC affiliate, KOB is outfitted with 11 satellite antennas for reception of wire services, Kavouras weather data, syndicated programming, and their network feed. "There's really very little to go wrong with receive-only earth stations, and as long as the picture and sound are okay, you're fine. Also, the relatively few adjustments there are on satellite receivers eliminates a problem common to many other station areas: tweaking by different operators." Merker explains that a signal-to-noise check of the blanking with a waveform monitor prior to each feed is usually all the testing that's needed.

Terry Jones, technician at WAGA-TV, in Atlanta, agrees with Merker, and explains that his station—a CBS affiliate—tests its two seven-meter C-band network dishes with a monthly testing procedure similar to what was formerly used with land lines. "It's a straightforward procedure, and it keeps the network satisfied and maintains our own confidence in our equipment. No extra testing is really needed. CBS sends us the forms to fill out, we run the tests, and mail the forms back to them."

These basic tests are done using the CBS feed's always-present vertical interval test signals, which include a line bar to test for insertion gain, or length of time needed for a signal to go from zero IRE to 100 percent video. The signal also carries a 2T pulse for checking short-time distortion, and a modulated 12.5 T pulse for measuring chrominance and luminance gain inequality and delay inequality. Video noise level is also checked by running the network's video output through high- and low-pass filters and a CCIR weighting filter, and by examining blanking level. A waveform monitor is used in these tests.

Audio level and signal-to-noise is also checked monthly. The level is tested using tones sent down by the network weekdays between noon and 12:30 PM (EST). A McCurdy SA 14023 extended-range audio level meter is used to see that the signal is at the prescribed +4 dB. The noise level check is done, of course, when no audio is present.

One additional audio test—not required by the network, but more important to stations every year—is a check of stereo phase, performed using the tones and a Ram PS 1000 phase scope. Perhaps the easiest measurement of the downlinked CBS signal, Jones points out, is provided by the station's Scientific-Atlanta receivers dedicated to that feed; the receivers provide an instant carrier-to-noise reading at the touch of a button.

M/A-Com satellite receivers mounted adjacent to waveform monitors in the transmitter control area at KOB-TV, in Albuquerque, NM.

A look ahead

The test and measurement involved in network-to-affiliate satellite communication can be relatively simple on the receive end, but perhaps the future of this form of program delivery will be simpler still. An indication of what tomorrow may hold is thought by many to be seen today in the satellite distribution system devised by NBC and Harris Corporation's Satellite Communications Division.

In this TI-free Ku-band system, affiliate TVROs have been designed with a one-watt digital status channel uplink capability to relay information back to NBC Skypath control, in New York or Burbank, via an SCPC relay on Satcom K-2. Test and measurement of TVROs and the network's eight regional uplinks is performed on-site automatically by redundant Intel controllers, which uplink status in a high-speed burst of bits for a brief period. Time-division multiple access (TDMA) enables each station to transmit its digital stream so that no two bursts overlap. Control of this TDMA system is performed by the Skypath maintenance controller, an Intel computer that logs technical problems and switches individual earth stations to backup components, if necessary.

To receive its NBC feeds, station KOB is outfitted with two Harris Ku-band antennas, a 6.1 meter and a 3.6 meter for backup. NBC's satellite distribution plans, however, also call for turning most affiliate TVROs into uplinks as well, to increase the number of locations that can transmit material to the NBC Skycom satellite newsgathering system. Member station SNVs play a major role in Skycom, but so do those TVROs outfitted with Harris PUPs, portable uplink package systems. A PUP is contained in two 125-pound transport cases that attach to the antenna's king post to minimize waveguide loss. One case contains the HPA and 160-watt power supply, the other case holds an exciter and the local Intel control module for interfacing with Skypath/Skycom computers.

Station KOB's PUP is attached to its 6.2-meter dish. "Our PUP uplinks news materials to NBC Skypath in Burbank, and they're the ones who turn it on and off," explains Lothar Merker. "Any time the network wants to get anything from us they just push a button, turn on the PUP, and we feed it to them. It's a very well designed system with a lot of backups, and naturally it's not inexpensive. From a test and measurement standpoint, the PUP is totally transparent to the station.

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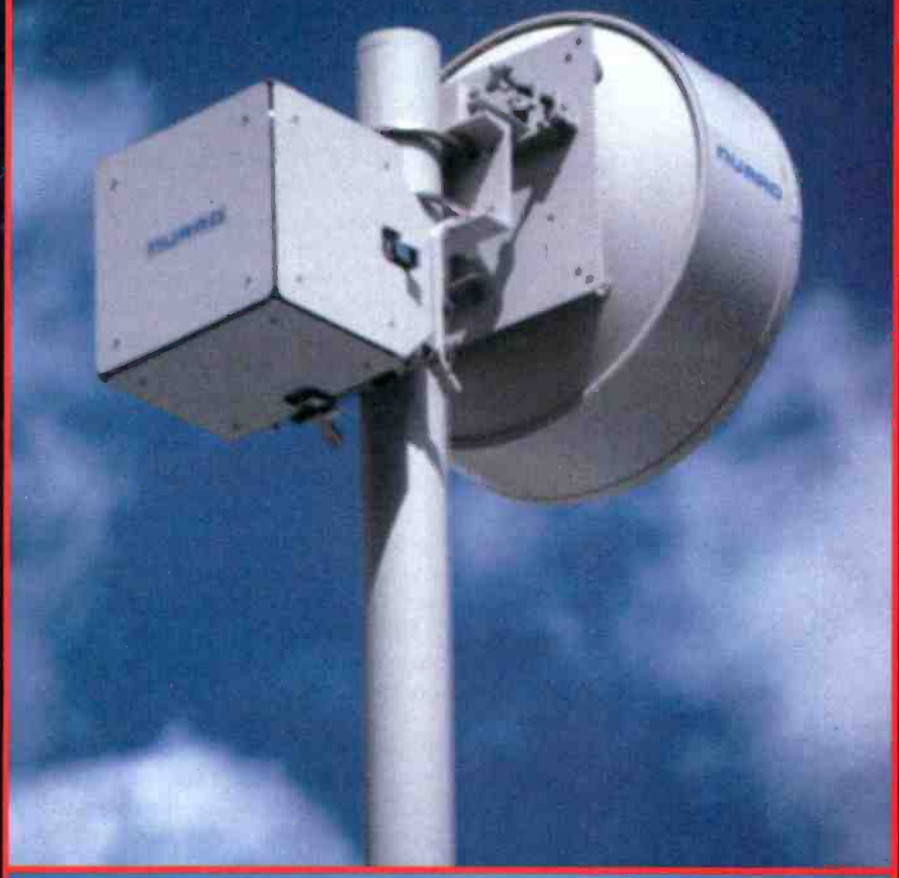

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Harris sends people every three months to perform preventive maintenance, sooner if there's a problem somewhere."

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New uplinkers

KOB-TV's uplinking activities aren't limited to its PUP, as the station also owns an SNV. The growth of SNV usage and the proliferation of satellite news cooperatives have been cited by industry experts as contributing factors in the increasing number of stations that are no longer only downlinking, but getting into uplinking as well from their nonmobile earth stations.

"I wouldn't call it a booming market, but many stations that have become familiar with uplinking from their trucks are now buying fixed Ku-band uplinks to complement them," states Dan Landreth, marketing manager at Scientific-Atlanta, a major supplier of turnkey earth stations.

"These are larger-market television stations, and often members of Conus, CNN, INN, or regional news networks. Fixed uplinks offer added convenience, and their wider antennas give better gain, are able to punch through more losses, such as in a rainstorm. After the cost of an SNV, a fixed uplink may not seem that expensive, and getting an uplink automatically gets you a downlink at the same time."

Landreth explains that although many stations install their own downlinks, they are reluctant to do so with a transmit earth station because of the greater complexity involved. The consequences of mistakes on an uplink are far more serious than those associated with downlinks, because of the potential of interference with other parties. With an uplink, not only is earth station construction more crucial, but so is the test and measurement involved.

"We supply our turnkey customers recommended test procedures and a list of test equipment to have available for both the operation and maintenance of their earth stations," explains Landreth. "The equipment includes a spectrum analyzer, waveform monitor, and in some cases a vector scope, RF voltmeter, or frequency counter, depending on the complexity of the station.

"When we do a turnkey system, including installation, we supply

NBC's Skypath facilities include a Satellite Network Management System for control of 356 antennas, 794 receivers, and 378 computers at the earth stations of 175 NBC-TV affiliated stations.

a statement of work referring to test parameters of EIA RS 250-B and antenna pattern test parameters. The statement shows the figures Scientific-Atlanta has provided in acceptance testing for qualification of the earth station as part of our installation practice.

"We normally request that the customer participates in the final acceptance test and sign-off, and he signs documents that show he witnessed that test. This enables him to see how to run the tests himself, so he could repeatedly perform those tests again for operation verification, or just a portion of the tests if he suspects some problem later."

Options

Larger earth station complexes—teleports—can, by their nature, afford the manpower and equipment to do more extensive testing than can the average television station.

Whether or not elaborate test and measurement equipment may be on hand, television stations with turnkey earth station installations can usually rely on original equipment vendors for 24-hour customer service information and consultation in the event of problems. Television stations and other uplinkers also work closely with satellite transponder management entities, such as AT&T's Skynet transponder service, in Hawley, PA, and RCA American Communications' Vernon Valley, NJ, network monitoring center. There, 30-meter antennas and sophisticated tracking, telemetry, and control computers provide detailed and constant measurement of transmissions to and from spacecraft.

"If you're an uplinker, you deal with the satellite owners on a pretty regular basis, and usually they will spot any serious problems," says Everett Helm, assistant chief engineer at KATU-TV, in Portland, OR. "During the cross-pole check prior to a transmission the transponder management people can spot if the carrier deviation isn't normal or if you're off frequency, and, of course, if your cross-pole is incorrect. We can get an evaluation from them immediately."

KATU-TV operates two C-band video uplinks at its antenna farm and transmitter site two and a half miles from its main studio. The antennas, a 10-meter Scientific-Atlanta and a 9.1- meter Andrew, sit in a TI-protecting natural depression on a mountainside 1,000 feet above the city. Five full-time microwave links serve as STL/TSLs. The station is also an ABC affiliate, and downlinks the C-band network on 7.3-meter and 4.5-meter Andrew antennas at the site, which also includes three more antennas for syndicated programming, and Group W's Newsfeed Network.

"Our receiving stations are in so much use on such a regular basis that there really isn't much reason to go through any very involved testing," Helm explains. "The biggest problem we've had is

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with the lack of standards in space. We take in feeds all day long from various syndicated sources and news vendors, and everybody pops up just a little bit different in terms of video levels, audio levels, and deviation standards. It's not a problem in most cases because our proc amps on the microwave feeds all have automatic gain control, so we can level everything out. The only thing it has to do with measurement is that it's difficult to check at any particular time of day and say, for example, that the video level is 3 IRE units low, because you never know who you're getting it from."

Helm states that the ABC network currently operates at a deviation standard of plus or minus 13.5 MHz, which improves the network's signal-to-noise ratio, but which is different from the 10.75 MHz deviation used by approximately 80 percent of the industry. The ABC standard, Helm explains, is not a problem because the network is essentially a closed loop, transmitting to dedicated dishes. But Helm would like to eventually see the industry agree on a voluntary deviation standard for the sake of simplicity.

"If we determine we have a problem in a receive system, we can do whatever testing we need to do either with existing signals on the satellite, or we can look at our own signal coming back from the bird on either one of our two regular newsfeed times, or we can buy satellite time and have Scientific-Atlanta or Andrew put up a standard test signal," Helm says. "All that's needed is pretty much normal video and audio test equipment: spectrum analyzer, waveform monitor, and audio distortion analyzer."

Uplink testing

Transmission problems, as mentioned earlier, are of course more critical than those encountered in downlinking video. KATU, like many television stations that have gotten into the uplinking business, operates a single-thread system with one transmitter and exciter going to one dish.

"It's more economical that way," Helm explains. "We primarily do occasional use business: half-hour news feeds, two-and-a-half-hour basketball games twice a week. We have the second earth station to back ourselves up with on most occasions, giving us two whole systems in parallel with each other. Frequently, we'll sell both of them at the same time, but our reliability factor is such that it's hard to make a case for real redundancy. If we can't do a half-hour newsfeed or something, there's usually another way to rout it to get it out for the customer. We can microwave it to our sister station, KOMO, in Seattle, which also has uplinks."

Checking the transmission chain prior to an uplink is crucial for stations such as KATU, and the testing tool they rely upon for this is the loop-test translator. The translator performs the same frequency change on the exciter's output that a satellite would, without actually transmitting to the satellite. The translator's RF connection can be inserted at several test points along the transmission chain to allow for testing of one or all of its components. Looped back into the receiver, the signal is evaluated with standard test equipment, which can include spectrum analyzer, frequency counter, waveform monitor, and vector scope.

"Both of our transmit earth stations are capable of running full power into a dummy load, with the signal sent through loop-test translators," says Helm. "These rack-mounted versions of the satellite enable us to look at our own signal coming back on our own receivers without even putting it through the antenna. So unless we have an antenna-related problem or a problem related to the high-power output stage of the transmitter, we can do a lot of testing right there in that closed-loop situation. Often the thing will be up there running several hours at a time, evaluating a glitch someone thought they saw.

"We use the loop-test translator before each feed. It's the one surefire way of guaranteeing that the

frequency that we're going to transmit on is the frequency we want. When the levels on the looped signal to your receiver look normal, you know you're all set to go. You just hit that button, and take a look at it, and then release it and it drops out, it goes back to snow. Now you're ready to call Western Union or whoever, get your cross-pole check, and switch to the antenna. The translator tests more than just the earth station transmitter, it also checks the microwave path from the studio to the earth station site. If necessary, we can switch different STL/TSLs to detect problems on that part of the chain."

Audio T&M

Besides video, audio for radio and other purposes is also distributed heavily via satellite. Capitol Broadcasting's Capitol Satellite dedicates one of its ten antennas—a seven-meter Satcom Technologies—to uplinking a half-dozen audio services at its Raleigh, NC, teleport. Among the single-channel per carrier audio services transmitted by Capitol are the North Carolina News Network and Seabury Music, and, according to chief engineer Charlie Bratton, these uplinks require more testing than video transmissions do.

"Because these narrow SCPC carrier levels tend to drift, you've got to balance each one individually," says Bratton. "We're working with six, sometimes seven different carriers through one HPA, and when you change the level of one it tends to affect the level of the other carriers. We check them on a weekly basis by looking at the 4 GHz downlinked SCPC signal on our spectrum analyzer, and measuring that power relative to a standard. Western Union is very good about supplying a standard signal from which to reference your measurements on; it's a clear, unmodulated carrier as narrow as they can possibly make it, perhaps 20 kc wide.

"We also check twice a year for audio distortion, frequency response, and audio signal-to-noise, using a distortion analyzer, Amber audio generator, and McCurdy audio meters. None of this test and measurement takes a great deal of time, and it provides the backbone of preventive maintenance. It's a lot easier to take up a couple of hours once a week—or even twice a year—making measurements than it is to wait until a failure occurs and then be trying to trace the problem," Bratton concludes.

Test and measurement of satellite earth stations provides down-to-earth confidence in the high-flying technology broadcasters have grown to depend upon, but the industry may see more testing of uplinks if a recent FCC proposal becomes law.

A notice of proposed rulemaking in Part 25 of the commission's rules and regulations on satellite communications includes the proposal that earth station operators perform test verification upon installation and at frequent intervals and that those results be filed with the FCC, which has not been the case previously. This requirement would affect both regular and transportable earth stations, and would include an annual verification of antenna pattern performance, a particular concern where mobile antennas—subject to the bumps and bruises of travel—are involved.

As this issue goes to press, comments and second comments have been filed, with some segments of the industry proposing modifications to the wording of the new rules, citing undue hampering of the industry if the law is passed. The FCC may reach a decision by the end of the year. In the meantime, test and measurement of earth stations operated by broadcasters continues to be performed diligently, and in the tradition that has made American television technology the model for the world. **BM/E**

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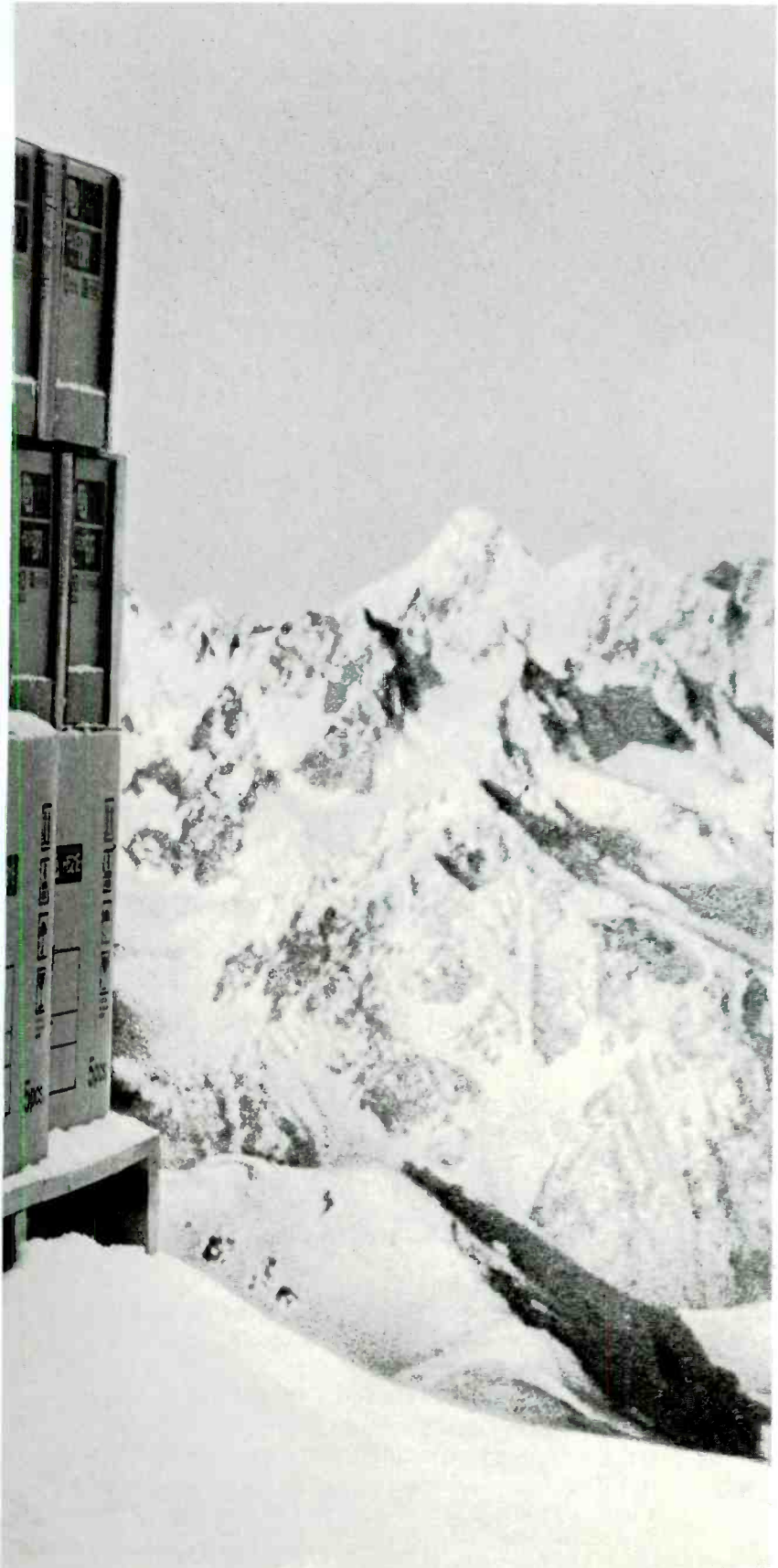

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SMPTE '87

Imaging and Sound: Today and Tomorrow

Although it commences on Halloween, a day known for its tradition of tricking and treating, this year's SMPTE fall conference is aimed at eliminating the trickiness and pitfalls stemming from industry uncertainty over new technologies. Instead the show is intended to treat everyone to the positive effects to be gained from an active interchange of experience and ideas on new hardware and standards in television, teleproduction, and film.

"We want to present all the issues," explains Frank J. Haney, director of television facilities for Capital Cities/ABC and this year's SMPTE program chairman. "In line with that, papers will be presented on today's technologies, and on those that can have a big impact on the television, teleproduction, and movie industries tomorrow. This includes items that are in early stages of development and those that are just around the corner."

The accent at the 129th technical conference is on examination and discussion of the essential issues of new and evolving television technology.

Program Highlights
Page 66

Product Review
Page 70

Exhibitor Listings
Page 86

As always, SMPTE's role as a means of setting standards necessary for progress is complemented by the organization's yearly fall conference, which provides an essential forum for information exchange. Equipment exhibits and technical sessions and papers will offer a wealth of data on hardware, standards, and methods that promise to have an effect on the future. Standards have an impact on technology, and technology in turn has an impact on the marketplace, but standards won't be stressed at the conference this year.

"We have no intention to push standards, the intent is to let

standards issues evolve unto themselves," Haney says. "We're putting forth a broad enough spectrum of topics so that we can appeal to a wide gamut of interests. We want to get into the forefront of the issues and present all sides. For instance, there will be a panel discussion on computer-aided design (CAD) of television systems through the use of PCs and minis. This is having an impact on the kinds of people that make up the designs group for systems. Today the industry is seeing more computer people and fewer draftsmen.

"With fiber optics, the telephone companies are proceeding with development of a scheme for handling video over fiber that broadcasters might not be aware of. We want to get that out onto the table before the phone companies get too far along and forget something essential in fiber for broadcast."

Fiber optics is among the topics that will occupy full technical sessions at SMPTE; other subjects include the ES bus, and HDTV (see accompanying sidebar on session topics). These are just some of the hot topics that this year attracted a record number of papers, despite an early (June 15) cutoff date. As a result, triple sessions will be held at the SMPTE conference for the first time ever. Haney explains that every attempt has been made to organize the sessions for minimum conflict of subject-matter interest.

Once again the Los Angeles Convention Center will be the site of the SMPTE fall conference. The Saturday, October 31 opening session keynote speaker will be Daniel E. Slusser, of Universal City Studios. As of this writing, a total of 247 exhibitors are slated to appear (see accompanying exhibitor list), and there will also be a full schedule of SMPTE engineering and administrative committee meetings, the society's honors and awards luncheon, and other activities. The conference will conclude on November 4.

SMPTE Exhibit Hours

Saturday, Oct. 31
2:30 p.m. to 6:00 p.m.

Sunday, Nov. 1
10:00 a.m. to 6:00 p.m.

Monday, Nov. 2
9:00 a.m. to 7:00 p.m.

Tuesday, Nov. 3
9:00 a.m. to 5:00 p.m.

Technical Program Highlights

Saturday, Oct. 31

Morning
Opening Session

Afternoon
Archival
CAD Panel
1988 Olympics

Sunday, Nov. 1

Morning
Film & Lab Technology I
35mm HDTV Tranfers
Image Processing

Afternoon
Film & Electronic Production I
35mm HDTV Transfers
Fiber Optics

Monday, Nov. 2

Morning
Film & Lab Technology II
HDTV I
Digital Signal Distribution

Afternoon
Film Laboratory Practice
HDTV II
Post-Production I

Tuesday, Nov. 3

Morning
Film & Electronic Production II
35mm HDTV Transfers
Enhanced NTSC/Compatible HDTV

Afternoon
Audio, Film
35mm HDTV Transfers
Beyond the Cathode Ray

Wednesday, Nov. 4

Morning
Audio, TV
Post-Production II
Video Recording

Afternoon
ES Bus and Panel Discussion
Post-Production III

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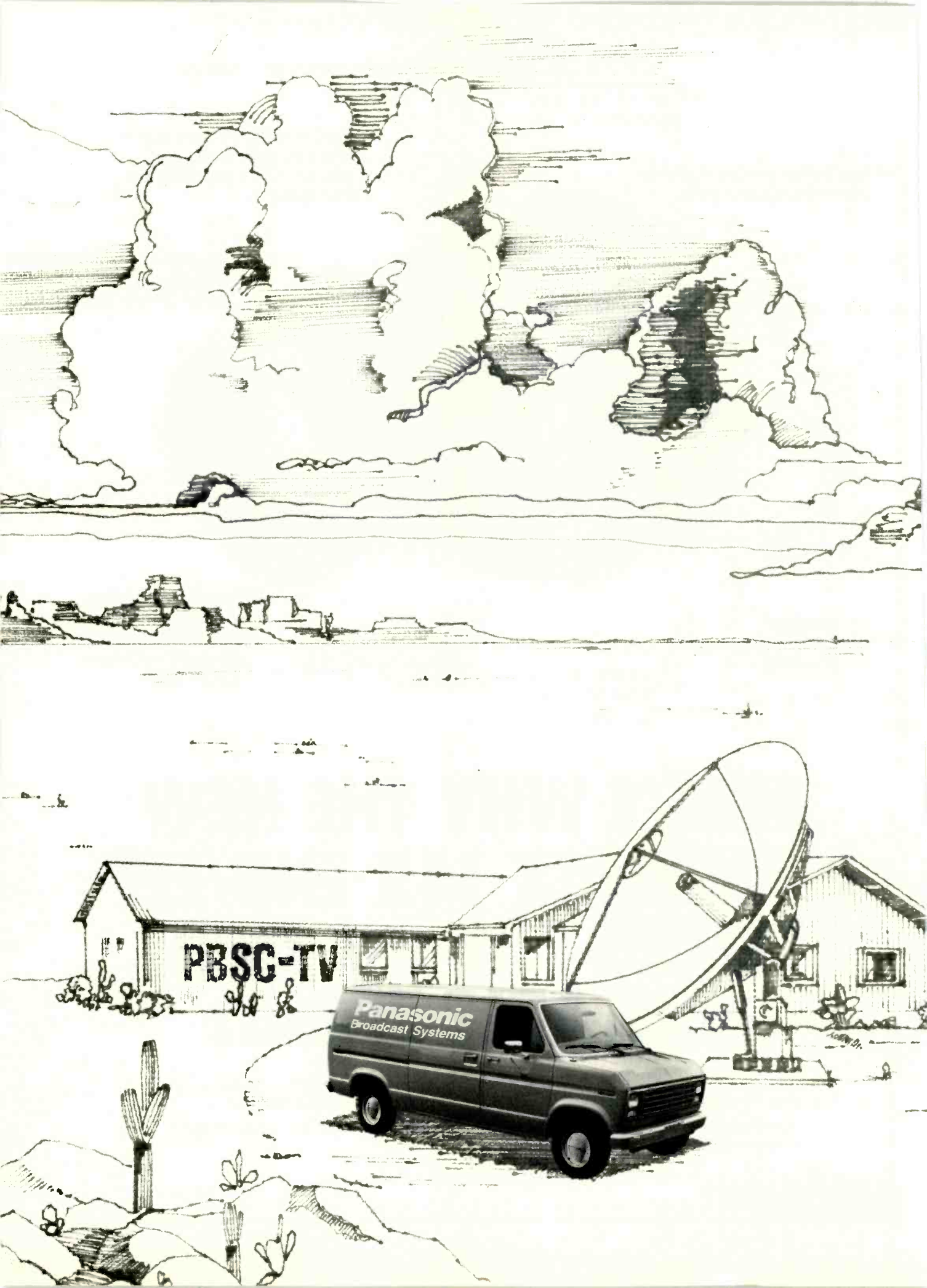
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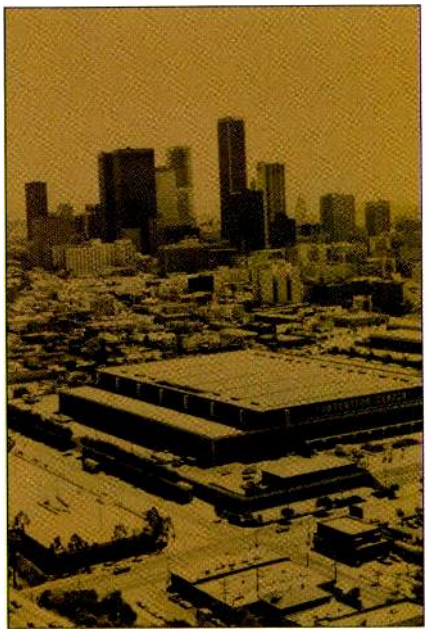

SMPTE's 129th Technical Conference and Exhibit

Previews of Product and Market Categories

The Video Viewpoint

Cameras

Heading into the last quarter of the year, it's apparent that two separate threads of development have come into general industry acceptance in the camera area. One is the CCD camera, and the other is the tremendously positive response to the ⅔-inch studio camera. Though these two trends are being met with parallel changes in the lens manufacturing sector, the acceptance of the cameras must come first.

On the subject of industry acceptance of the CCD camera, manufacturers have begun to throw their hats into the CCD ring, and camera brands and models are proliferating. Over the last year or so the number of production model CCDs has more than doubled, creating both confusion and opportunity.

Unlike past SMPTE conferences, this year will see significant new introductions, especially in the realm of CCDs. Sony will surprise attendees with the introduction of its new BVP-50, a technological departure from its current BVP-5. The well-known BVP-5 (a model that will continue to be available) is an interline-transfer design, but the new BVP-50 is based on frame-interline technology. This is the same technology used in NEC's SP-3A. Unlike the SP-3A, Sony's new BVP-50 has a standard RGB configuration. The BVP-5O, more expensive than the BVP-5, features a six-position electronic shutter speed control switch, offering advantages in still-frame and high-speed work.

Three more new products will also be offered by Sony. The first is a camera control unit for the BVP-350, which is Sony's ⅔-inch high-end production camera, now being delivered to the marketplace. The new CCU provides system flexibility because it will also work with the new CCD camera. Also new from Sony is the CA-50 adaptor for cabling between the BVP-50 and the new CCU, which will give full remote-control capability. Last but not least, Sony will unveil a prototype CCD camera with switchable infrared mode. This feature will exploit the low-light characteristics inherent in CCDs, and should be suitable for ENG night work.

Well known for its own interline-frame transfer CCD technology (ideal for eliminating vertical smear) is NEC, and they will bring their popular SP-3A to SMPTE. The SP-3A can marry directly to a Betacam recorder or, with the new MII adaptor, can take Panasonic's AU-400. In addition to established products, NEC is expected also to introduce a production version of the new EP-3 electronic field prod camera.

Of course, Panasonic makes its own camera for the AU-400, and that's the AK-400. It doesn't require an adaptor for the MII camera recorder, and the entire camera weighs little more than seven pounds. The AK-400's variable electronic shutter minimizes lag of moving objects and permits creation of "stop action" effects.

Sony, NEC, and Panasonic aren't the only manufacturers providing CCD cameras. BTS supports the Betacam line with its own CCD product, the LDK-90 camera. Employing frame-transfer chip design, the LDK-90 features an optical shutter for elimination of vertical streaking.

Ikegami will introduce a new version of the HL-379 CCD camera, the HL-379A, which features an improved chip over the one shown at NAB. Also showing at Ikegami is the model 770 camera, which offers CCD technology at an affordable price.

Ampex will, of course, bring its CVC-5 CCD camera to SMPTE's equipment exhibit. The CVC-5 is designed for perfect integration

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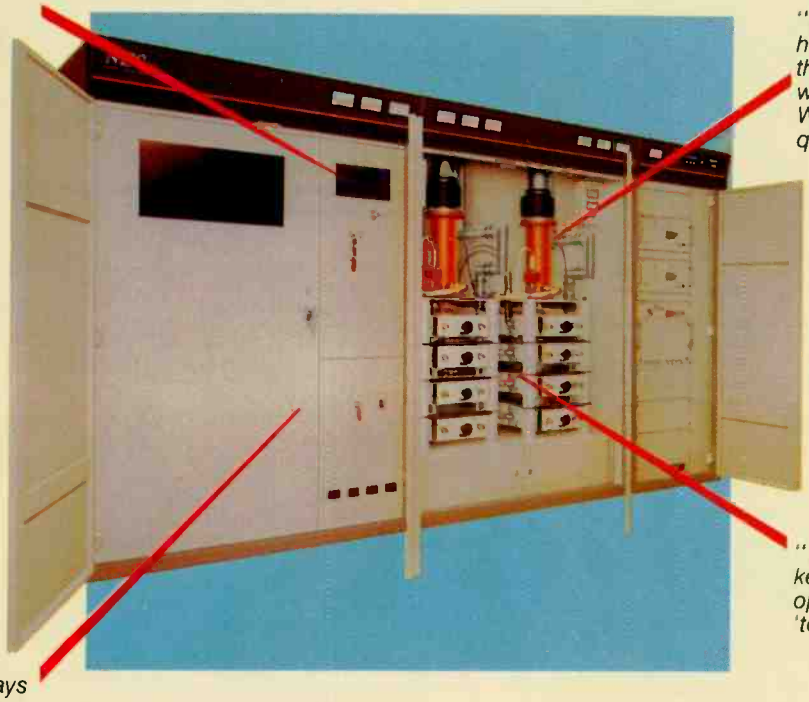

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with the CVR-5 camcorder VTR, which features Beta SP. Hitachi will show the FPC-1 CCD camera and also the new FPC-2, a dockable CCD with 650 lines of resolution.

Given all the excitement over CCDs, it would appear that chip cameras are the only things going for ENG, but that's definitely not true. Tube cameras still hold a dominant position for this type of application and will continue to do so into the foreseeable future.

Ikegami's HL-79 is a well-known example of this, and the company will show a brand-new addition in that camera series, one that offers a direct-docking feature for both Beta and MII camera recorders. It can also be used in a standalone configuration. The ITC-735 industrial tube camera will be introduced by Ikegami as well. It's the successor to their ITC 730, and features new Saticon IV tubes for lower noise performance.

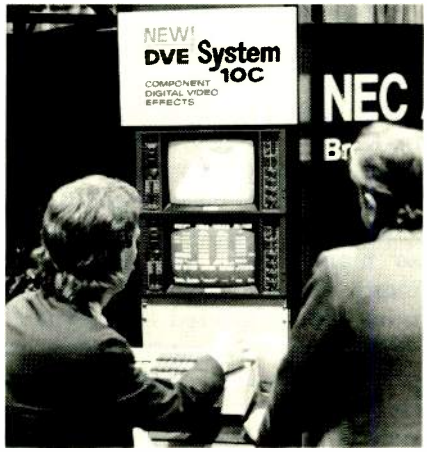
Sony's BVP-350, meanwhile, is a portable tube camera intended for high-end field production, as opposed to ENG applications. Hitachi's offering in ENG-style tube cameras is the SK-97. The company also offers the 97D, a portable version of the 970D, a ⅔-inch tube camera.

Lenses

As previously mentioned, lenses will follow the direction the cameras take. That direction most clearly is toward lighter, more efficient ENG cameras (including the CCD) and toward lighter, more efficient studio cameras (most notably the ⅔-inch tube innovations).

Attendees can expect Fujinon to continue its thrust in this area with developments for both types of cameras, and also to continue its call for standardization of the optical block in CCD cameras, allowing lens manufacturers to make more efficient and higher quality lenses for that application. The importance for standardization of the optical block in regard to CCD is that, unlike tube cameras, there is no adjustment for each individual color channel since the chips are cemented directly to the glass of the beam-splitting prism. Tubes, of course, can be carefully positioned and have tracking adjustments to correct for longitudinal chromatic aberration. All lens manufacturers serving the CCD market, including Fujinon, Canon, Angenieux, and Schneider, must address these obstacles.

Also related to recent camera development (actually more of a market development than a camera innovation) is the need for lenses suitable for use with upgraded ⅔-inch tube studio cameras. No longer relegated only to EFP, the smaller tube is now widely accepted in the studio, where lighting places different demands on both lenses and tubes. Changes in the type of glass used in the optics will most likely be the innovations shown in this area at SMPTE, as low-dispersion glass and artificial flourite are used to achieve higher performance. Canon has been a leader in glass innovations and indicates that it will continue to pursue this research.



Manufacturers continue to expand the versatility of their digital video effects systems, which are always a favorite of SMPTE participants.

Another area where Canon has excelled is in wide angle lenses, an area that in recent years has increased in demand. This is due to a broader range of applications as opposed to new camera innovations. Both Canon and Fujinon have addressed the market demand for ultra-wide angle lenses.

Both Angenieux and Schneider are leading the way in another area that is not directly related to camera matters, and that is in microprocessor-controlled lenses. Angenieux's new microprocessor-controlled lens is a 40x9.5 f1.3 for ⅔-inch tube or CCD cameras. The unit eliminates limitations pertaining to minimum object distance because of the precision of the microprocessor control focusing. Expect other microprocessor models from Angenieux at the show.

Schneider's microprocessor lens is a 16-bit design for control of optical element movement for both zoom and focus. The microprocessor also controls a floating element for optimum image formation during focusing. Schneider's technical development in this area is intended to eliminate mechanical cams and followers.

Schwem Technology will demonstrate its gyro zoom lenses, including the most recently introduced FP1, which allows the operator to pan faster than was previously possible.

Video recording

The 1987 NAB convention witnessed both a resurgence in interest for one-inch Type C recording and half-inch technologies, and there is no doubt these developments will continue to garner attention at the fall SMPTE show. More prominent, perhaps, will be the Sony display of its digital video recorder, the DVR 1000. With the larger motion picture and post house population at the SMPTE show, the all-digital studio, based on 4:2:2 technology, should receive plenty of notice.

As the technology of digital recording develops, of course, prices will change, and, along with them, features and capabilities will expand. Impacting such developments are the standards and formats, composite and component approaches to digital recording. In addition, market considerations are at work. Demand for the DVR 1000 is largely represented by production facilities,

high-end computer graphics users, and producers needing the DVR for multilayer effects use. Sony allows that it is heavily back ordered on the DVR 1000, so the high price apparently has not curtailed the digital mania.

That notwithstanding, only Sony's D-1 machine is expected to appear as a representative of available component digital product. Ampex, with its ACR-25, (which will not be at the show) demonstrates multiple machine composite digital capability, but as yet has not announced a component machine. Ampex will have a technology showing of a preliminary studio composite digital system, which with its expected savings over component digital, should command much attention. Sony has agreed to build a composite digital machine as well, adhering to the agreed-upon 4fsc composite digital format exhibited by Ampex. The Sony machine, however, will not be at the show.

Other sophisticated technology will be shown in the form of the HDTV recorder. Hitachi's international trade show schedule will preclude it from showing its prototype digital HDTV recorder, but information is available from the company. Sony, of course, continues to market its product line of HDTV equipment, including its HDVR.

The activity in the digital and high-definition arenas should not, however, overshadow heightened interest in one-inch Type C. It is widely acknowledged that the format is still the workhorse for the video industry, and it has a large installed user base. Due to the fine tuning of the technology over so many years and within so many different types of applications, it is expected that Type C will witness changes mostly in price/performance characteristics rather than in undergoing any radical innovation. This certainly holds true for this year's SMPTE convention. The innovations by Ampex in this category as represented at the show this year will be exemplified by, most notably, the Zeus video processor and software updates for the VPR line, including the popular status-at-a-glance menu.

Another area of technology advancement, besides sophisticated software, comes in VLSI development. This has manifested itself clearly in Sony's new BVH-3000. The nonsync version is the BVH-3100, with both models benefiting from the integrated circuit research efforts. Making the system better and more convenient, a built-in TBC is standard with the unit, while another aspect of simplicity includes the menu-driven software.

It is often easy to get infatuated with the onslaught of new technologies and forget the importance of existing product that continues to have a niche in the market. Hitachi maintains such a position with its one-inch Type C VTR, the HR 230, which will be on display at this year's Los Angeles SMPTE.

No less in evidence at the show will be the continuation of the half-inch wars. It currently shows no signs of abating as the Betacam group and MII camps jockey for market position. Each side, of course, has its success stories. Accordingly, new product can be expected in the half-inch area. Sony plans three new product introductions with a playback adapter permitting color playback for the BVV 5. Also new will be the component color corrector geared toward ENG/EFP applications. Many of the units in the Betacam line are intended to add quality production dimensions for the field, including quick editing features.

On the MII side, Panasonic Broadcast plans to center its display around the AK-400 CCD camera as it grows in popularity. Of particular note will be the field editing products including the AU-550 field edit recorder and the AU-A50 field edit controller. Rounding out the field editing

A message to other SNV manufacturers:

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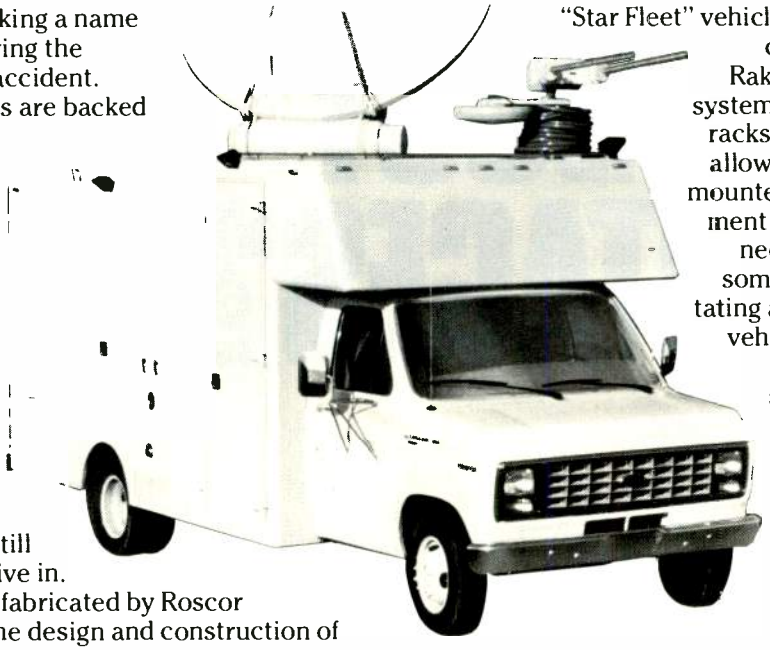

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Automation is another area that the industry will be looking at with a keen eye at this year's exhibits.

system is the AU-MX50 audio mixer and optional AU-TB50 time base corrector.

Turning to the "other" format, ¾-inch U-matic refuses to die as evidenced by the continuing introduction of product from both Sony and JVC. There are those who think that the format may be relegated to a shoot-out with S/VHS for the industrial market. Further complicating matters is the Panasonic/JVC intention of marketing the upgraded VHS to local television stations. This may be a formidable task since the installed base for U-matic in television stations is huge, perhaps close to 100 percent penetration. Still, the future for broadcaster recording applications as represented at the show should see less activity in these areas than in half-inch and Type C.

Production switchers

Along with the familiar full-size production switchers from the major manufacturers, the show will also see the new small, but full-featured, switchers drawing attention. The small-switcher trend came about for good reasons of economy and space, and also because sophisticated switching power is no longer the sole domain of big post-production houses. SNVs and other mobile units are increasingly being outfitted with these mighty minis to provide studio switching sophistication on the road.

Some of these new small switchers were designed from the ground up, and as a result feature some innovative design elements users haven't seen before. Ampex's AVC Vista switcher is a good example. Its graphics-oriented display of memory setups, transition timing, and other information offers simplified control of complex functions. An 18-input version will be introduced at SMPTE.

The 20-input Grass Valley Group Model 200 packs powerful keying capabilities into its small size, with downstream, linear, luminance, and chromakeyers provided for each M/E. Central Dynamics, Intergroup, Ross, and BTS are just some of the other companies with their own versions of small-but-powerful production switchers. Abekas has also recently entered the small switcher arena with their T8, a 10-input unit that offers over 80 wipe patterns accessed through dual pattern generators.

All of this is not to say that the larger switchers we're all used to are a thing of the past, it's just that not every user may need or be able to afford one. Expect to see the big switchers on hand, and the accent will continue to be preprogrammability, interfacing with editing systems, and increased effects capability. There seems to be few limits on what switchers can accomplish today, especially when operated along with today's digital effects units: the NEC DVE System 10, the Ampex ADO, Grass Valley Group's Kaleidoscope, DSC's Eclipse and Illusion, the Abekas A53-D, Quantel's Encore, and Microtime's RP-1 and Genesis 1 Act 1. This listing gets us into yet another product area that never fails to draw interest or make news. The roster of tricks digital video effects equipment can perform is ever-growing; don't be surprised if you see some new ones at SMPTE.

Video graphics

Computer graphics for television is, as it has been for several years,

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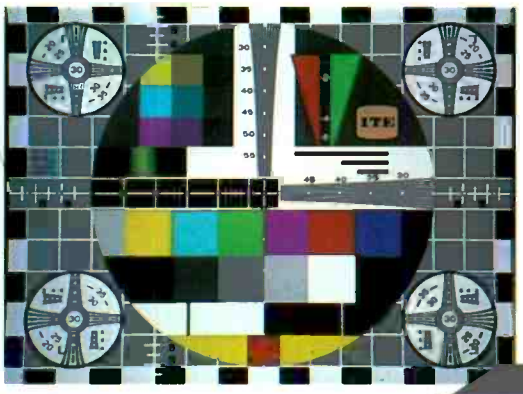

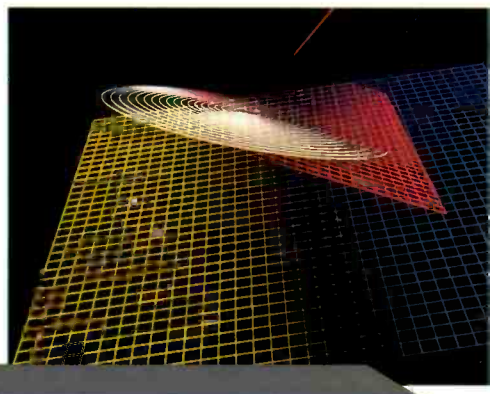

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129th SMPTE

a hot product area. Interest in three-dimensional modeling and animation, electronic paint, weather graphics, and sophisticated character generation remains keen as stations and teleproduction facilities strive to stay competitive and produce novel computer-generated images. Capabilities and prices of such equipment vary widely, but certain trends are evident.

One trend is increased processing speed. Obviously, faster is always better in a business where time is money and deadlines are inexorably tied to the clock. Greater processing sophistication is also tied to performance, and each year the lower-end products are capable of more magic, thanks also to continued software updates. No doubt at least one or two of these will be introduced for various video computer graphics products at SMPTE. Trends also include networking capability, to allow multiple users to access the same software programs.

Three breeds of graphics animal have evolved in recent years, and representatives of each of these species will be on hand at the show: powerful hardware-based units for 3D animation that also offer optional paint or still storage; products designed from scratch as integrated workstations, offering some combination of 3D and 2D animation, paint, or still storage; and standalone units dedicated to one function, such as electronic paint for station news and weather data presentation.

It remains to be seen which breed is fittest to survive, but the systems drawing the most attention may give a clue, and it's always interesting to compare what's at the current show with what was seen a year ago.

Editing and post production

Of all product categories, this is the one in which the needs of broadcast television, teleproduction, and motion picture come closest to merging. SMPTE conventions always showcase editing technologies, especially when the displays are practically in Hollywood's back yard. We'll likely see the entire spectrum of editing and post equipment at SMPTE, from high-end systems based on expensive proprietary computers to A/B roll operations driven by PC/XTs.

For the broadcaster there's a wealth of choices available, from low end to high. The modular approach is popular now, as it allows the user to choose his desired level of sophistication, and it is seen in such products as the CMX 6000, Sony BVE-9000, Ampex ACE 200, and Paltex's E series editors.

Whatever the choice, factors such as memory and software upgradeability for increased speed and system control capability weigh heavily. The faster that commands can be executed the better, and the more equipment that can be interfaced with the system—VTRs, ATRs, switchers, and digital video effects—the greater the level of creativity possible. Expect enhancements in these areas. Edit list size and sophistication, time code compati-

bility, and the ease of operation are also driving forces behind product development and refinement.

Trends in system design will continue to be in evidence: editors that incorporate videodiscs for fast, random access (disc cost remains problematical); computer keyboards versus dedicated keyboards; systems that are compact.

A major trend in post-production seen at last year's fall SMPTE and at this year's NAB is the development of the all-digital studio in which signals are recorded, processed, manipulated, rerecorded, etc., without ever leaving the CCIR 601 component digital domain.

Along these lines, Ampex will demonstrate a digital interface between their AVA-3 video art system and their ADO digital effects system and ESS-3 graphic composition/storage system. Manufacturers at past shows have cooperated to demonstrate the all-digital environment, which maximizes the capabilities of many state-of-the-art products, such as the Abekas A64 and Microtime Vision 4 disk recorders, and of Quantel's Harry. Expect to see the emphasis on the all-digital studio to continue at SMPTE.

Video processing

Among the many things proven by each year's NAB and SMPTE shows is that there's always something new in the area of video processing products. Improvement in the versatility and number of features in this area has come to be expected as vendors continually improve their product lines.

Time base correctors have always been essential to video editing, but special effects are increasingly being included as well, a feature especially appealing to the lower-end user who may not be able to afford the more costly digital video effects systems. Frame and field freeze are popular, too. Improvements in the error-correction capacity—the window—and memory of TBCs and frame synchronizers are also ongoing among vendors, the end result being products that offer greater versatility and transparency.

Also among the trends are combination TBC/frame synchronizers, which can be switched between correcting video from VTRs to synchronizing video from remote feeds, or even doing both simultaneously. An example of this are the smart TBC/syncs that can sense when a satellite or other remote feed is originating from a time base incorrect source, and—if so—automatically switch in the TBC function. Another feature found in smart TBC/syncs is automatic noise reduction. TBCs that can handle multiple video formats are also becoming more common, as are such features as velocity compensation and tape drop-out compensation.

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Color correctors are also increasing in sophistication, with products that offer the flexibility of being able to color- correct parts of a picture without changing any other parts. Creative flexibility is another trend; control of hue, saturation, and luma for each of six color-bar vectors is a feature of Fortel's CC-1 color corrector.

Definitely worth noting in the area of video processing at the 129th SMPTE is the planned presentation of the David Sarnoff Gold Medal to Yves Faroudja, founder and president of Faroujda Laboratories. The company's development of its proprietary bi-dimensional comb filtering techniques, which have been licensed by many major manufacturers, is a significant video processing technology for the improvement of NTSC.

Another significant video processing technology to be seen at the show is the Ampex Zeus advanced video processor, which has recently won Emmy and Monitor awards for its improvement of the multigenerational capabilities of the one-inch Type C videotape format.

Routing and master control

The move toward automation at many stations has refocused industry attention on routing, distribution, and master control equipment, which plays a vital part in automatic systems. In this regard, there's been disagreement over the data speed of the SMPTE/EBU "ES-bus" versus that of the Utah Scientific Dynabus communication systems, although this issue has calmed with the general realization that the two standards can be interfaced. This is not to say the controversy is dead, and it remains to be seen which system the marketplace will favor. An entire technical session will be devoted to lectures and discussions on the ES-bus.

New video signal standards such as component, digital, and HDTV have their own special routing and distribution requirements, and manufacturers have responded with new products designed for these formats. Dynair's new Dynasty 100 series routers offer up to 100 MHz in bandwidth, and both Dynair and Grass Valley Group offer fiber optic routing products, which continue to grow in popularity as broadcasters gradually discover the advantages of fiber. This discovery process should be aided by a full SMPTE technical session on fiber, which has been included to get broadcasters familiar with the technology.

Users' needs have also been addressed with routing products offering compactness, economy, easy expansion, security, and—as stated earlier—computer control. Automation has also had an impact on master control, leading to speculation that these switchers may someday require little if any human attention. In the meantime, provisions for MTS and SAP are also appearing as stations get into stereo and look ahead to simulcasting additional audio.

Vehicles

Today's broadcast parking lot may hold separate vehicles for ENG, satellite newsgathering, remote sports production, or C-band uplinking. There are hybrids in each category, and you can, for instance, get a lively debate going in some quarters on the wisdom of using your SNV for ENG duties. Despite this, a combo ENG/SNG truck can be economically appealing, and an emphasis on vehicles capable of both functions has lately been made by some vendors.

Whatever wheels a station may choose, there's plenty of equipment—audio consoles, production switchers, TBCs—being designed with mobility in mind so a crew on the road need not go underequipped. This is the age of production mobility, and there's a vehicle for every purpose, though not all of them will be represented at the show.

SNVs are the most active vehicle area today, for reasons of popularity, newness, and the ongoing technical innovations needed to meet changing transmission and communication specs. For these reasons, SNVs will be in the vehi-

cle "limelight" at SMPTE, and will be displayed—in one form or another—at the show.

Audio Synchs In

Fueled by the popularity of MTS technology and the booming video post-production and audio sweetening markets, audio equipment is expected to play a major role at this year's SMPTE show.

MTS has had a particularly strong influence on new product designs. With all of the major networks engaged in stereo broadcasting to some degree (and, in the case of NBC, to a very large degree), the emphasis on improving the quality of broadcast audio is found in virtually every product line from consoles to microphones. At the same time, new consumer awareness about audio has resulted in better stereo mixes on film and video productions, which, in turn, has led to a dramatic increase of post-production assignments.

Such trends are likely to have a lasting impact on the broadcast and motion picture industries, especially as audio and video move together toward the digital domain. In the meantime, there will more audio equipment at SMPTE than ever before, with many new products specifically designed with audio-for-video applications in mind.

Audio production

The ongoing demand for high-quality film and video soundtracks continues to be the motivating force behind audio upgrades in television production studios and post-production facilities. At TV stations, the decision to implement stereo broadcasts often involves revamping the entire audio chain in order to accommodate the improved signal output. At the same time, more post-production suites are using digital audio recorders to meet both quality and competitive standards.

A new development here is the recent arrival in some state-of-the-art post-production houses of so-called "tapeless" digital production systems, such as New England Digital's Synclavier with its Direct-to-Disk option, which allows users to record digital audio soundtracks (along with SMPTE time code) on Winchester disks. Although such systems are significantly more expensive than analog—and even most digital—recorders, they do eliminate the hassles associated with tape (e.g., sound degradation, splicing, and tracking problems) while adding advanced editing capabilities and instantaneous access to any recorded segment.

A/V editing & synchronization

Expect to find a wide selection of audio synchronizers and editors at this year's SMPTE show, with many new players into the field, including such well-known manufacturers as Tascam and Fostex. The convergence of audio and video technologies in the studio has led to greater product integration and more user-programmable functions in the latest generation of these products, while software-based systems and competitive pricing policies have contributed to making the hardware more affordable.

Pricing still remains a priority issue with regard to digital audio editors—as illustrated by the demise earlier this year of Droid Works, whose Sound Droid was one of the most sophisticated and expensive digital editors on the market. Thus, manufacturers have sought to bring down hardware costs with the introduction of new modular packages and interfaces that increase product flexibility while reducing obsolescence. Advancements in digital control continue to be made as seen in products such as Image Video's modular AES-1000 system, which digitizes an analog signal and stores it while providing real-time editing and output. Also of note is the recent debut of interface boxes from Nagra and

others that allow video editors to manipulate audio signals as if they were video.

Recording technology

With more TV and film facilities getting involved in audio production, the audio tape recorder (ATR) has become as much a studio essential as the routing switcher. Not surprisingly, the latest generation of analog ATRs integrate a multitude of features that make them especially well suited for such applications. For instance, user-programmable functions that significantly reduce the number of needed keystrokes are found on many new machines, as is 14-inch reel capability. Expanded interface modules, center-track time code, and user-selectable tape speed pairs also distinguish various new recording decks.

Perhaps the biggest news in analog recording technology is still last year's introduction of Dolby's Spectral Recording (SR) process, which is expected to have a dramatic influence on the future success of analog recording in view of the rising popularity of digital audio recorders. Dolby SR utilizes a unique algorithm that responds to variations and level changes throughout the signal spectrum to provide analog recordings and transmissions with a dynamic range and S/N ratio that rivals the quality of digital recordings (but at a fraction of the cost).

While both digital recording formats (i.e., the Sony-developed DASH and Mitsubishi's PD) have been received with considerable acclaim in the music recording industry, it would appear that, for the time being at least, the expense of digital tape recorders is still inhibiting their use at most film and video studios. However, one digital audio medium that is already arousing interest for portable audio-for-video assignments is the RDAT (Rotary Digital Audio Tape) format, which features three selectable sampling rates and cassettes approximately two-thirds the size of their analog counterparts (providing up to two hours of recording time). Al-

Graham-Patten's new compact 608 edit suite audio mixer houses audio signals in a separate electronics frame and interfaces with most video editors.

though Sony has announced its plans to market a portable DAT recorder with time code record and playback capability in the first quarter of next year, the future of professional DAT applications in the U.S. and elsewhere is still contingent upon the outcome of the current legislative battles.

Consoles

Advancements in automation and modular design schemes continue to dominate audio console technology. The ability to store and recall board setups on floppy or hard disk has made computerized automation a much-sought-after console feature for MTS and video post-production applications.

This past year has seen several new and innovative approaches to automating the mixing process. For instance, Solid State Logic, which has received wide acclaim for its floppy-disk-based Studio Computer with Total Recall automation, introduced the G Series Studio Computer for use with all of its E Series consoles. The new system uses portable, compact 20-megabyte data cartridges that can store up to 80 floppy disks' worth of information. At the same time, Harrison updated its Series X console with the company's VGA Ten interactive graphics subsystem for on-screen display and mouse manipulation of console functions. The Series X console also employs a dual automation system with mix data stored on Winchester hard disk and archival storage on floppy or optional cassette.

Modular designs that permit studios to configure their consoles to meet their specific needs are prevalent in most companies' lines. Sony's new MPX-2036, for example, is built on a 40-module frame that allows any module to function in any slot, permitting virtually any possible physical arrangement of console features. It also has facilities for an optional video interface that enables each of the console's VCA groups or selected inputs to be remote controlled by many of Sony's video editors.

Keep an eye out for a new breed of mixing console, specifically designed for TV post-production work, in which the audio signals are isolated from the mixing controls in a video switcher-type architecture. One such system, Graham-Patten's 608 edit suite audio mixer, is designed to be operated by a video editor with an an edit controller. Its edit system control provides manipulation of audio signals directly from the edit decision list or from manual operation, while the audio level is controlled by VCAs housed in a separate electronics chassis.

Microphones

The rise in stereo TV production has had a dramatic impact on current microphone design. In addition to creating the market for matrix boxes, the two stereo miking techniques used for most MTS work—x-y and mid-side (m-s)—are now being addressed by new microphone introductions. Expect to see many boom and hand-held mics with capsule assemblies accommodating one or both recording methods. At the same time, the influence of ENG/EFP has led to a slew of new wireless mic introductions. Judging from this year's NAB show, there will be several new FM diversity models shown with some manufacturers offering multi-transmitter/receiver packages.

Intercoms

Wireless intercoms are also in plentiful supply this year. Still, it's not enough for these units to be compact and rugged; audio quality is equally important. Thus, manufacturers have concentrated on improving signal control, with some units—such as Clear-Com's new Series 500 intercom beltpacks—incorporating digital logic control for all audio and signaling circuits. Flexibility is also an important issue here, as evidenced by Cetec Vega's "Q" Plus wireless intercom system,

which accepts all types of headphones and dynamic or electret mics with a S/N ratio of 80 dB. Telex will also be on hand with a full line of studio and wireless intercom systems.

Test & Measurement

Among the battles to be waged at this year's SMPTE will be a debate over what the industry really needs in the way measuring instruments. Some say downward pressure on prices will be the main consideration in new equipment, while others maintain that size and features will be the dominant concerns among broadcasters. Obviously the ideal piece of gear would be an inexpensive, high-quality instrument that is small and light and interfaces easily into the plant or remote vehicle. Stress on the word, ideal.

Attendees won't see the ideal instrument but they will see a continuation of the very positive demonstrations witnessed at the 1987 NAB. One of the most active booths in that Dallas convention was the Videotek stand, showing its new combination waveform/vector unit that offers other features as well. The model TVM 620, in addition to being a combo unit, has the ability to look at three filters simultaneously: flat, low-pass, and chroma. Further, addressing the size issue, this innovative device is housed in a half-rack width frame made possible by its microprocessor-based design. Also, tactile membrane control panels allow individual or combined viewing of parameters.

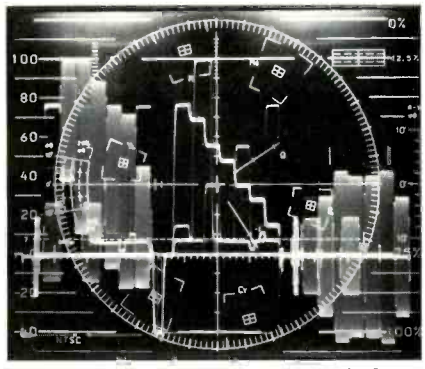
The TVM 620 is indicative of the trend toward smaller, and lighter, combined units. The obvious advantages include saving rack space and portability. Beyond price, because everyone wants things to be cheaper, space and features seem to attract a lot of attention. Quality and practicality are two additional considerations that manufacturers pay attention to when addressing the market. Microprocessor design and digital circuitry are contributing factors to the size/quality/feature parameters and contribute as well, in the long run, to more cost effective instruments. Then, of course, there is practicality.

Things are practical when they deal efficiently with the actual daily obstacles encountered in a facility. This means building instruments that will measure the other new technologies in the plant as they come into use. Here we see an intelligent approach by the people at Magni Systems. Their recently introduced model 1515 component and composite test signal generator seems to have accurately targeted a void in the industry as facilities operating around hybrid component/composite recording technol-

ogies have scrambled for accurate and, perhaps just as important, easy-to-use instruments.

Once again this capability is due to the influence of the microprocessor and the abilities of sophisticated companies to take advantage of its strengths, optimized by carefully prepared software. Magni recognizes this and the company's approach to this technology market will be in evidence at SMPTE.

As the plant becomes more complex and the needs of monitoring and measuring become more diverse, combining features and capabilities may become more common. As software and hardware develop further, various technologies, such as the component/composite issue and digital circuitry will influence the test and measurement sector of the industry. In keeping with this, Rohde & Schwarz is expected to show its first digital TV oscilloscope with a high-speed 10-bit analog/digital converter permitting resolution of $1/1024$ of display height. Also possible, because of the digital circuitry, are features like electronically inserted graticules and tolerance masks.



Demonstrating advanced features, the Videotek TVM 620 screen here displays its triple filter parade: 1H each of flat, low-pass, and chroma filter.

Further advancing the cause of digital circuits in the checking field is Tektronix, bringing its VM 700. Shown in prototype at the NAB, the unit should be in the advanced stages of user input and refinement, allowing the company to produce a product fairly close to its production form. For those not familiar with it, the VM 700 is an automated video measurement set geared toward automated transmitter checking. The design concept draws from the platform approach, allowing the company to take user concerns and incorporate them into the final product. Not only is the instrument slated for transmission checking, but full studio measurements are also possible, automatically. Manual determinations are available and the touch screen capability is a big plus for the test and measurement unit.

Whether it's digital circuitry, price, or performance this year's SMPTE showing will demonstrate the evolution of market concerns as engineers attempt to get the most out of the available features for the best price. BM/E

SMPTE Exhibitor Listings

The following is a list of SMPTE exhibitors and their booth numbers

Abekas Video Systems, Inc. **138**
Adams-Smith **304**
Adriene Electronics Corp. **2020**
A.F. Associates, Inc. **312**
Agfa-Gevaert, Inc. **816**
AKG Acoustics, Inc. **1940**
Alamar Electronics USA, Inc. **1644**
Allen Production Co. **2034**
Alpha Audio **1146**
ALTA Group, Inc. **1707**
Amek Consoles, Inc. **1647**
American Studio Equipment **1932**
American Video Factory **2030**
Ampex Corporation **130**
Amtel Systems, Inc. **1742**
Angenieux Corp. of American **1518**
Anton/Bauer, Inc. **812**
Anvil Coses, Inc **950**
Aphex Systems Ltd. **350**
Arriflex Corp. **1523**
Asaca/ShibaSoku Corp. of Amer. **212**
Aston Electronics, Inc. **2022**
Audio Precision Inc **1816**
Audio Services Corporation **650**
Aurora Systems **938**
Barco-Industries, Inc **1204**
B & B Systems, Inc. **1910**

BCS **2021**
Belden Communications, Inc. **946**
Bencher Inc. **752**
BHP, Inc. **1726**
Birns & Sawyer, Inc. **1516**
Bremson Data Systems, Inc. **352**
Broadcast Video Systems Ltd. **1713**
Bruel & Kjoer **1453**
BTS, Broadcast Television Systems **120**
Cam-Lok Inc. **801**
Canon U.S.A. **1116**
Dwight Cavendish Company **201**
CEI Technology **1818**
Century Precision Optics **705**
Cetec Vega **452**
Christie Electric Corp. **1920**
Christy's Editorial Film Supply, Inc. **552**
A. Chrosziel & Optex Ltd. **1253**
Chyron Corporation **1434**
Cine 60 Inc. **348**
Cine Video Tech, Inc. **1547**
Cinema Products **148**
Cinematography Electronics Inc. **1718**
CineMills Corp. **907**
Cipher Digital, Inc. **1417**
Clear-Com Intercom Systems **1724**
CMX Corporation **930**
Coherent Communications, Inc. **749**
ColorGraphics Systems, Inc. **1007**
Comprehensive Video Supply Corporation **109**
Compu=Prompt **1102**
Computer Prompting Corp. **848**
Corporate Communications Consultants, Inc. **1316**
Crosspoint Latch Corp. **849**
Cubicomp Corporation **1305**
DeSisti Lighting/Desmar Corporation **1709**
Digital Audio Research, Ltd. **1931**
Digital F/X, Inc. **1400**
Digital Services Corporation **1538**
Di-Tech Inc. **1924**
Dolby Laboratories, Inc. **118**
Dorrough Electronics, Inc. **748**
Dubner Computer Systems, Inc. **520**
Dynair Electronics, Inc. **1201**
Eastman Kodak Company **530**
ECHOlab, Inc. **1546**
Editron USA, Inc. **1502**
E-mu Systems **1812**
Evertz Microsystems Ltd. **1349**
Faroudja Laboratories, Inc. **1610**
FGV Panther **852**
Film Processing Corporation **1232**
FOR-A Corporation of America **116**
Fortel Inc. **920**
Fostex Corp. of America **746**
Frezzolini Electronics Inc. **418**
Fries Engineering, Inc. **948**
Fuji Photo Film of U.S.A., Inc. **312**
Fujion, Inc. **309**
Fumeo S.P.A. **1447**
Future Productions Inc. **1814**
General Electric Co. **1324**
Geocam Corp. **1643**
G&M Power Products **2023**
GML America Inc. **1712**
Alan Gordon Enterprises **909, 912**
Graham-Patten Systems, Inc. **1730**
The Grass Valley Group, Inc. **525**
Gray Engineering Laboratories, Inc. **1616**
James L. Grunder & Associates, Inc. **1142**
Harris Sound, Inc. **1922**
Harris Video Systems, Bdcst. Div., Harris Corp. **1130**
Harrison Systems, Inc. **914**
HEDCO **707**
Karl Heitz, Inc. **152**
Hitachi Denshi American **538**
Hollywood Film Company **406**
Hotronic Inc. **1646**
Ikegami Electronics (USA), Inc. **518**
ILC Technology, Inc. **1407**
Image Video Ltd. **502**
Innovative Television Equipment **1301**
Innovision, Inc. **1714**
Interactive Motion Control **1915**
Jem-Fab Corp. (formerly Franklyn R. Beemish) **1942**
The J-Lab Co. **1906**
J&R Film Co./Goldberg/Moviola **507**
JVC/Paltrex **542**
Kern Elektronik Mechanik GmbH **900**
K & H Products Ltd. Porta-Brace **505**
Kintek, Inc. **1642**
Kliegl Bros. Universal Stage Lighting Co., Inc. **1447**
Laird Telemedia **1049**
Lake Systems Corporation **1309**
LCI/Sync **2015**
LEE Colorran **942**
Leitch Video of America Inc. **709**
Lenco, Inc., Electronic Division **445**
Leonardo **2016**
Lexicon Inc. **1138, 1338**
Listec Video Corp. **904**
Lites, Inc. **2024**
LMC Peterson **1346**
Lowel-Light Mfg., Inc. **442**
LTM Corporation of America **546**
Magno-Tech Electronic Co., Inc. **112**
Magni Systems, Inc. **1838**
Matthews Studio Equipment, Inc. **1109**
Merlin Engineering Works, Inc. **509**
Micron Audio Products, Ltd. **402**
Microtime, Inc. **106**
Microwave Radio Corporation **1507**
Mideast Communications Corporation **302**
Miller Fluid Heads (USA) Inc. **1550**
Mitchell Camera Corporation **1542**
Mitsubishi Pro Audio Group **142**
Mole-Richardson Co. **535**
Montage Group Ltd. **1945**
Motorola Communications and Electronics, Inc. **2046**
Moviecam F.G. Bauer GmbH **1150**
Ernest F. Moy, Limited **1103**
Multi Track Magnetics **604**
NAC Incorporated **1504**
Nagra Magnetic Recorders, Inc. **612**
NEC America, Inc. **316**
LE Nelson Sales Corp./Thorn-EMI **100**
Rupert Neve Incorporated **934**
New England Digital **1412**
Norris Film Products **653**
North American Philips Lighting Corp. **602**
Nova System, Inc. **1740**
Nurad, Inc. **1409**
O'Connor Engineering Laboratories **735**
Odetics, Inc. -Broadcast Division **1720**
Omicron Video **800**
Optical Disc Corporation **550**
Osram Corporation **1438**
Otari Corporation **702**
Pacific Radio Electronic, Inc. **1347**
Paco Electronics USA, Inc. **601**
Panasonic Broadcast System Corp. **924**
Pannonia International Imports **1936**
Perrott Engineering Labs Inc. **1340**
Photo Micro Systems Ltd. **1604**
Pinnacle Systems, Inc. **1004**
Plastic Reel Corp. of America **416**
Preston Cinema Systems, Inc. **1733**
Q-TV **504**
Quanta Corporation **248**
Quantel **1125**
Rank Cintel Inc. **1134**
Rank Precision Industries Inc. **512**
Research Technology International **922**
R.F. Technology, Inc. **548**
Riviera Broadcast Leasing **1405**
Rohde & Schwarz/Polarad **2012**
Rosco Laboratories, Inc. **1510**
Ross Video Limited **1921**
Sachtler Corporation of America **1320**
Schneider Corporation of America **1449**
Schwem Technology **450**
Scientific-Atlanta, Inc. **306**
Sescom, Inc. **1706**
Shure Brothers Incorporated **1745**
Sigma Electronics, Inc. **1104**
Sikorel Corp. **1930**
Solid State Logic Inc. **1123**
Sony Communications Co., Sony Corp. of America **124**
Sound Ideas **300**
Sound Technology, Inc. **1408**
Soundmaster International Inc. **1047**
Soundtracs plc **1938**
Spectra Cine, Inc. **1252**
Spectra Image, Inc. **1836**
Steadi-Film Corp. **1202**
Steenbeck, Inc. **1326**
Strand Lighting **102**
Superedit, Ltd. **2013**
Sylvania Lighting **1020**
3M **438**
TASCAM/TEAC Corporation of America **1525**
Teccon Enterprises Ltd. **947**
Technical Film Systems, Inc. **1050**
Techniform **2014**
Tektronix, Inc. **1330**
Telemetrics, Inc. **400**
Telepak San Diego **253**
Telescript Inc. **1716**
Telex Communications, Inc. **600**
Tentel **1152**
Tiffen Manufacturing **1738**
Triconcper **1100**
Tromperer Electronics, Inc. **1307**
TSM (Total Spectrum Manufacturing, Inc.) **1342**
Ultimotte Corporation **1806**
United Ad Label Co. Inc. **500**
Ushio America, Inc. **252**
Utah Scientific Inc. **1112**
Vertigo Systems International Inc. **1736**
Video Design Pro **1908**
Video Services Unlimited **1808**
Videomedia SED Inc. **700**
Videotape Products, Inc. **1912**
Videotek, Inc. **1317**
Vinten Equipment Inc. **902**
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Minority Ownership Updates

By Harry Cole, Bechtel & Cole, FCC Counsel

Several months ago, all broadcasters received a surprise package from the FCC—a "Minority Ownership Report" seeking information about the ethnic, racial, and gender characteristics of station owners. Although the deadline for completing and filing the form was April 30, 1987, various circumstances occurring after the preparation of this article may have postponed that deadline or, possibly, caused the Commission to withdraw the form. Nevertheless, the issuance of the report form in the first place, together with a recent Supreme Court case on affirmative action, suggests that an update on the Commission's minority ownership policies may be in order.

As you will probably recall, the FCC has not always warmly embraced the concept of considering race or gender in connection with broadcast licensing. Fifteen years or so ago, in fact, it specifically declined to do so. However, the U.S. Court of Appeals for the District of Columbia Circuit told the Commission in 1973 that the FCC should treat an applicant's minority ownership as a "plus factor" in the overall comparative process. The Court of Appeals was acting under the assumption that minority ownership would in and of itself lead to program diversity; in the Court's view, such diversity was a goal toward which the Commission should strive.

The Commission thereupon gradually developed a number of policies intended to expand the incidence of minority ownership. Pursuant to the Court's instruction, the FCC formulated a method for assessing "merit" or "plus factors" for minority ownership as part of its comparative evaluation of competing applicants. In 1978, perhaps as a result of its political (*i.e.*, Democratic-controlled) composition at the time, the Commission went further, creating the "minority distress sale" and the tax certificate policies. While neither of those policies had been suggested by the Court in 1973, the Commission simply extended the Court's reasoning.

Getting the edge

In effect, the FCC treated the assumed minority ownership/program diversity nexus as justifying further efforts to increase minority ownership—efforts separate and apart from the comparative process. Moreover, at approximately the same time the Commission expanded the comparative element by including female ownership among the categories of "minority ownership," which would be entitled to "merit" or preference of some degree. While the female preference was clearly stated to be of less significance than the preference to be awarded racial or ethnic minorities, it was still sufficient to give, in most instances, a female-controlled applicant an edge over a nonminority, male-controlled applicant.

These minority ownership policies were in place for a period of years. The Commission did make efforts, in occasional individual cases, to discourage "sham" minority or female applications—that is, applications in which the owners are claimed to be minority or female individuals, even though it turns out, upon closer scrutiny, that those individuals are merely serving as "fronts" or "puppets" for nonminority males attempting to take advantage of the preferences available to minorities. However, at no time did the Commission ever challenge the validity of the assumption that started off the whole minority preference notion—that minority ownership leads to program diversity. And indeed, as recently as 1984 the Commission successfully argued to the Court of Appeals that its comparative preference policy was fully valid for that reason.

Times change, though, as do courts and Commissions. In 1985 a nonminority male lost a comparative proceeding to a nonminority female solely as a result of the female preference. In his appeal of that decision (entitled *Steele v. FCC*), the male challenged the constitutionality of the female preference in court, and, to the surprise of many, a three-judge panel of the U.S. Court of Appeals for the District of Columbia Circuit concluded that the female preference was unconstitutional. Over a strong dissent from Chief Judge Wald, Judges Tamm and Scalia (yes, the same Judge Scalia who was subsequently elevated to the U.S. Supreme Court) found that there was absolutely no basis for the assumed connection between female ownership and program diversity. In his majority opinion, Judge Tamm struggled to distinguish the female preference from the minority preference, probably because he recognized that that preference had been forced on an unwilling Commission by the Court itself in 1973, and had been reaffirmed by the Court in 1984. As Judge Wald noted in her dissent, however, it really is impossible satisfactorily to distinguish the female preference from the minority preference.

Although the Commission had initially defended the female preference policy before the Court, it seemed willing to accept Judge Tamm's opinion without a fight. This is probably because the Fowler Commission, motivated by the Reagan

administration's general antipathy toward affirmative action programs, viewed Judge Tamm's opinion as consistent with the current FCC's position. In other words, while the Commission under Chairman Fowler had continued to apply the minority ownership policies, its heart may not necessarily have been in that effort. When Judges Tamm and Scalia threw out the female preference policy, they were thus very likely doing the Fowler Commission a favor by eliminating a policy which the FCC may not have approved but which it probably felt itself politically incapable of abandoning on its own.

Decision en the banc

The Commission could not, however, get itself taken off the hook quite so easily. The female applicant asked the entire U.S. Court of Appeals to review the case *en banc*, and it agreed.

In September, 1986, the FCC finally filed its brief in the *en banc* aspect of the *Steele* case. In that brief the Commission took the position that both the female preference *and* the minority preference were unconstitutional to the extent that no actual connection had ever been established between minority/female ownership and program diversity. The Commission attempted to avoid arguing that such preferences would in any event be unconstitutional; rather, it took the position that it had never compiled an adequate supporting record to assure the policy's constitutionality and that, as a result, the policy must be deemed unconstitutional unless and until such a record is compiled. The Commission asked the Court to send the case back so that it could attempt to compile such a record. The Court agreed and last December the Commission initiated a proceeding with the goal of determining whether the minority ownership/program diversity concept exists.

In connection with that proceeding, the Commission developed the "Minority Ownership Report" form that was mailed out to licensees in March and April. Reports around Washington indicate that the form as the FCC originally drafted it simply requested information about the minority characteristics and/or gender of each licensee, without reference to the type of programming provided.

In any event, shortly after the form was mailed to licensees, the Office of Management and Budget (OMB) got into the act. OMB must approve all FCC forms, and it did initially give its approval. However, it turns out that its approval was based on assertions made by the FCC to OMB that completion and submission of the form would be strictly voluntary. If you have seen the form as it was actually sent out, you realize that its submission is (according to the form) required. NAB called this to OMB's attention, and OMB decided to take another look at the form. The upshot was a letter, sent by OMB to the Commission in early April, in which OMB specifically advised the Commission that the form would be approved only

if its submission was voluntary and if all forms submitted would remain confidential.

Other affirmative actions

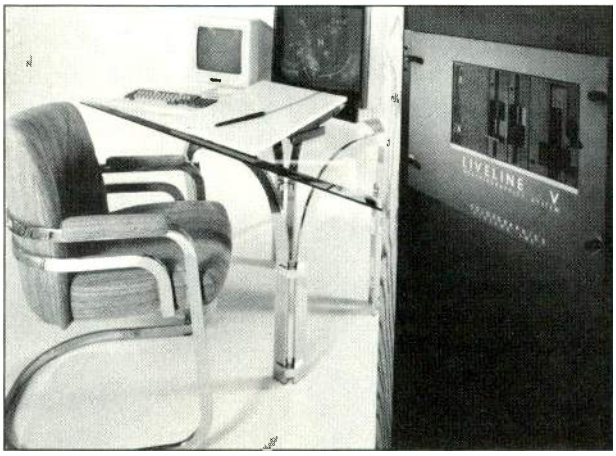
Meanwhile, elsewhere on the affirmative action front, the Supreme Court issued a decision (*Johnson v. Transportation Agency, Santa Clara County*) in late March with respect to an affirmative action program adopted by the transportation agency of Santa Clara County in California. That program had been applied to give a woman a job over an equally qualified man. The man challenged the validity of that affirmative action program under Federal civil rights legislation, and the Supreme Court affirmed the validity of the program. Upon its release this decision was hailed as a major step for affirmative action, and it probably is just that. However, the decision does not provide any solid indication of the validity of the FCC's minority and female ownership policies. The *Johnson* case was brought solely under Title VII of the Civil Rights Act. For reasons that are not at all clear, the plaintiff in *Johnson* never challenged the affirmative action program's constitutionality, and thus the Supreme Court did not have that issue before it.

This is an important aspect of the *Johnson* decision that some observers (particularly nonlawyers) fail to appreciate. As the Court makes clear, Title VII of the Civil Rights Act was intended to encourage private employers to take affirmative steps to increase minority and female employment in areas where, historically, such employment had been minimal or nonexistent.

That is, the Civil Rights Act was intended, as the Court sees it, to serve a remedial purpose by encouraging private, as opposed to governmentally-mandated, actions. The Court reasoned that it should be reluctant to take any steps that might undermine that Congressional intent. Since the affirmative action program in question appeared to the Court to be reasonable, and since the successful applicant's gender was only one of a number of factors taken into account, the Court decided the program was consistent with Title VII.

The bottomline on all this is that the real bottomline—whether the FCC's minority/female ownership policies will survive—is still far from clear. While the Commission continues to indicate its desire to conclude the *Steele* inquiry in short order, the complexity of the questions at issue there may frustrate the FCC's wishes in that regard.

For the time being, then, the situation is likely to remain in its present, unresolved state. One case concerning the constitutionality of the FCC's "minority distress sale policy" is awaiting decision before the U.S. Court of Appeals for the D.C. Circuit as of this writing. If the Court there chooses to reach the constitutional issue, we all might have a better idea of where things are likely to be going on the FCC's affirmative action front. **BM/E**



ColorGraphics Intros LiveLine V

ColorGraphics has announced the introduction of the LiveLine V, a 32-bit weather graphics system that offers upgrades for users of the LiveLine III and IV systems. New system features include 24-bit per pixel image generation; 32-bit overlay animated graphics; two-plane, color cycling, and event recording animation techniques, with real-time animation as an add-on option; expanded satellite looping; and automatic base map generation of five views of any geographical area from the system's database.

List price for the system is $69,900. For upgrade information, contact ColorGraphics at (800) 248-1050

Circle #200 on Reader Service Card

Gotham Audio Has Port-A-Flex System

Available from Gotham Audio is an integrated system of rugged portable audio troubleshooting units, called the Port-A-Flex system. Currently composed of seven field units, the system features internal or external power sources, balanced inputs and outputs, and XLR and GPO jacks and connectors.

Pictured here is the compressor/limiter; other units include a one-to-four DA, monitoring unit, one-to-four headphone splitter, hi-fi to XLR interface, low/high-pass filter, and stereo distribution splitter.

Circle #201 on Reader Service Card

Evertz Debuts Emulator/ Chaser

Evertz Microsystems, Ltd., has announced the new Emulator/Chaser devices for audio-for-video applications. The Emulator is an audio transport interface that allows ATR control from a video editing system. Using the Emulator, multitrack audio edits are automatically performed in sync with video. The unit is currently available in Sony BVU/BVH/BVW and CMX I^2 formats.

The Chaser is a time-code based chase synchronizer, developed principally for post-production. The unit continually reads edit code from the two tape machines during editing and maintains a constant time relationship, between the two by servoing the slave machines transport functions. In addition, three different sync modes—frame-lock, phase-lock—and auto-lock, provide extra flexibility.

Circle #202 on Reader Service Card

TBC/EFX Unit from Prime Image

Prime Image, Inc., announces the Dub•TBC+, a component dub time base corrector with digital effects, including posterization, sepia tone, and mosaic. The unit is compatible with component Y/C-688 type, R-Y/B-Y, and NTSC composite video signals, and, in addition, can transcode between these formats.

List price is $6200; $5200 without effects.

Circle #203 on Reader Service Card

Microdyne Sat Receiver Bows

New from Microdyne is the 1100-BKR compact satellite video receiver, which meets or exceeds EIA RS-250B specs. The unit, which receives broadcast signals from any C- or Ku-Band satel-

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lite transponder, features two tunable audio subcarrier demodulators with 10 kHz step tuning and automatic audio subcarrier deviation compensation for elimination of distortion due to overdeviation.

Other features include four selectable IF bandwidths, front panel tuning in 1 MHz steps, and compatibility with VideoCipher and BMAC scrambling systems.

Circle #204 on Reader Service Card

NTSC Decoder from Innovative Tech Works

A new low-cost decoder unit, which allows users of computer graphics cards with RGB "frame grab" inputs to capture NTSC composite video signals from a tape or other NTSC source, has been announced by Innovative Tech Works. The primary use for the decoder, according to the compony, will be in conjunction with the Targa and Vista series of graphics controllers.

The external unit accepts NTSC signals and converts them to RGB and SYNC signals. With full 4.5 MHz bandwidth, the picture quality produced by the decoder is high—controls are provided to adjust hue, brightness, contrast, and color saturation, much like a home video receiver List price is $695.

Circle #207 on Reader Service Card

SP-6 Console from Wheatstone

New from Wheatstone Corp. is the SP-6 stereo production console. The SP-6's line input channels feature full machine control and remote module status ports. In addition, mic channels include tally and remote on/off ports as well as full control of multiple stereo and control room mutes, interrupts, tally, and talkback.

Other features include automatic and manual timer modes, clocks, and full function tape remotes. The SP-6 is available in either eight-buss multitrack radio format of four-stereo subgroup television format.

Circle #205 on Reader Service Card

Telemetrics with Beta/M-II Adapter

Telemetrics, Inc., has unveiled a new adapter device that automatically allows M-II format portable VTRs to be plugged into the existing recorder position on professional Betacam cameras, including the Sony BVP series.

With no modifications or interconnect cables the Model TM-8615 adapter can be bolted right to the camera unit. A quick disconnection restores the original all-Beta combination.

The unit comes with a standard battery bracket the accepts a battery or AC adapter. List price is $1900.

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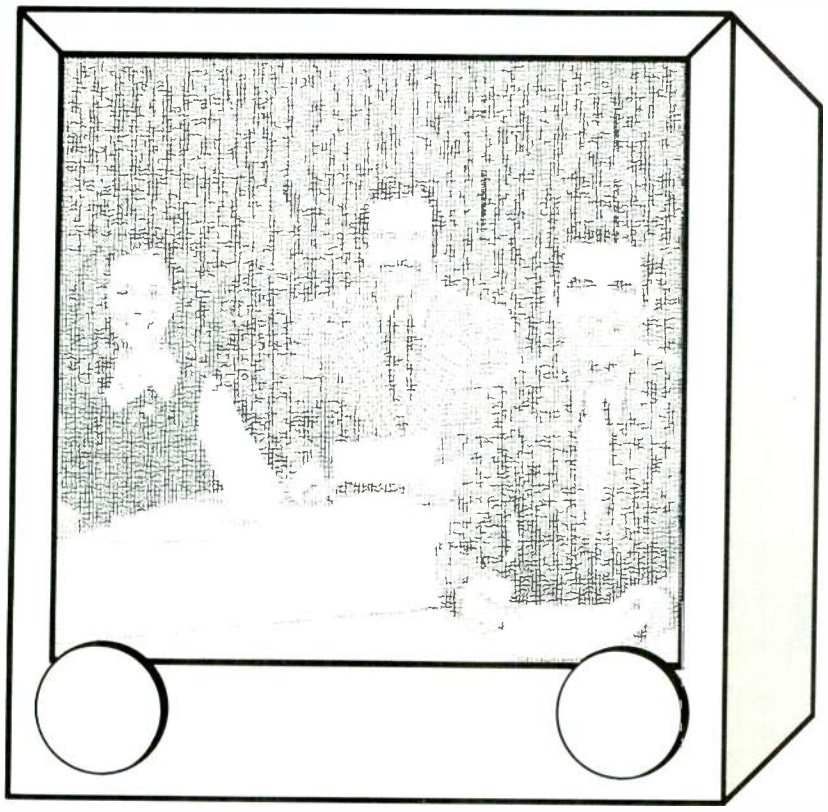

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Get the new Harris 642 or 634 Frame Synchronizer for high quality freeze frames, exceptional digital noise reduction, and clean, stable synchronization...even from dirty inputs!

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Add special options for even more creative control. If you select *Smart Noise Reduction*, you can automatically apply up to 12 dB of noise reduction to incoming video that needs special attention. The precision *Freeze Frame* works in either the synchronization or time base correction mode.

642

634

The **Harris 634** will synchronize and time base correct both Component RGB and Composite NTSC video sources.

Harris' exceptional digital noise reducer allows up to 10 dB of independent luma and chroma noise reduction.

Full-bandwidth picture freeze increases production versatility by providing front panel selectable field or frame freeze.

The RGB output of the 634 can be used as an input to a down-line color corrector or NTSC encoder.

All this!...Plus the capability of accepting either 3-cable or 4-cable RGB inputs, makes the Harris 634 ideal for Telecine and other production applications.

For more information on either the Harris 642 or 634 Frame Synchronizer, contact Harris Video Systems, 960 Linda Vista Ave., Mountain View, CA 94043 415/969-9100.

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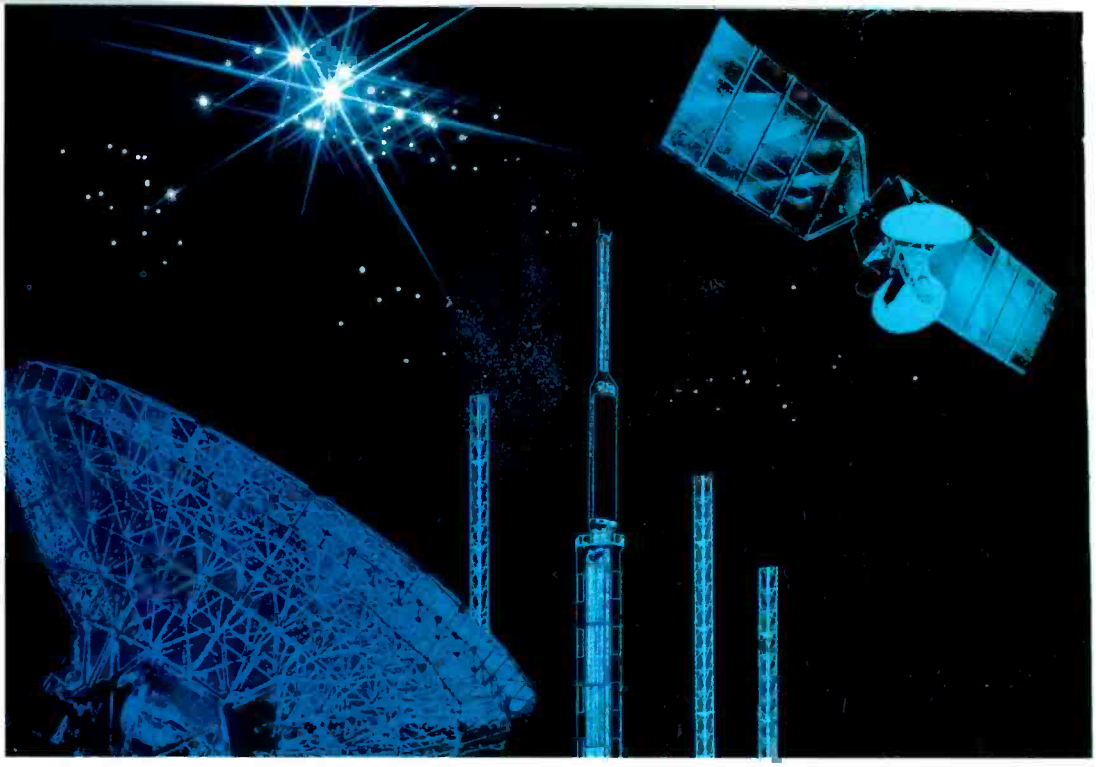

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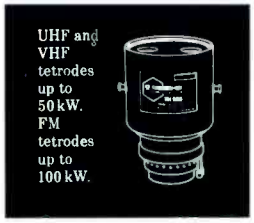

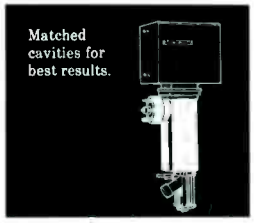

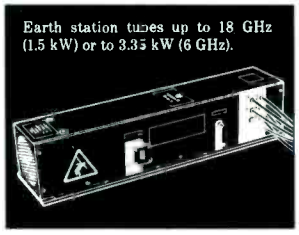

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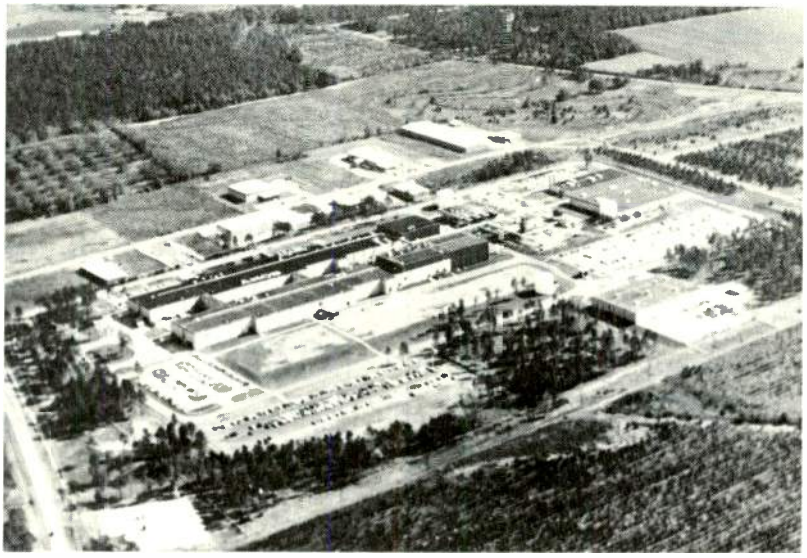
POLARIS 5576

In the news at **Ampex** is the recent equipping of the **Brooklyn College Television Center** of the City University of New York (CUNY) with $1.2 million worth of Ampex post-production equipment. The Center purchased a full "Creative Command Center" package: five VPR-3 Type C VTRs, an AVC Century switcher, an ACE editor, ADO 2000 efx, and AVA-3 video art system. According to the Center's CE and director, Gordon Fiat, the CUNY's 800+ production students will "train on the best equipment in the industry. And because it is the same equipment used in the industry, our students graduate with a tremendous advantage."

ZBS Production, of Fort Edward, NY, producer of innovative radio dramas for 15 years, has recently debuted *Dreams of Rio*, a 13-part fantasy/comedy. Producer/writer Tom Lopez and composer Tim Clark spent one month recording ambient sounds for the series on location in Brazil using a **Sony PCM-F1** recorder and **Sennheiser** 416 and Tram microphones.

Expectations are running high at **Panasonic Broadcast Systems** that shipments of MII VTRs, which ran at about 1000 units in the first quarter of 1987, will top 2000 by the third quarter of this year. And a good deal of the sales will be to corporate/ industrial users. "Our MII sales have been exceptional," said President and CEO Stan Basara. "We are now seeing an upsurge of MII sales to the corporate industrial area . . . our sales are almost fifty/fifty between broadcasters and business production."

VTE Television, a location-production company in Hollywood, has taken delivery of six **Sony BVP-360** studio/field cameras. The company has incorporated the new cameras into its four mobile units, used primarily for sports and concert coverage. According to Mary Roney, director of marketing for VTE, the camera's flexibility of design and operation figured heavily into the selection.



Planning to expand its tape producing capabilities by 40 percent starting next year, Sony currently makes video and audio tape in its 750,000 square foot facility in Dothan, AL. Sony Magnetic Products, Inc., has invested $140 million in its plant, allowing the company to coat, cure, slit, and package audio and video tape as well as 5.25-inch computer floppy disks.

The yearly production volumes are running at 60 million video-cassettes and 65 million audio cassettes. Tape for ¾-inch U-matic as well as VHS and Beta consumer markets is currently being manufactured at the plant. Cassette shell moulding and assembly are also performed on-site.

Currently, one-inch and Betacam tape is being manufactured in Japan, and it is undecided how much if any, of these products will move to Dothan, the world's largest tape producing facility.

Two AM stations, **KKLQ in San Diego** and **WSSH in Boston**, have recently begun broadcasting in stereo with the addition of **Kahn/Hazeltine AM stereo** transmission equipment. KKLQ, formerly a C-Quam station, has reported quality reception as far away as the northern suburbs of Los Angeles . . . The latest product acquisition at **Editel/Chicago** is an **Abekas A53-D** video effects system. Editel editor Tom Pyers says the unit will assist in quicker effects generation for the facility's many broadcast and corporate clients . . . **Varitel Video** in Los Angeles has opened a new digital graphics studio centered around its new **Quantel Harry** recorder/controller. The Harry, in conjunction with one of Varitel's electronic paint systems, an **Encore 3D** efx system, and an on-the-way **Sony DVR-1000** digital videotape recorder will form the heart of a state-of-the-art component digital studio.

In sat news, **Wold Communications** has just announced its first major expansion since a recent corporate recapitalization. The company has acquired the New York videotape duplication facilities of **Reeves Teletape** at Kaufman Astoria Studios. The new facility, renamed Wold Teletape, will help beef up the company's tape bicycling distribution system. In addition, Wold Communications has signed a three-year agreement with **LBS Communications, Inc.**, whereby Wold will exclusively coordinate the satellite and videotape distribution of all LBS programming. LBS syndicates *Tales from the Darkside* and *The New American Bandstand.*

Advertisers Index

Manufacturer	Page No.	Circle No.
AKG Acoustics	36	
Alpha Audio	90	158
Ampex Corp./MTD	64	138
Angenieux Corp. of America	67	139
Audio Technologies	85	154
Belar Electronics	83	152
Bryston Vermont Ltd	82	151
BTS Broadcast Television Systems	72	142
Camera Mart, Inc., The	30	119
Canon USA, Inc	11	106
Canon USA, Inc	52-53	131
Datatek Corp	46	130
Delta Electronics	54	132
Dictaphone Corp	42	127
Digital Services Corp	27	117
Digital Video Systems	30	120
Eastman Kodak Co	74	143
Eastman Kodak Co	76	145
Express Tower Co	60	135
Fidelipac Corp	1	101
Fuji Photo Film USA	62-63	137
Grass Valley Group, Inc., The	6	104
Grunder & Assocs., James	20	113
GTE Spacenet Corp	59	134
Harris Video Systems	95	162
Ikegami Electronics (U.S.A.), Inc	44-45	129
JVC Company of America	5	103
JVC Company of America	8-9	105
JVC Company of America	12-13	107
K & K Products Ltd	94	163
Laird Telemedia	91	160
Leader Instruments	29	165-166
Leitch Video Ltd	33	123
Magna-Tech Electronics Co., Inc	41	126
Magni Systems, Inc	19	112
Midwest Corp	15	108
NEC America, Inc	71	141
NEC Corp	88	157
Nurad	57	133
Odetics	93	161
Otari Corp	81	150
Paco Electronics U.S.A., Inc	32	122
Panasonic Broadcast Systems	21	114
Panasonic Broadcast Systems	22-23	115
Panasonic Industrial Co	68-69	140
Pinnacle Systems	78	147
Pinnacle Systems	79	148
Quantel	24	116
Roscor Corp	75	144
Sanix Corp	51	118
Schneider Corp. of America	31	121
Shibasoku	77	146
Shure Brothers Inc	16	109
Shure Brothers Inc	43	128
Sony Broadcast Products Inc	2-3	—
Sony Broadcast Products Inc	34-35	—
Sony Pro Video	Cov. 3	164
Specialty Vehicles Inc	61	136
Struder Revox America, Inc	Cov. 2	100
Techron Industrial Products	18	111
Telex Communications	4	102
Telex Communications	39	125
Telex Communications	84	153
Thomson-CSF	96	156
Total Spectrum Mfg	80	149
Videotek	17	110
Videotek	86	155
Ward-Beck Systems	Cov.4	—
Winsted Corp	90	159

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