

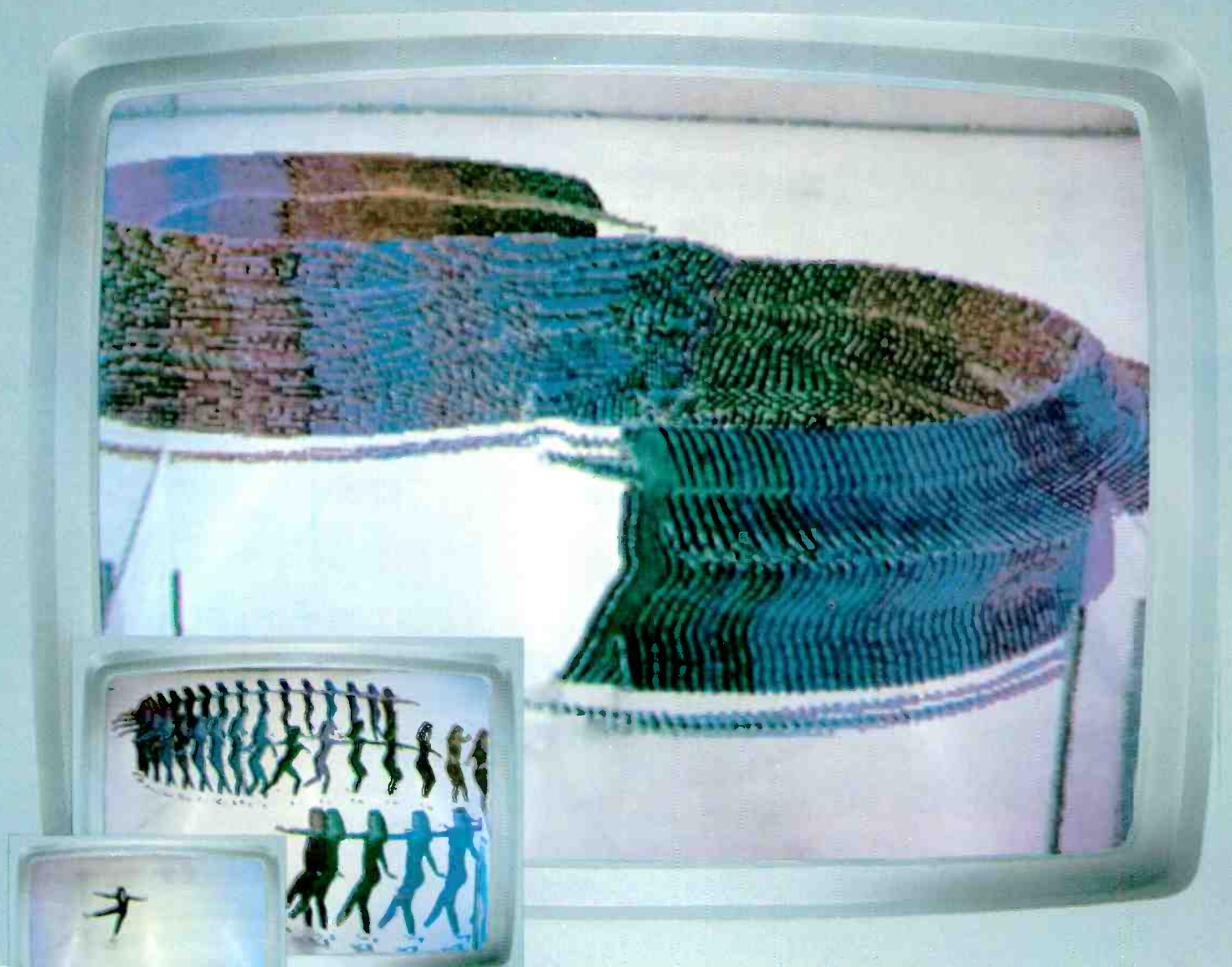
BROADCAST engineering

October, 1979/\$2.00

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for Technology**



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Another option for NEC's FS-15 frame synchronizer.
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FIELD EVALUATION REPORT CARD

PRODUCT: *TFT 7700 STL*

EVALUATION PERIOD: *5/79 - 7/79*

ACHIEVEMENT

COMMENTS

Category	Site 1	Site 2	Site 3	Site 4	Comments
Sound	<i>A</i>	<i>A</i>	<i>A</i>	<i>A</i>	<i>70 dB signal to noise. 40 dB stereo separation from 50 Hz to 15 kHz</i>
Power Output	<i>A</i>	<i>A</i>	<i>A</i>	<i>A</i>	<i>Demonstrates 12 watts minimum. No signal degradation over long transmission</i>
Frequency Stability	<i>A</i>	<i>A</i>	<i>A</i>	<i>A</i>	<i>Excellent in all cases.</i>
Security	<i>A</i>	<i>A</i>	<i>A</i>	<i>A</i>	<i>Automatic transfer and alarm are instantaneous</i>
Design	<i>A</i>	<i>A</i>	<i>A</i>	<i>A</i>	<i>Very easy to service in field</i>
Maintenance	<i>A</i>	<i>A</i>	<i>A</i>	<i>A</i>	<i>Has required none so far!</i>

AT THE TOP OF ITS CLASS

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QUALITY SOUND: 70 dB S/N ratio and 40 dB stereo separation from 50 Hz to 15 kHz with 50 dB @ 1 kHz crosstalk between main and subchannels.

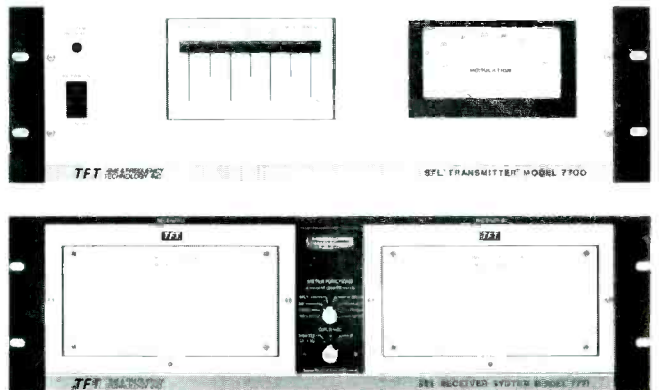
SECURITY: Fully redundant receiver and transmitter, both with automatic transfer and alarm.

FREQUENCY STABILITY: Fully frequency synthesized transmitter.

POWER: Adjustable up to 12-watts to compensate for degradation and handle long and difficult terrain.

ECONOMY: Modular design for easy field servicing. Sealed solid state components.

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BROADCAST engineering

The journal of broadcast technology

October, 1979 □ Volume 21 □ No. 10

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THE COVER

The Emmy Awards were aired September 9th and presented by the Academy of Television Arts & Sciences for outstanding contributions. The cover illustration was provided by Hank Rieger, president of the Academy, to commemorate this annual event. An article beginning on page 28 by Jeanine Fox of ABC describes some of the technical preparations for this program and contains sidebars covering this year's technical awards presentations.

NEXT MONTH

- NRBA Convention Replay
- Radio Automation
- Broadcast Console Roundup

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BROADCAST engineering

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October 1979 *Broadcast Engineering* 5

FCC update



October, 1979

By Broadcast Engineering staff

Task Force to Consider 9kHz Channel Spacing

The Commission has formed a task force to focus on the question of 9kHz channel spacing in the AM broadcast band. The task force comprises professional and support staff from the office of Chief Scientist, Broadcast Bureau, Office of Plans and Policy and Field Operation Bureau under the leadership of Robert Foosaner, a senior attorney in the Office of General Counsel. A major objective of the task force is to provide information that can be used in arriving at a United States position on channel spacing at the upcoming Region 2 Conference.

By way of background, FCC rules currently specify that AM broadcast stations operate in the band of frequencies extending from 535 to 1605kHz, and must operate on the 107 AM broadcast channels which are spaced in successive steps of 10kHz starting with 540kHz and continuing through 1600kHz. Because there are not enough channels to meet requests for additional fulltime facilities, interest in increasing the number of AM broadcast channels has been growing, and one method of increasing channels would be to reduce the AM channel spacing from 10 to 9kHz. Such spacing already is in use in other regions of the world (Regions 1 and 3) but not in the Americas, Region 2. In June the Commission issued two Notices of Inquiry—one on a change to 9kHz and the other on preparation for the Region 2, Administrative Radio Conference on AM broadcasting that is scheduled to begin in March, 1980.

The task force has initiated an investigation along both domestic and international fronts while awaiting the comments to be filed on the 9kHz Notice of Inquiry, BC Docket No. 79-164. The task force is located in Room A-204, 1229 20th St., N.W., Washington, DC 20554 and can be contacted by telephone at (202) 634-4056.

It is anticipated that informal contact will be made with members of the public, government and industry. The contacts with non-government sources will be preparatory and not advisory in nature.

Emergency Communications Plan Available

A local emergency support plan developed in

Tacoma, WA, and a state plan for Emergency Broadcast System (EBS) support developed in Connecticut have been reviewed by the Amateur Radio Services Subcommittee of the FCC's National Industry Advisory Committee (NIAC) and are now available from the FCC's Emergency Communications Division.

The NIAC Amateur Radio Services Subcommittee determined that a modified version of the Tacoma Plan could serve as a guide for development of similar plans elsewhere and approved distribution of it and related developmental worksheets to amateur groups and communities desiring to develop similar plans.

The plans were developed by the radio amateurs, broadcasters, and officials of the respective local and state governments using a grass roots approach with FCC participation. Both plans were approved by the FCC executive director in his capacity as alternate defense coordinator.

For further information or to obtain a copy of the plans or worksheets, please contact: Executive Secretary, NIAC, Federal Communications Commission, 1919 M Street, N.W. Room A-201, Washington DC 20554.

Fixed and International Broadcasting Sharing

The International and Operations Division of the Office of Science and Technology has announced the limited availability of report FCC/OST 79-01 "Sharing Between Fixed and International Broadcasting: A Time Sharing Approach." The report was written by David P. Anderson, a former employee with the International Conference Staff who now works for the National Telecommunications and Information Administration, and Arthur Thompson, an employee of Trans World Radio. It studies the possibility of specifying time-scheduled operations for the fixed and international services that would allow one service to operate in a particular area when the other was silent.

Copies of FCC/OST ICS 79-01 are available by sending a self-addressed label to: International and Operations Division, Room 7218, FCC Washington, DC 20554, Attention: ICS 79-01.

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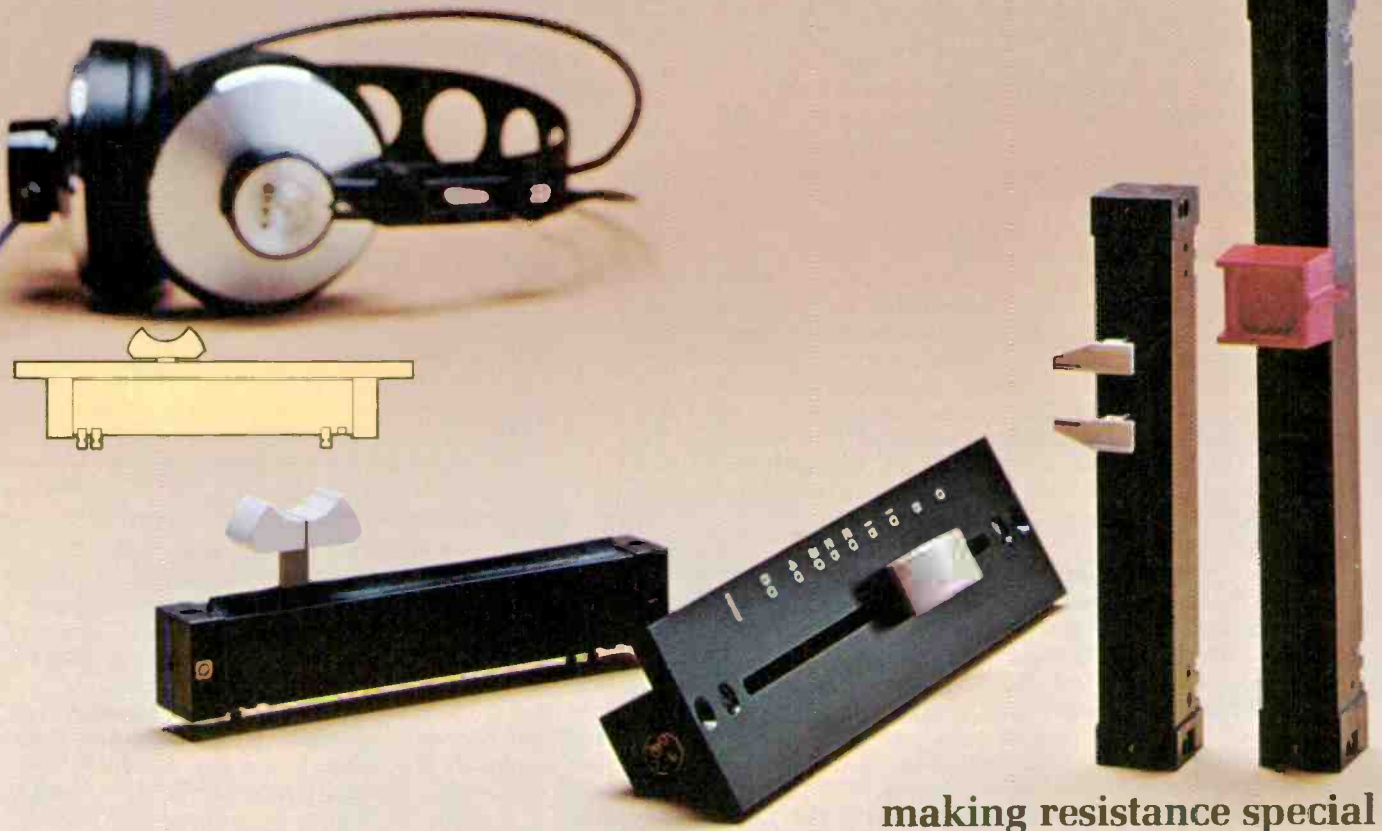
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Deleting Sections of the Rules

The Commission has directed its staff to institute a rulemaking proceeding to delete Section 73.653 of the rules, which prohibits separate operation of the aural and visual transmitters or the presentation of different or unrelated material except in certain specified situations.

On March 5, the Commission granted Midwest Radio-Television, licensee of WCCO-TV at Minneapolis, MN, authority to transmit from 2 AM to 6 AM three concurrent messages containing current news, financial and stock market reports and up-to-date weather information, with added background music. Since then, it has received numerous similar requests.

The Commission instructed its staff also to institute a rulemaking proceeding to delete Section 73.654, since it no longer serves a useful purpose, adding that its deletion was consistent with the FCC's efforts to deregulate wherever feasible.

Inquiry on Telecommunications Needs

The Commission has started an inquiry for developing policies and guidelines for construction and use of cable and satellite facilities to meet demands for voice and other communications services on the North Atlantic route during the 1985-95 period. The Commission said the inquiry and North Atlantic consultations, an ongoing process, must consider satellite options simultaneously and in the same way that cable options are considered. This should be done before the International Telecommunications Satellite Consortium (INTELSAT) decides on the replacement for the present INTELSAT-V satellite series. Comment and reply dates will be announced in a Public Notice reporting the results of an international conference on the subject in Montreal in late July. CC DOCKET NO. 79-184; FCC NO. 79-459.

FCC Responds to GAO Report

The Commission has adopted its official response to a June 5 report of the General Accounting Office, (GAO), "Selected FCC Regulatory Policies: Their Purpose and Consequences for Commercial Radio and TV," dealing with commercial broadcasting.

In its response the Commission said it "generally concurs with GAO's determination of regulatory areas needing attention and with many of the specific recommendations made in the report." The Com-

mission noted that a number of the GAO recommendations are already under study as part of pending proceedings.

The recommendations addressed specifically in the Commission's response concerned the broadcast licensing process, program regulation, ascertainment of community needs, ownership of broadcast stations and equal employment opportunity in the broadcasting industry. The report also considered the Fairness Doctrine, "equal time" and spectrum use, but its recommendations on those subjects were directed exclusively to Congress.

Station Count

The latest FCC figures show the following growth in broadcast stations:

Count By Date			
Type of Station	July 31, 1979	July 31, 1978	No. Change
AM	4547	4529	+ 18
FM	3114	3049	+ 65
FM (educational)	993	933	+ 60
UHF (Comm. TV)	220	210	+ 10
VHF (Comm. TV)	517	516	+ 1
UHF (Educ. TV)	158	158	0
VHF (Educ. TV)	105	102	+ 3
Totals	9654	9497	+ 157

Rulemaking and Inquires

Loud Commercials. Inquiry on measuring the loudness of TV and radio commercials to determine whether Commission action is appropriate. Comments December 15. BC Docket No. 70-168; FCC No. 79-412; Mimeo No. 14205.

Educational FM Radio. Proposed realignment to improve the efficiency of educational FM radio. Comments October 14, replies November 20. Docket No. 20735; FCC Nos. 76-240, 78-385; Mimeo Nos. 39873, 95287. □

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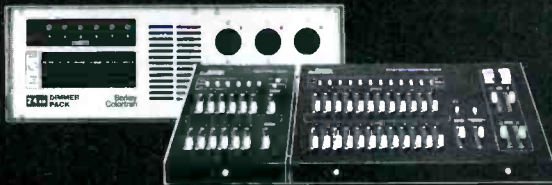
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October 1979 *Broadcast Engineering* 9

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feedback

Letters from readers, technical & miscellaneous notes, station & plant visits

From California

With reference to the letter from Mark Humphrey, station manager, WJSL-FM (**Broadcast Engineering**, December 1978) I believe that we can offer some clarification and insight.

Several associates and myself are involved with a continuing probe into the compression and modulation practices of FM stations. The problems that Humphrey described are common, easily explained, but not so simply conquered in practice.

It is possible to calibrate an oscilloscope to 100% modulation (preferably by means other than a reference station) connect it to the wideband output of an FM tuner, and measure the relative modulation levels of stations. However, this method does not display the entire picture.

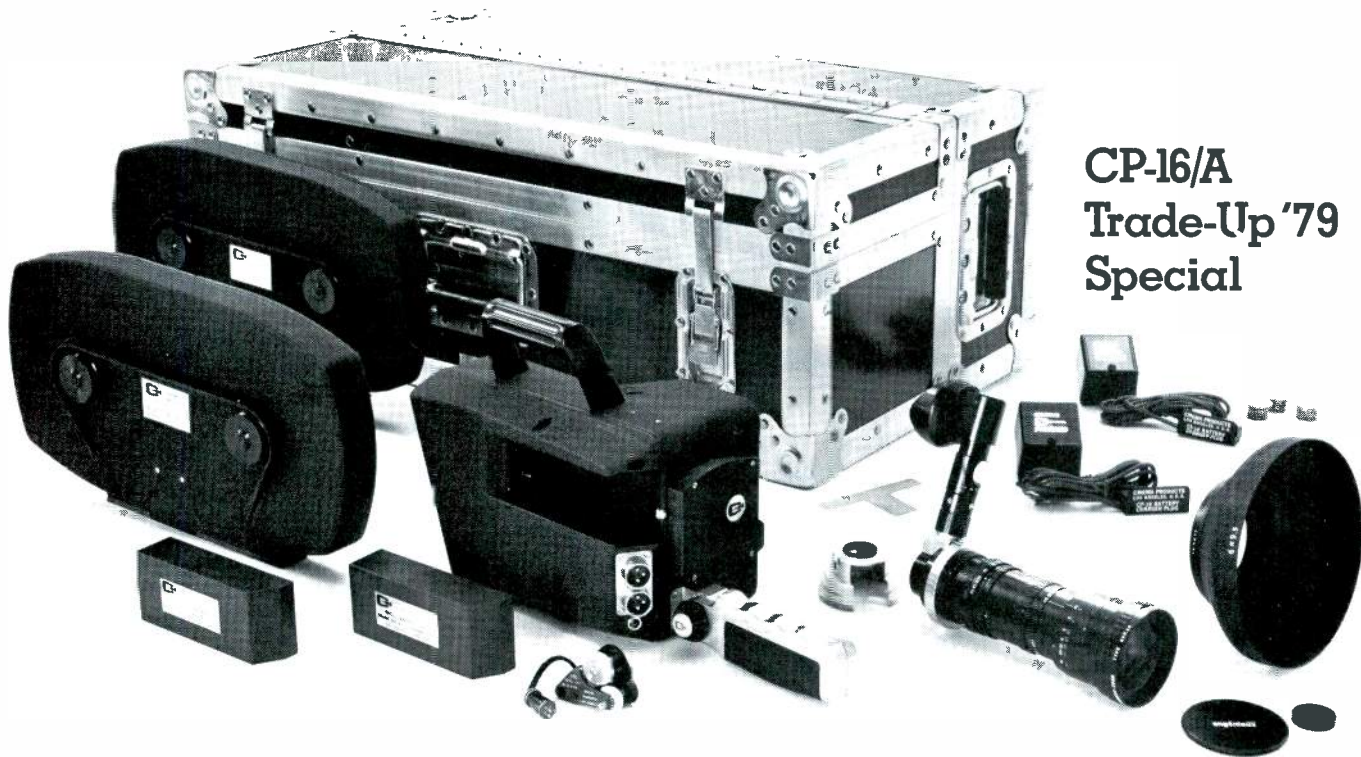
All FM limiters that we are aware of use diodes to clip the program material, providing a maximum ceiling level. This clipping action generates square waves. It has been found that 19 and 53 kHz filters in stereo generators will overshoot and ring when presented with a square wave. Combine this phenomenon with peaks that may slip by the limiter, level differences caused by filtering certain frequency square waves, and even another area that we are currently investigating—an area that manufacturers have not yet exploited—and the whole situation looks rather dismal.

Unfortunately, the overshoot that we depict is exceedingly fast and will not normally register on the modulation meter but will trigger the peak flasher. This explains the large difference (up to a 30% discrepancy between the modulation level as indicated by the meter and the peak flasher. As well, this overshoot is normally not visible on a scope, and is even difficult to see on a spectrum analyzer.

Therefore, a station that desires to sound loud for competition reasons may employ unyielding amounts of compression and other signal processing, and to be legal, they will adjust their modulation peak level using the peak flasher on the modulation monitor. Despite the fact that the modulation meter may only display 65% to 70%, the peak flasher may indicate peaks up to, and perhaps exceeding, 100%. The station may sound reasonably loud and compressed to the ear, but they are losing modulation capability, and creating other problems.

FM stations are beginning to realize that there is a solution. Sometime back, we installed an Elcom Engineering limiter system, the advantages of which permit modulation to 100%, with absolutely no overshoot. Consequently, we have adjusted our peak modulation level to 99%, and the peak flasher adjusted for 100%, simply does not trigger. Modulation, as indicated by the meter, is usually in the 90% to 95% range, with only 5 to 7 dB of compression. By utilizing some of the new limiting technology available today, it is possible for a station to sound loud, with minimum compression, by limiting the inaudible overshoot occurring in the stereo generator.

Dennis J. Martin
KOLA/KGUD
Riverside, CA



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Feedback

More on Farnsworth

A belated congratulations to **BROADCAST ENGINEERING** for the informative 20th Anniversary (May) issue. **BE** did an exceptional job documenting various phases of broadcast history.

It's most gratifying to see Philo Farnsworth given the credit he deserves for development of television. Too many references have ignored, or at best, acknowledged to a limited degree, this man's contribution to electronic TV.

Residents of the community of Rigby, ID are finalizing plans to construct a museum honoring Farnsworth. It was here in the early 1920s while a student at Rigby H.S., that the young genius formulated his ideas, which were later used as evidence for the famous patent litigations.

We are attempting to locate Farnsworth memorabilia, particularly, early models of Capehart-Farnsworth TVs plus pre-WW II electronics from his laboratories. Any assistance for this project from **BE** readers will be appreciated.

Bob Ziel, Chairman
Farnsworth TV
Pioneer Museum
152 Dove Avenue
Rigby, ID 83442

Editor's note: Can anyone direct this museum to sources of early Farnsworth equipment? If so, write to Bob Ziel directly or to **Broadcast Engineering**.

To the editor:

I have recently returned from Tokyo where I had the pleasure of listening to stereo audio on TV. It does indeed add a new dimension to watching television, and I'm sending you a copy of the weekly program listings in Tokyo to show their many programs in stereo.

It is for this reason that I believe the Dolby Labs announcement about their VHS licensing to include Dolby B-type noise reduction is an important move in the right direction. Anything which encourages better sound with TV pictures, and eventually gives the public stereo audio on broadcast or cable TV is, in my opinion, a useful addition to the range of services available to home viewers.

Joe Roizen
Telegen

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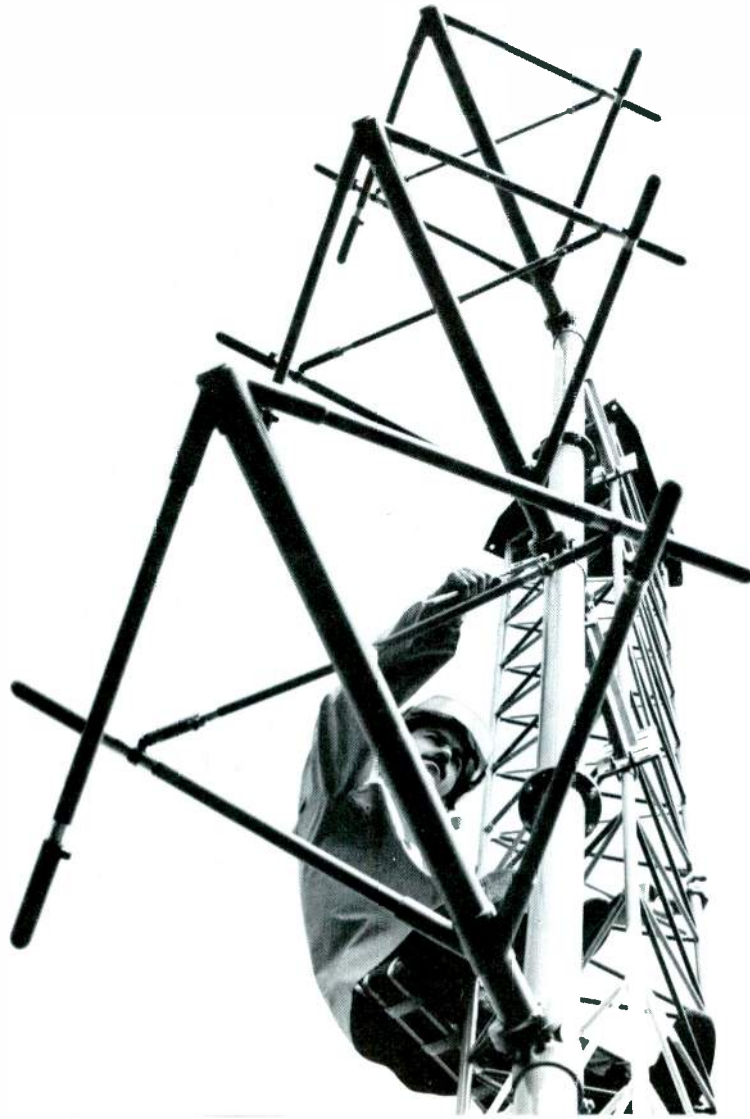
The bottom line is that Cetec leads the way in CP antennas for FM broadcast. The proof is in the field, at radio stations around the world.

For technical specs and performance data, write or telephone collect today to Andy McClure, (805) 684-7686.



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Gabbert leaves radio, going into UHF

In a surprise move, Jim Gabbert, owner of K-101 in San Francisco and president of the National Radio Broadcasters Association (NRBA), reveals he's selling his radio inter-

ests and is entering the UHF market. Gabbert's farewell speech is planned for the December, 1979 issue of **BROADCAST ENGINEERING** because his theme is going to be the future of radio and why there is need for the NRBA.

Just back from Hawaii, Gabbert

was enthusiastic about his new ventures in broadcasting. "I'm not leaving radio because of the money," he said, "it's been a very lucrative business. But it seems that we've done about all there is to do in radio, and its time I go on to new challenges."

"When you look back on all the 'firsts' we've pioneered at K-101 (see the May issue of **BROADCAST ENGINEERING**, pages 90-91 for a summary of these contributions) it's astounding. Pioneering new technology applications has built a top organization here, and we enjoyed both financial and technical successes. But, we've reached the top of the mountain and have an incredible money machine, but the challenge just isn't there. I think UHF is just on the threshold—facing some formidable problems and dramatic changes. That's where I want to be."

Regarding the sale of his stations, Gabbert says that three of his four stations have been sold, and the FM station should be sold within the next few weeks. His two stations in Honolulu were purchased by John and Kathleen Parker, owners of KOWL in South Lake Tahoe, CA. "We're thrilled with the acquisitions," commented Parker. "Jim has done such an excellent job in engineering and programming that we don't plan any immediate changes. And, Jim will still be consulting with us. If he (Gabbert) contributes to television as he has to radio, there are going to be some exciting times ahead."

The AM station is being purchased by Rene DeLarosa who's now with Channel 20 in San Francisco, and he is planning a significant change. "This will be," says DeLarosa, "the first Spanish-American owned station in the Bay area with a Spanish format, and our coverage of the area will be complete. When the transactions are approved, I'll be leaving television for radio as Gabbert goes the other direction."

Gabbert plans to file applications for buying his UHF station (KEMO-TV/Channel 20, San Francisco) within the next few weeks. **BROADCAST ENGINEERING** wishes Jim Gabbert good fortune in his adventure into television.

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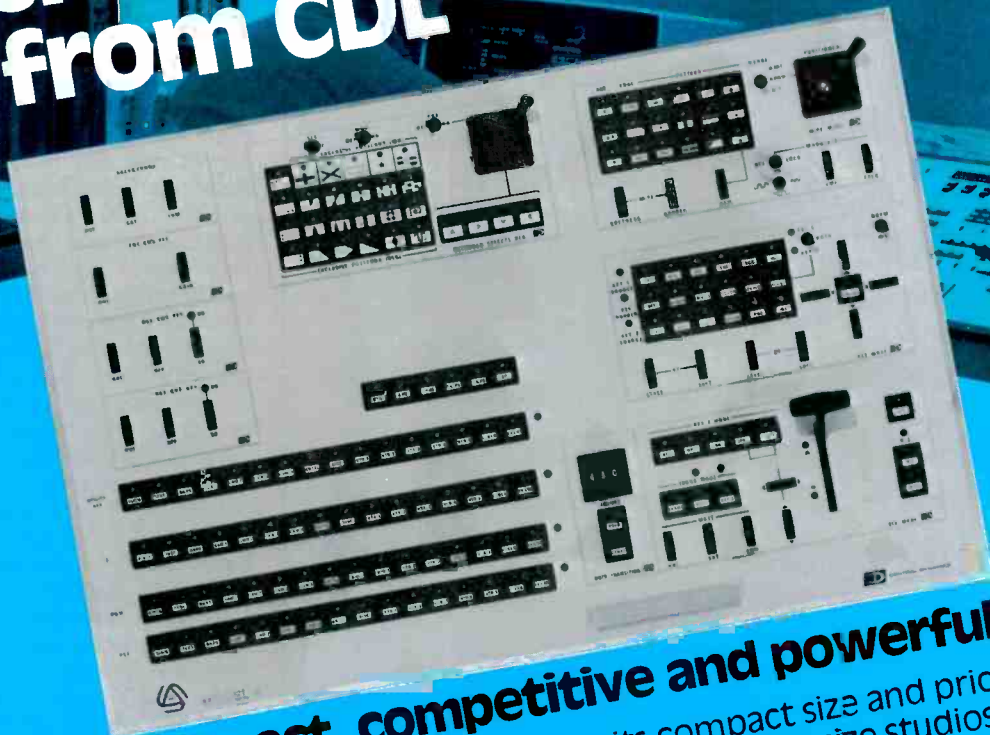
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CENTRAL DYNAMICS



Industry news

Broadcasters establish communications committee

Radio and TV broadcasters planning to provide media coverage of the republican nominating convention in Detroit or the democratic nominating convention in New York City are invited to join a political convention radio frequency coordinating committee that is holding regular meetings in New York City.

The Committee is presently comprised of over 30 members representing 12 broadcast companies,

including the three major television networks. Primary purpose of the Committee is to coordinate all wireless microphones, 2-way communications, microwave and other related RF needs of broadcasters and others planning to cover the conventions by determining user requirements, providing frequency coordination, analyzing radio interference problems and providing viable recommended solutions, and acting as

the liaison organization to the FCC, political parties, and other concerned agencies.

Individuals or groups desiring information concerning the Committee should contact the chairman, Michael LoCollo, at the American Broadcasting Company, Dept. BE, Broadcast Operations and Engineering, 57 West 66th Street, New York City, NY 10023 (telephone (212) 887-3489).



The ultimate in cost effective, state-of-the-art, compact console design.

Trouble-free by design—MICROTOUCH bus switching eliminates lever key switches, inputs and outputs are transformer isolated to block RF pick-up, ground plane shielding protects circuitry. LED's and self-indicating switches provide operator feedback.

Up to 21 inputs in 5 channel (21" wide) and 8 channels (26" wide) rotary and linear fader configurations with dual mono and dual stereo outputs.

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Government relations

The president of WGHP-TV in High Point, NC, Eugene Bohi, also serves as chairman, Government Relations Committee, Board of Governors, ABC Television Affiliates Association and has appeared before many government committees on broadcast-related issues. Bohi recently appeared before the Senate Communications Subcommittee dealing with S-611 and S-622 and found legislators eager to learn about the broadcaster's views. "They were amazed that the top 20 markets in the US serves only about 45% of the population," Bohi said. "And, these elected officials sincerely want to hear from broadcasters on how particular legislations affect them."

To help broadcasters strengthen their presentations to legislators, Bohi has prepared a booklet titled *Defending Yourself in Congress*. It is available at cost (\$1.00 for postage and handling) from WGHP-TV, Dept. BE, 400 N. Main Street, High Point, NC 27260.

New Canadian policy

A new policy which involves changes in Canadian spectrum allocations in the 406 to 960 MHz frequency band have been made to accommodate the growing requirements of a number of radio services including mobile, broadcasting and amateur. The department will adopt more efficient techniques for allotting television channels to enable forecast UHF TV requirements to be satisfied within channels 14 to 69.

Details of the policy are outlined in *Spectrum Allocation Policy in the 406 to 960 MHz Frequency Band*. Copies may be obtained from the Information Services, Department of Communications, Ottawa K1A 0C8.

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IN A TEST OF ONE-INCH VIDEO TAPES, WE ACED OUT THE COMPETITION.

When we tested the top four brands under strict lab conditions, the overwhelming performance leader was Scotch 479 Master Broadcast Video Tape. In fact, we came out on top in all ten performance categories.

If that isn't reason enough to make us your choice, maybe this is. We're the only one-inch supplier that winds your tape onto a special cushioned flange reel to protect against shipping and handling damage. And we pack and ship our tape in a flame-retardant case to give you even more protection.

We're the people who pioneered the development of video tape 25 years ago. And according to the pros who know video tape best, we're still the best video tape. Give or take an inch.



3M

The 3-tube Saticon* camera you wanted...

A/V executive "I want a camera that makes my department's tapes look good at a price that makes me look good. One that can adapt to our needs as we expand."

Purchasing agent "I'm naturally looking for maximum value in a video camera. One that delivers a lot of features for the money...from a manufacturer I can trust."

Field cameraman "A nice compact, lightweight, well-balanced camera. One that delivers clear shots even in near darkness. That's what I need."

Top management "Higher productivity, more effective training and selling, better communications... if a video camera can help deliver that, I'm for it."

Studio cameraman "We're ready for the high performance of a sophisticated Saticon camera. And I can certainly do without having to have a separate genlock unit."



*Registered trademark of Hitachi

You got!

"We can turn out needle-sharp pictures with the KY-2000L. And with optics like JVC's remote control unit, it's adaptable to just about any field or studio situation."

"The KY-2000U meets all my criteria for performance and price. And I know I can trust JVC, with their reputation for quality."

"This neat little KY-2000U is less than 12 lbs. with 1.5" viewfinder. Handles nice and easy. And with 52 dB S/N and sensitivity doubling to 12dB, what more could I ask?"

"I can see how the KY-2000U can help me get more out of my people wherever communications is involved."

"What a relief! No more separate genlock. And the Saticon tubes really deliver high sensitivity and resolution, and low lag."



JVC's new KY-2000U 3-tube Saticon camera is a real rarity today: an engineering breakthrough that makes economic sense, too. It has all those features mentioned above. Plus horizontal and vertical contour correction, both standard. Built-in variable blanking circuit and VTR trigger mode select. Broadcast-standard Y.I.Q. encoder. C-mount lens versatility.

And something else just as important: JVC's reputation for superb quality.

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National Association of Broadcasters

1771 N Street, NW
Washington, DC 20036



NAB objects to FCC cable decision

The FCC was informed by the NAB that it has no major objections to proposed technical standards for the television auxiliary service, but it does object to the Commission's decision allowing the Cable Television Relay Service (CARS) and the Broadcast Auxiliary Service (BAS) to share TV band D. According to the NAB sharing band D "totally disregards the public interest priorities of local live television news operations." Association spokesmen say that "coordination procedures between the CARS service and TV mobile operations are totally unworkable and will lead to insurmountable difficulties for CARS and BAS operations as well as for the commission's staff."

A justification for broadcast claims for cable copyright royalties filed by the NAB suggests that copyright ownership and time be the

Engineering committees announced

Members of two NAB engineering committees were announced by President Vincent T. Wasilewski and NAB board chairman Thomas E. Bolger. The engineering advisory committee will be chaired by Robert W. Flanders, vice president and director of engineering, McGraw-Hill Broadcasting, Indianapolis, IN. Other members include William E. Garrison, Eugene R. Hill, Albin Hillstrom, Eugene Jackson, Walter E. May, Martin Meany, Robert A.

O'Connor, R. LaVerne Pointer, Doyle Thompson and William Wisniewski.

The broadcast engineering conference will be chaired by Edward H. Herlihy, vice president, engineering, Golden West Broadcasters, Los Angeles, CA. Its members include James Bloyd, Robert Butler, Joseph P. Gill, William Honeycutt, R. LaVerne Pointer, Russell B. Pope, L. S. Stevens, Richard G. Streeter, Charles Wright and William Wisniewski.

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that is unsurpassed in today's video recording industry. Available in SMPTE Type "C" or "B" formats. 34 min/66 min/94 min.

Contact Ampex Corporation, Magnetic Tape Division, 401 Broadway, Redwood City, CA 94063, 415/367-2011.

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NAB news

basic criteria that govern royalty distribution. According to NAB, royalty amounts due should wait until the Tribunal decides the formula that will govern their distribution. A sample claim was devised that includes four categories of programming for television stations with a simpler version for radio stations. The TV station form allows for locally-produced programming, sports events, programming of

which the station is an exclusive licensee, and the entire broadcast day. Radio stations that record their entire broadcast day may also claim royalties for them as compilation.

NAB requests regulation clarification

The NAB is supporting CBS in an effort to convince the Federal Elec-

tion Commission to clarify and reconsider recent regulations governing funding and conduct of debates between federal candidates for public office. According to CBS, if interpreted narrowly and without reference to other provisions of the Federal Election Campaign Act, the regulations would bar commercial radio and television stations from conducting candidate debates. CBS also questioned whether a regulation that would prohibit a primary election debate among one party's competing candidates where the other major party has an uncontested election unless that other party's candidate is added would be constitutional.

Separate classification requested

A request was made from an Ad Hoc committee of the NAB and the Broadcast Financial Management Association to the Office of Industrial Economics to retain the separate asset classifications for broadcast equipment. A study is being conducted by the office on the Class Life Asset Depreciation Range System for assets used in telecommunications activities. The broadcast industry is separate from telephone and cable and the committee maintains this should continue in any revision of the system.

NAB suggests March conference be devoted to planning

A suggestion from the NAB to the FCC requests that the Region II Administrative Radio Conference on AM broadcasting to be held in March be devoted to planning rather than decision making. According to the NAB, actions taken at the General World Administrative Radio Conference (WARC) could have a large impact upon the meeting and negate many of the preliminary steps.

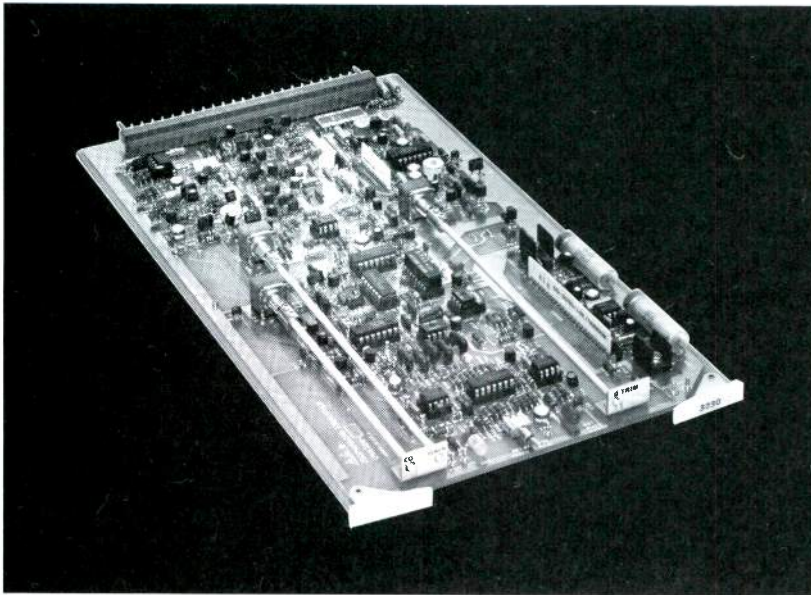
Inquiry of rates

The NAB has filed with the FCC a form that supports the World Press Freedom Committee's request that the FCC institute an inquiry of the rates charged for international press services. The committee has asked that preferential rates be established. □

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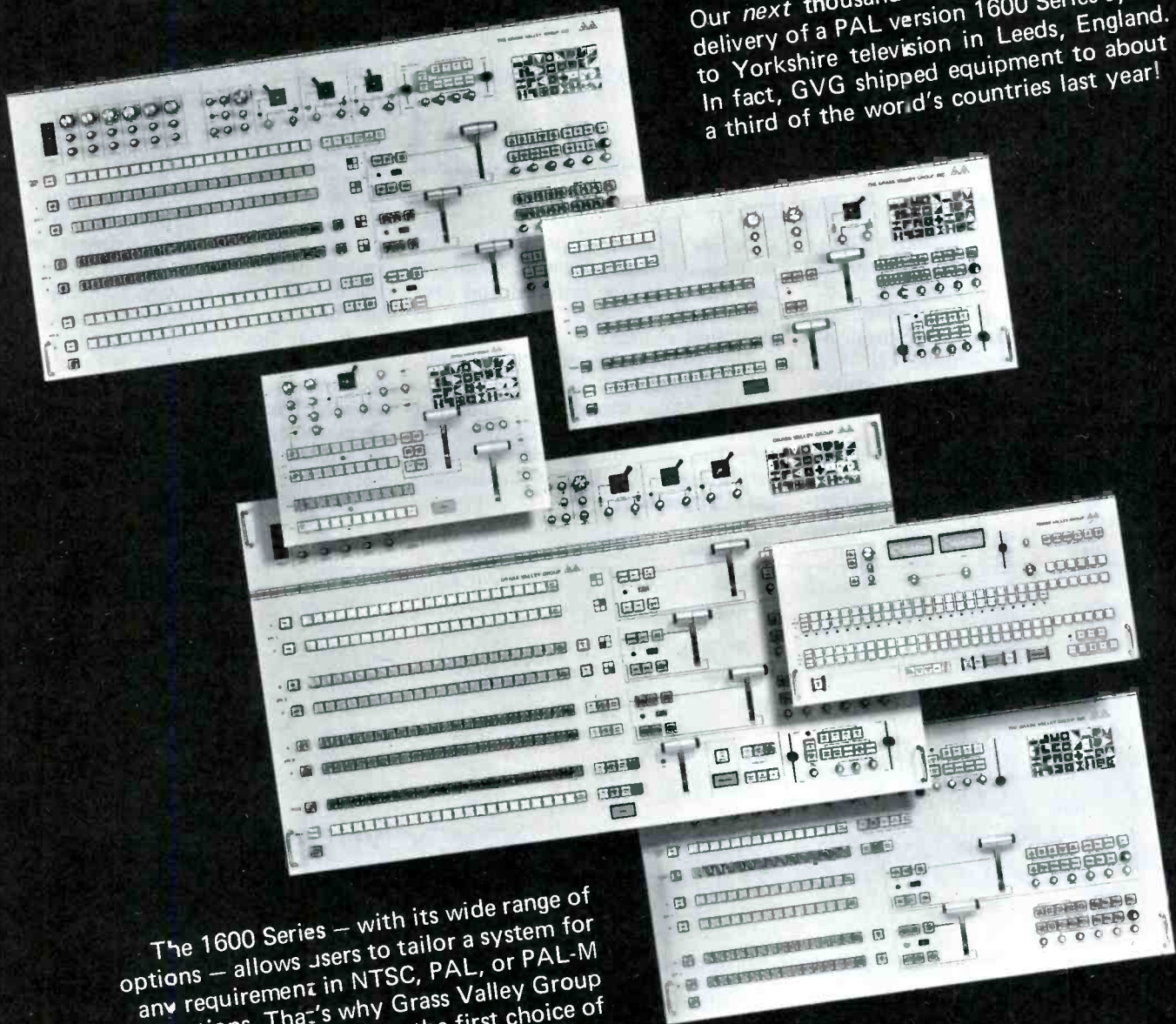
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NRBA

National Radio Broadcasters' Association

1705 De Sales Street, NW
Washington, DC 20036

NRBA concerned over government commercial intervention

The NRBA is concerned about a recent commercial time petition filed recently with the FCC by the National Citizens Committee for Broadcasting (NCCB) because "it is a classic example of government intrusion into an area where it does not belong." The petition would limit the number of commercial minutes to 10 per hour and the number of breaks to four per hour, with lower amounts permitted during children's viewing hours. The NRBA views the proposal as "so retrogressive as to be almost medieval and strikes at the very heart of our present system of commercial broadcasting."

FCC issues Notice of Inquiry

The FCC recently issued a Notice of Inquiry regarding the issue of loud commercials in which the focus will be on three main questions: (1) What are effective and appropriate measurement procedures, (2) What range of loudness can be tolerated, and (3) What remedies are economically feasible?

Solutions under consideration include outlawing programming interruptions and requiring that commer-

cials be clustered at hourly and half-hourly intervals; and, requiring that non-program material and program material be "compatible in style and volume."

The NRBA believes that the problem is negligible, especially in the case of radio broadcasts, and that the marketplace is the best regulator. The association will file comments with the FCC by the December 15 deadline.

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Larry Pfister
VP Marketing

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Although it's a desk-top model, our 1600 Series audio console offers a brilliant array of features and capabilities for handling the most demanding program material.

One of our new breed of consoles, the ADM® 1600 is available with up to 16 discrete inputs, 4 submaster and 2 master outputs. Combined with a host of pre-selector, buss selector and processor modules, the ADM 1600 creates perfect harmony with today's video. Like all ADM consoles, the 1600 is designed to exacting standards and manufactured to the most rigid tolerances. Each ADM console is backed by an exclusive 5-year warranty.

Make sure you control the entire audio spectrum. Contact Audio Designs and Manufacturing, Inc., 16005 Sturgeon, Roseville, MI 48066. Phone (313) 778-8400. TLX-23-1114. *The Audio Company.*

Why you should continue Plumbicon® TV tubes in

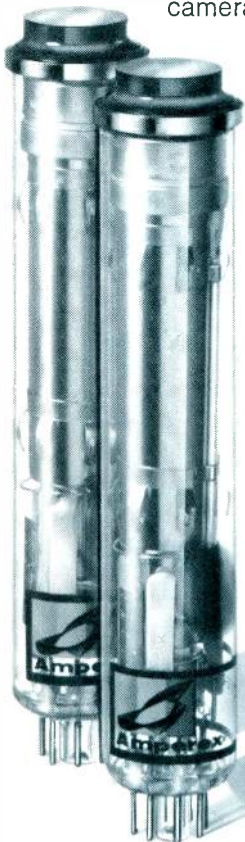
The future for ENG grows brighter and more exciting with each passing day. The same can be said about the $\frac{2}{3}$ -inch Plumbicon, the TV camera tube that made Electronic News Gathering possible and practical at the same time.

Reflecting our continuing commitment to provide the broadcast community with state-of-the-art Plumbicon tubes—it was a Plumbicon tube that revolutionized color TV broadcasting in 1964—we invested almost four million dollars in the development of the $\frac{2}{3}$ -inch Plumbicon tube, most of it before the first ENG cameras were even introduced. Very early in the game, we felt that electronic journalism, with the support of modern tube and camera technology could surely add a new dimension to television broadcasting.

Even with that confidence, the phenomenal acceptance of Plumbicon-equipped portable cameras nearly overwhelmed us, as it did everyone else. In just 18 months we have supplied almost 4000 of these tubes to U.S. broadcasters!

In a market of such magnitude, it was not unexpected that other $\frac{2}{3}$ -inch camera tubes would arrive on the scene, sooner or later, with the usual "ours is better than theirs" claims. We feel that much conflicting and contradictory information has been given to the broadcast industry, regarding these new tubes. In the final analysis, only you, the broadcaster, can judge the *system performance* of these tubes and compare their performance *in the camera* with the Plumbicon tube.

In the meantime, we offer some of our own experience on the system performance of the Plumbicon tube compared to the Saticon (Registered trademark NHK/Japanese Broadcasting Corporation), one of these recently arrived new products.



Sensitivity Sensitivity is the critical parameter in ENG. In the field, where you have no control over lighting, you need the Plumbicon tube's greater sensitivity to maintain an acceptable signal-to-noise ratio in your final edited news story. Even in those next-to-impossible lighting situations, you are more assured of producing a useable picture with a Plumbicon-equipped ENG camera than with the same camera equipped with the Saticon.

Resolution Your final, edited tape is the criterion by which you must evaluate ENG system performance, and your pick-up tube should always be selected with that fact in mind.

Resolution specifications are a good example of this principle. Plumbicon tube sensitivity gives you enough latitude for aperture correction with very little loss in S/N ratio, to achieve the required 100% modulation depth at 5 MHz, but the resolution of most ENG systems is limited by the video tape equipment used. From the systems performance point of view, therefore, a pick-up tube chosen solely for its resolution specifications may have no positive effect at all on picture quality!

Lag The Plumbicon tube has lag characteristics that are so favorable that it can be used entirely without bias light. If your camera provides bias light, it simply improves the Plumbicon's lag characteristics. The Saticon *must* use bias light or its pictures will be seriously degraded. In the middle of a news event, should a bias light lamp burn out!

to specify $\frac{2}{3}$ -inch your ENG cameras.

Temperature Stability

Since the Plumbicon's photoconductive layer is processed at temperatures in excess of 175°F, your Plumbicon tube can tolerate temperature excursions that may take the photoconductor to 160°F. The Plumbicon tube tolerates 160°F ambient without damage of any kind. The Saticon, however, will experience partial or complete layer destruction at these temperature levels after a few hours. It is totally conceivable that your ENG camera will experience temperatures which will cause the Saticon tube in your camera to approach a critical life condition.

Life Based upon actual operating experience with the Plumbicon, rather than on statistics of accelerated life testing, you can expect from 2 to 5 years of service, depending upon operating practice.

Burn-in The Plumbicon exhibits no, or very little perceptible picture sticking (burn-in) especially in highlights. The Saticon, on the other hand, has been observed to have a noticeable characteristic of "hanging-up" on bright highlights and also tends to exhibit picture sticking after a camera has been focussed on a scene for any length of time.

Registration The Plumbicon tube incorporates a precision gun assembly for controlled geometry and registration. Our final testing includes a computerized registration check which matches each tube's performance with a data base which includes readings on previously tested tubes. Should any tube fail to match up to this data base, it is rejected. This is added insurance that your camera will maintain precise registration even after you replace your original Plumbicon tubes. Needless to say, you *do not* have to replace the Plumbicon tubes in "sets."

Storage The Plumbicon can, of course, be stored for many months without deterioration. But why store TV camera tubes? Storage means money. Amperex service to the broadcast industry is justly famous. Delivery of replacement tubes anywhere in the USA within 24 hours is routine. In extreme emergency situations, we have shipped tubes clear across the country in as little as eight hours.

We expect you to make your own comparisons and we are sure your findings will agree with ours. One of the things that may not be apparent from your comparisons is the fact that Plumbicon TV camera tubes continue to stay abreast of the needs of the broadcast industry after more than ten years of production which has put almost 150,000 Plumbicon tubes into broadcast stations around the world.

When you specify Plumbicon tubes in your ENG cameras, we deliver a lot of experience.

For more information, contact:
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ACADEMY OF TELEVISION ARTS & SCIENCES

The Airing of the 31st Annual Emmy Awards

Jeanine Fox, Technical Manager,
Broadcast Operations & Engineering,
ABC, Hollywood, CA.



On September 9th the prestigious Emmy Awards were given for excellence in television arts and sciences. This is a brief glimpse of the behind-the-scenes action in preparation for the event.

This year's broadcast of the 31st Annual Emmy Awards for the Academy of Television Arts & Sciences on ABC-TV was designed to be a marriage of the old and the new. Set amid the history of the 50 year

old Pasadena Civic Auditorium in Pasadena, CA, art director Brian Bartholomew took special care to design the set as an integral part of the newly redecorated center. His work made the audience an intimate

part of the event rather than just viewers of a set.

The technical equipment for the event began rolling in on September 4. The bulk of the cabling was triax, which allowed ease of installation and 3000 or 4000 foot runs with no degradation of signal. Cabling for the 7-camera operation was completed by the evening of the 4th. That evening ABC's phase six video truck arrived along with the videotape truck containing a total of five Ampex VPR-2s using Type C format.

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HBU-4400



You don't need a "gorilla" to carry the portable HBU-4400. It weighs only 22 lbs. without the battery and provides 10 full minutes of recording time per cassette. Cassettes are preferred for portable applications because you don't have to monkey around with reel-to-reel tape. High band "quad"

quality is achieved by tripling the head-to-tape speed of the U-format recorder and adding Recortec electronics to a transport with proven interchangeability. For reliability reasons the capstan and scanner speed increase is achieved without any change in motor rpm and, of course, all bearings are still well within their design limits.

And when you need a studio machine for playback and editing there is the HBU-2860 that will faithfully reproduce your high quality HBU tapes. We kept the 2860 remote control interface unchanged so it can work

HBU-2860



with your computerized editing system.

The HBU format is economical to own and economical to use. The HBU costs less than a third of machines of other formats with the same video quality. Tape costs are lower too. CONCLUSION: Buy the HBU and donate your "gorilla" to the zoo.

Other products from Recortec are: Video Tape Conditioners and Video Tape Evaluators for all tape widths, Video Cassette Evaluators, Video Tape Timers and Reel Servo Modifications (R-MODs) for quad recorders and Video Tape Addressors which record time code on two-inch tape at high speed.

Emmy Awards

Four of the machines were scheduled for use in the Emmy program and one served as back-up.

ABC's truck compliment included two Chyron IV character generators and titling systems, two Arvin video framestorers, and four Quantel units (two were model 3100 digital framestore synchronizers and two were model 5000 digital production effects systems). This equipment gave producer Bill Lee and producer/director John Moffitt the desired effects. The Quantel 5000s enabled them to capture audience reactions as they happened and to broadcast

them back in a most unique way. In addition, a truck from Filmways-Heider, Hollywood, CA, handled audio operations.

Two Philips LDK-5 cameras were set on the stage, both on Chapman sidewinder cranes. These cameras had the option of either 18:1 or 30:1 lenses. This was planned to enable shots of talent on stage, with needed mobility, and some audience shots. Two pedestal cameras, Philips LDK-5s with the same choice of lenses, were mounted on a platform near the center of the lower level audience area on P-50 peds. These

cameras remained relatively stationary—their main function being to shoot the stage.

Two hand held cameras, RCA TK-76s with 12:1 lenses, were stationed at the head of the right and left aisles adjacent to the stage. These were used with Steadicam supports to give versatility and depth to award-winner shots and audience segments. These were fed via a hand held microwave system to the truck adding yet another dimension of versatility, and also satisfying fire regulations regarding cabling in the audience area.

Emmy Awards for Outstanding Achievement in Engineering Development

There is bound to be confusion regarding the prestigious Emmy Awards because two separate academies now bestow the award independently. One of these organizations, the National Academy of Television Arts and Sciences, is headquartered at 110 West 57th Street, New York, NY 10019. John Cannon is its president. The other academy is called the Academy of Television Arts & Sciences and is headquartered at 4605 Lankershim Blvd., Suite 800, North Hollywood, CA 91602. Hank Rieger of NBC is president and Richard Krafusur serves as awards administrator. For simplicity, **BE** will refer to the East Coast organization as the *National ATAS* and the West Coast organization as the *ATAS*.

The Emmy Awards for Outstanding Achievement in Engineering Development go to individuals, companies, or organizations for developments in engineering that are either so extensive an improvement on existing methods or so innovative in nature that they materially affect the transmission, recording or reception of television. Awards may be shared among technology contributors, and they need not be awarded each year.

The ATAS Emmy Awards were aired the night of September 9th, and the article here describes some of the technical preparations for that event. This year Ampex was awarded an Emmy for their Automatic Scan Tracking system for helical videotape equipment and Magicam was given a special citation for development of real time tracking of independent scenes.

The Blue-Ribbon Panel selecting these awards consisted of: Gary Borton, Eastman Kodak; Leo Chaloukian, Ryder Sound Services; Ken Erhardt, NBC; Jim Fulmis, J. K. Engineering; Joe Kelly, Glen Glenn Sound; Hal Landaker, The Burbank Studios; Harry Lubcke, patent counsel; Don McCroskey, ABC; Bob McKenny, CBS; Steve deSatnick, KCET; George Tokar, KHJ-TV; Petro Vlahos, Vlahos-Gottschalk Research Corporation; and Fred Wolcott, chairman.

The National ATAS ceremonies took place on September 17th in the Rainbow Room at the top of the RCA Building in New York. John Cannon spoke of this event at his luncheon speech at NAB/Dallas '79 on March 26th, the banquet culminated extensive preparations. Emmy Award winners this year were Ampex and Sony (jointly) for engineering development of the compatible 1-inch Type C format that made possible improved videotape recording, editing and playback. Also, a citation was given to the Society of Motion Picture and Television Engineers for the standardization work associated with the 1-inch Type C format. Although the event was not aired, Cannon expressed excitement about the industry response to this year's ceremonies.



Holding the Emmy that Sony was awarded for development of the compatible 1-inch Type C videotape format are Masahiko Morizono, (second from left) managing director, Video Products Division, Sony and Koichi Tsunoda, (second from right) president, Sony USA, which markets Sony's broadcast products in the US. John Cannon, (far left), president of the National Academy of Television Arts and Sciences, and Robert Wussler, chairman of the board of the academy, presented the award at ceremonies September 17 in New York.



Donald V. Kleffman, vice president/general manager, Ampex audio-video systems division (left), accepts an Emmy for outstanding achievement in the science of television engineering from Robert Wussler; looking on is John Cannon. Ampex shared the Emmy with Sony for development of the Type C video format.

WALL STREET TODAY
 DOW JONES: 757.54
 ↓ 5.80
 VOLUME: 21,950,000
 NYSE: ↓ .01
 AMEX: ↑ .02

News Index

- ✉ Postal Strike
- ☁ Storm Watch
- 🎵 Maestro Returns
- 🎬 Movie Review
- 🏆 America's Cup

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17 17

THE MORNING SHOW

TIME: 8:25

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Emmy Awards

Rounding out ABC's camera compliment was a hand held Ikegami HL-77 with a 10:1 lens positioned in the balcony. Three separate cable drops were used to give this camera its own ability to obtain the most creative perspective. These cable drops were fed to one location in the balcony to facilitate almost instantaneous switching.

In addition to the happenings at the Pasadena Civic, ABC's Studio 59 was used for a pre-recorded entertainment segment incorporating several special features, including an

elaborate UltiMatte 1 chroma key portion. The orchestra for the event was located at Filmways-Heider with a 15kHz loop carrying it to Pasadena, with a back-up standing by. Another highlight of the evening, from yet another source, was a live feed from the White House where President Carter added some of his thoughts regarding the media and the people who make it what it is. The President's feed came via satellite and AT&T to Pasadena.

All portions of the program, those created or received at Pasadena—the hosting, the award presentations, the music, the President's comments and the pre-recorded entertainment—then made their

journey via microwave to ABC's Studio 57 for commercial integration and on to New York. A return loop from Studio 57 fed nearly 100 monitors at Pasadena. Most of these monitors were located in the audience area, with a major portion in the conference room adjacent to the auditorium and in a special area of the Holiday Inn, also adjacent to the auditorium, for the deadline press.

It all came together on the night of September 9th, the state-of-the-art and the art-of-the-theater. And, with both production and engineering doing their homework, the 31st Annual Emmy Awards broadcast on ABC-TV was an evening to remember for both young and old. □

The following list shows Emmy Award winners for technical achievements from 1970 to date:

- 1971-72—Lee Harrison, III, for the development of Scanimate, an electronic means of generating picture animation.
- 1972-73—Sony, for the development of the Trinitron, a picture tube providing good picture quality in color television receivers.
 - CMX Systems, a CBS/Memorex company, for the development of a videotape editing system utilizing a computer to aid the decision-making process, store the editing decisions and implement them in the final assembly of takes.
- 1973-74—Consolidated Video Systems, for the application of digital video techniques to the time base corrector, permitting use of smaller, lightweight, videotape equipment on news and other outside events in television broadcasting.
 - RCA, for its leading role in the development of the quadraplex videotape cartridge equipment, providing improved production reliability and efficiency in broadcasting videotaped program segments, promos and commercials.
 - The Telecopter—To John D. Silva for the conception and expertise and to Golden West Broadcasters for its realization.
- 1974-75—Columbia Broadcasting System, for spearheading the development and realization of the Electronic News Gathering (ENG) system.
 - Nippon Electric for development of digital television frame synchronizers.
 - SMPTE, citation for the technical development of the Universal Videotape Time Code Reader.
- 1975-76—Sony, for the U-matic microcassette system used in electronic news gathering.
- 1978 —Petros Vlahos of UltiMatte, for outstanding achievement in engineering development related to color matte composite techniques.

Los Angeles, September 9th (aired)

- 1979 —Ampex, development of their automatic scan tracking system for helical videotape equipment.
- Magicam citation for development of real time tracking of independent scenes.

New York, September 17th (not broadcast)

- 1979 —Ampex and Sony, joint awards for the engineering development of the compatible 1-inch Type C format that made possible improved videotape recording, editing and playback.
- SMPTE, citation for the standardization work associated with the 1-inch Type C format.



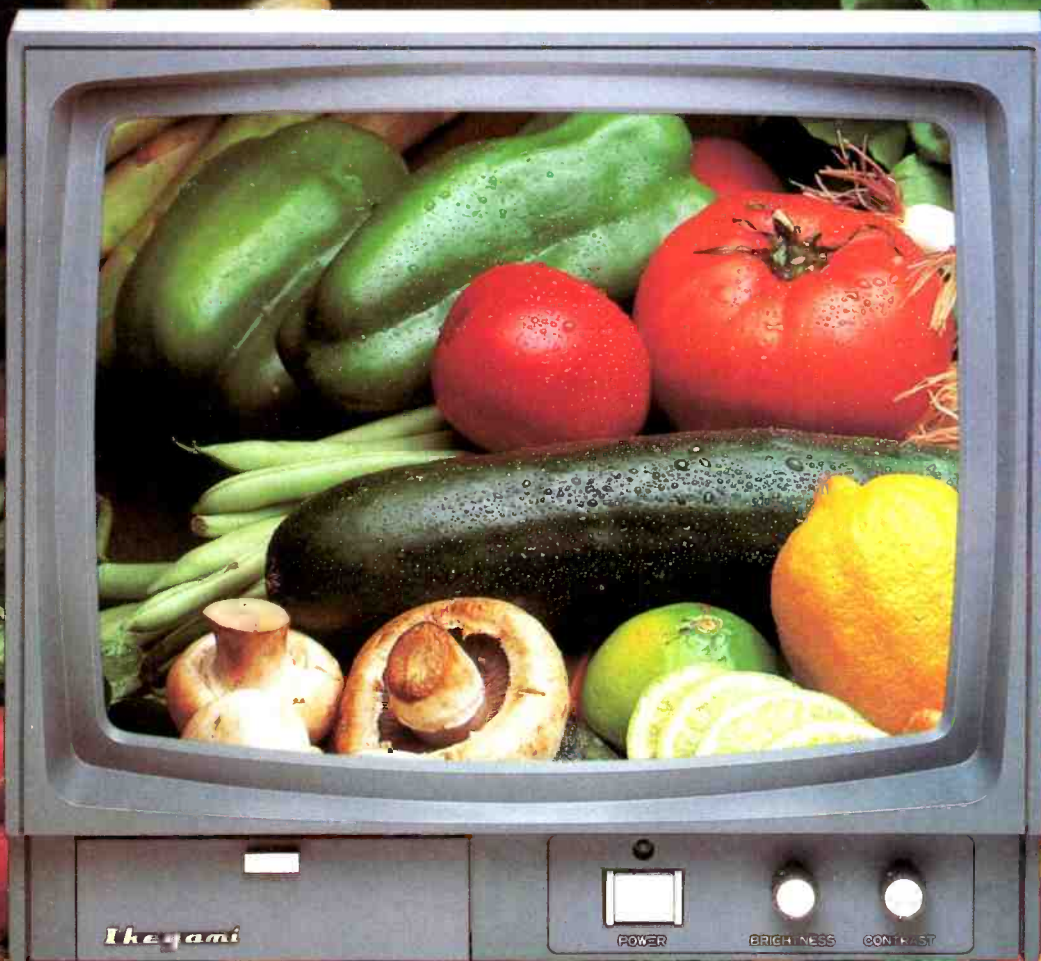
A historical moment. Charles Ginsburg, head of the team that produced the VR-1000 videotape recorder, was on hand in Hollywood in March 1957 to accept Ampex' Emmy Award for the system's development.

Ampex' second Emmy was received in 1967 for development of high band color videotape recording. The firm's third Emmy was awarded September 9, 1979 for the development of their automatic scan tracking system for helical videotape equipment.

Ampex' fourth Emmy (shared jointly with Sony for development, and with SMPTE for standardization of the Type C format for videotape recording) was presented, but not broadcast, in New York at the National Academy's ceremony on September 17th.

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For details and additional information contact: Ikegami Electronics (USA) Inc., 37 Brook Ave., Maywood, N.J. 07607, (201) 368-9171; West Coast: 19164 Van Ness Ave., Torrance, Calif. 90501, (213) 328-2814; South West: 330 No. Belt East, Suite 223, Houston, Texas 77060, (713) 445-0100.

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**“FINALLY THERE’S A ONE-INCH
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DAVID HALL / OPRYLAND PRODUCTIONS

Opryland Productions is one of the largest video production houses east of the Mississippi. The company's facilities have been used for shows as varied as "Nashville on the Road," "Big Ten Basketball," and "Dance in America."

David Hall, General Manager of Opryland Productions, has been using the Sony BVH-1000 video recorder for close to two years and two BVH-500 portable recorders for about six months.

"Sony one-inch equipment has expanded our capabilities considerably," says Hall. "With a BVH-500, we were able for the first time to get broadcast quality tape on a roller coaster for an upcoming special.

"We also took the BVH-500 on a ferris wheel and in a helicopter to tape 'Superstars at the Ohio State Fair.' It performed as well as they did.

"Now we're using Sony on almost all shows we tape in the field. The big advantages are portability and cost. Durability, too. Sony even bailed us out when we were taping a quad production and our equipment broke down. We used Sony to finish the job, then transferred the results to quad. The client was more than satisfied.

"And when the Dominican Republic asked us to tape the visit of Pope John Paul II, we couldn't have done it without our Sony video recorders," Hall adds.

"Because they travel so well, we could get down there fast and do a professional job."

Of course, Sony makes a full line of one-inch broadcast equipment, all of it backed by state-of-the-art technology. We have video recorders, cameras, editors, and the BVT-2000 digital time base corrector.

For information, write Sony Broadcast, 9 West 57th Street, New York, N.Y. 10019. Or call us in New York at (212) 371-5800; in Chicago at (312) 792-3600; or in Los Angeles at (213) 537-4300.

Like David Hall at Opryland, you'll be impressed. Even if your productions don't have you going around in circles.

SONY BROADCAST

Sony is a registered trademark of Sony Corp.

The 64th AES Technical Meeting and Exhibits

**Waldorf Astoria Hotel
New York City
November 2-5, 1979**

The Audio Engineering Society anticipates that the 1980s will be a period of exceptional growth and technological change in the field of audio engineering. In preparation for this audio evolution, the 64th AES Convention has been planned to provide a technical base from which to step into the future. A program of outstanding technical papers is being planned along with the largest product exhibit in the AES history—both coupled to stress a foundation for the future.

Robert Schulein, papers chairman for the 64th AES Convention, and his committee, are assembling an impressive program of papers in the following subject areas:

- Digital techniques
- Electronic music
- Environmental audio
- Magnetic and disc recording
- Signal Processing and Instrumentation
- Sound reinforcement and
- Transducers

An expanded exhibit area is planned this year to permit AES Convention attendees to view the latest in audio instruments and products, including new and exciting digital products, on five different levels of the Waldorf Astoria. Also, this year the exhibit area is contiguous with the demonstration area for easy traffic flow without need of elevators.

Exhibit space is already sold out for the 64th Convention, but some demo rooms are still available. There are 157 exhibitors, a substan-

tial growth over the 128 exhibitors of last year's convention.

UK plans big splash at AES Convention

As **BE** goes to press there is anticipation that some exciting things are about to happen at the 64th AES Convention in the area of digital audio technology, but there have been no formal announcements received as yet. However, British organizations have announced that the newest and best British audio processing equipment will be featured in New York. At least 20 UK firms are exhibiting at AES, and new equipment includes: master recording consoles and studio computers; high frequency pressure drivers; a cut-only, 29-band, third-octave graphic equalizer; and a stereo compressor-limiter-expander.

A synopsis of the UK exhibitors and their products at the AES Convention follows:

Allen and Heath

Syncom multi-track (16 or 24) console.

Audio and Design (Recording)

Limiter with memory and variable attack/release times. F760X-RS complex-limiter.

Audio Kinetics

XT24 inter-locator, microprocessor-based controller for multi-track audio/video machines.



At the AES Convention, Audio and Design Recording from England will feature their new stereo Ex-Press Limiter, a compact compressor-limiter-expander that is controlled by digital logic switching. It has a memory system which retains the latest settings when the unit is switched off and a series of LED indicators to show the status of functions when the unit is powered. It has stereo input/output/attenuators, variable attack and release times and an auto release network.



At the AES Convention, Solid State Logic from England will exhibit the SL 4000E series master recording console featuring the "Supercue" system which provides console control of all multi-track functions in tandem with monitor and foldback switching, enabling completely accurate drop-ins to be made at the touch of a single button. Extensive signal processing is incorporated, with a full-feature compressor/limiter/expander/gate and 4-band parametric equalization on each channel. A computer system provides assistance during both recording and mixing. All computer commands are conveyed in simple phrases or sentences, and verified on a built-in video monitor which also displays fader and VCA levels.

The Age of Creativity Begins

Finally! The first reasonably priced video graphics system that actually expands rather than limits your graphic capabilities. It's the Dynasciences Model 9048 Video Graphics System with the new "ACE" feature.

Dynasciences' unique new "ACE" feature provides our system with a full range of abilities never before possible. It allows both storage and recall of 10, 20, 30, even 40 or more user pre-programmed events including Roll, Crawl, Flash, Title, etc.

"ACE" is standard on the Model 9048 system,

in addition to such features as an instruction channel, Zoom on one font, and a Digitizer that allows you to build fonts and logos not supplied with the original unit.

Our Video Graphics System even frees you from worry! If you're unsure of a procedure, a push of the "PANIC" button activates operating instructions contained in the memory and displays them on the preview screen in non-technical English while you're composing a page. Mistakes are virtually impossible to make.



DYNASCIENCES VIDEO PRODUCTS

Dynasciences A Unit of Whittaker Corporation, Township Line Road, Blue Bell, PA 19422 215/643-0250 Telex 846358

Whittaker

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AES Convention

B&W Loudspeakers

Model 80 loudspeaker.

C A Audio Systems

Cadac audio high performance 32-track console.

Boralynn

Audio public address system stack.

Notch filter.

Intercom system.

Digital analyzer.

Calrec Audio

Soundfield microphone.

H H Electronics Viking Way

MOSFET power amplifier.

Industrial Tape Applications (ITAM)

16-channel tape recorder.

Keith Monks (audio)

Record cleaning machine.

MT1 microphone stand.

Klark-Teknik Research

Cut-only, 29-band third octave equalizer.

Millbank Electronics Group

Facilities control system.

Neal-Ferrograph

SP7 reel-to-reel recorder.

Studio 8 broadcast console.

Neal 302 stereo cassette recorder.

Neve Electronics International

Model 8108 (56 channel) console.

Penny and Giles Conductive Plastics

Linear motion faders.

Joystick quadraphonic pan potentiometers.

Raindirk

Concord S2000 8- and 16-track consoles.

Solid State Logic

SL-4000E recording console and studio computer.

Soundcraft Electronics

Series 400 mixing consoles.

SCM 381-8 8-track recorder/reproducer

Strand Sound

Sound mixing desk.

Trident Audio Developments

Series 80 console.

Vitavox

High frequency pressure drivers.

A listing of the US exhibitors and their booth allocations will not be available for several more weeks. However, inquiries on the 64th AES Convention may be addressed to: Audio Engineering Society, Dept. BE, 60 East 42nd Street, New York, NY 10017 (212) 661-8525. □

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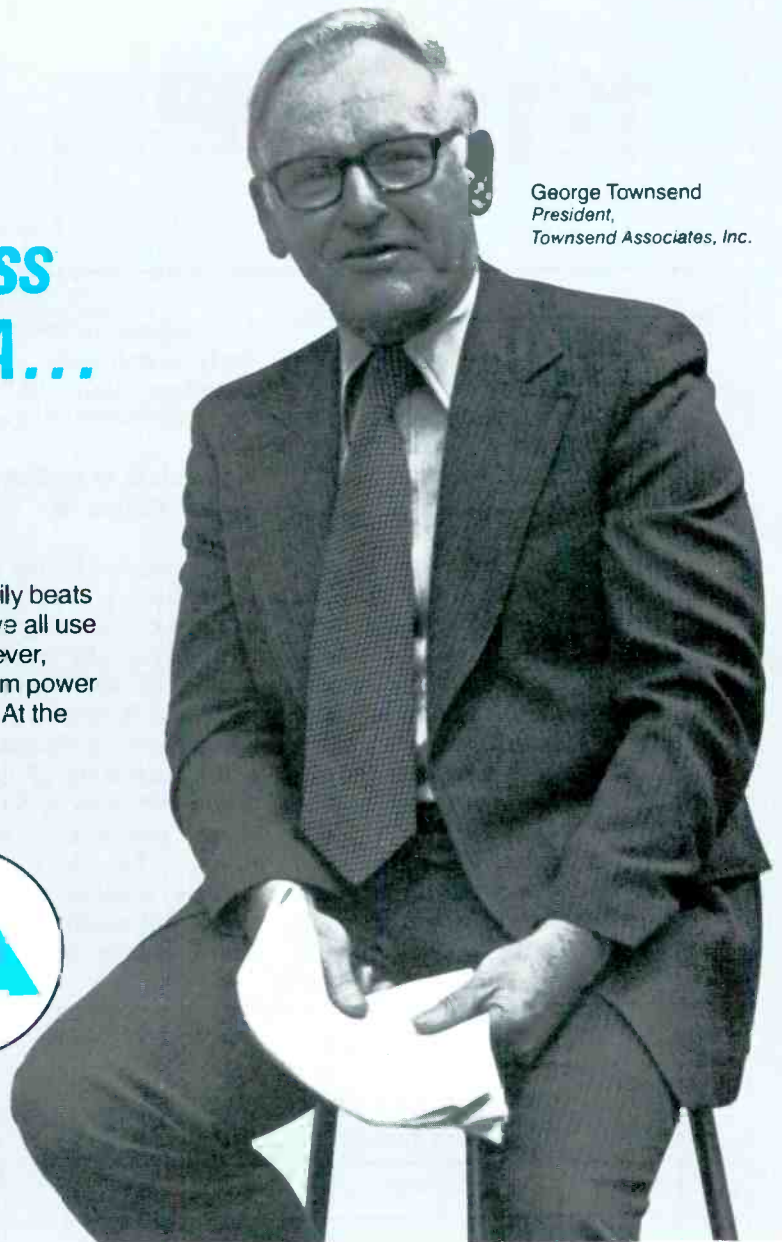
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Thanks, in part, to the cost of bigness, Townsend easily beats giant competition like Harris and RCA, even though we all use the same klystrons and employ I.F. modulation. However, Townsend is the *only* company that provides two beam power supplies, complete metering, and many more extras. At the same time, we offer easier maintenance, high redundancy, and peak performance. The chart below shows how we can afford these competitive advantages.

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COMPARATIVE COSTS OF COMPETING WITH GIANTS:

Cost Factor	Townsend Associates	Harris and RCA
NAB CONVENTION:	No exhibit or related expenses.	Large Hollywood-style exhibits with consequent high costs.
SALES OFFICES:	No sales force to maintain. All sales handled from factory.	Extensive sales organization with numerous and costly branch offices.
CORPORATION STATUS:	Townsend is the only corporation involved. Specializes in television transmission equipment.	Gates is a division of Harris and must share high corporate expenses. Likewise, Broadcast Products Division of RCA is responsible for percentage of corporate burden.
MEDIA ADVERTISING/ PROMOTION:	Low budget, sales-oriented advertising targeted to direct response.	Emphasis on far reaching, big budget, institutional advertising heavily promoting corporation and brand name.
CORPORATE RESPONSIBILITY:	Satisfied with reasonable profit.	Handled by parent corp. as a profit center with ever-increasing profits as its goal.
SERVICE:	Individual. Gets immediate attention of management.	Service necessarily delegated by management through large, cumbersome operation with employees who come and go.
HARDWARE:	Low overhead permits superior product quality, at lower prices.	Giant corporation cost factors make it difficult to match price and quality of a smaller, specialist company.
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121st SMPTE Technical Con

**Century Plaza Hotel
Los Angeles, CA
October 21-26, 1979**

An unusual, not-to-be missed, opportunity is coming up—the 121st SMPTE Technical Conference & Equipment Exhibit. For professionals in television and motion pictures, this annual meeting is a special opportunity to pick up the latest technology at sessions and see what's new in equipment at the exhibits.

SMPTE Conferences have grown dramatically in attendance. Last year more than 7000 professionals attended. This year's conference in

Los Angeles is being planned as a truly worthwhile experience for attendees. Here, in a nutshell, is what the SMPTE Conference will offer:

- Five days of technical sessions on motion picture and television technology
- A major exhibition of professional motion picture and television equipment featuring more than 140 companies. The exhibit will have more than 300 booths of the latest video and filmmaking equipment of the major manufacturers.
- An assortment of social activities that starts with a Sunday evening event sponsored by Eastman Kodak. Then there is the Tuesday Awards Luncheon. Weekly registrants will receive luncheon tickets compliments of Agfa Gevaert.

There is also a banquet on Thursday night and five days of events for spouses.

The technical sessions for the SMPTE Convention are firmly established, but the advance program of papers will need fine tuning before arrangements are finalized. A tentative outline of the advance program (as shown below) contains an impressive selection of papers to be presented.

Inquiries about specific papers should be addressed to: SMPTE, Attn: 121st Conference, Lynne Robinson, conference programs secretary, Dept. BE, 862 Scarsdale Ave., Scarsdale, NY 10583, (914) 472-6606 or to John Zeman, program chairman, Eastman Kodak, 6706 Santa Monica Blvd., Hollywood, CA 90038, (213) 464-6131.

THE ADVANCE PROGRAM (All sessions run concurrently)

Sunday, 21 October

Registration (from noon)
Entertainment (Evening, Kodak Party)

Monday morning, 22 October

LABORATORY PRACTICES I.

A stretch of time.
Monobath processed color composite print.
New Fujicolor reversal films.
A new Gevacolor negative type 682 film.

Television production.
Microprocessor controlled cameras and their operation.
Flying spot scanner operational PAL/NTSC/SECAM.
A newly developed 30mm pickup tube for cameras in teleproduction.
High quality montage picture by soft chromakey.
Matching of the TK-47 (a high performance color TV

camera) to a unique pickup tube design.
A new method of specifying the resolving power of television camera tubes.
The usage of 1-inch videotape format in TV production in Austria.

SMARTS system progress report.
Automatic set up system for a broadcast color camera.
Layout and performance of a modern CCD-telecine.

Monday afternoon

LABORATORY PRACTICES II: Ecology
Recycling photographic wash waters.
The application of reverse osmosis to recover photographic wastes.
Economics of a zero discharge waste treatment system.
Pollution control through regeneration and reuse.
Water reuse in Los Angeles and Orange Counties.
Overview of world-wide effluent regulations.
Recovery and reuse of color developing agents.

PANEL DISCUSSION: Effluent management.

erence & Equipment Exhibit

Tuesday morning, 23 October

LABORATORY PRACTICES III:

Equipment/Processes

Full immersion contact printers.

OPAL: A computer language for the control of optical printers.

An electronically controlled additive lamp house for optical printers.

A new on-line viewer for high speed motion picture processing.

A multiformat polygon projector for film inspection.

A high speed, auto demand film loop cabinet.

Continuous printing by means of an automatic loop system.

HFC total immersion printer.

A printer-film transport system.

Wet loop printing of release prints.

TELEVISION POST PRODUCTION

Post production in Televisa Mexico.

Post production switching with a digitally controlled switcher.

A flexible audio/video tape synchronizing system for television production.

An adaptive digital noise reducer for television.

Advance computer editing techniques.

Single camera editing systems.

Operating experience with the "B" format for electronic field production and post production.

Film-to-tape transfer: solution of the problems by modern means.

Image quality transfer through film and television.

Awards Luncheon (noon): Beverly Hilton

Wednesday morning, 24 October

INTERNATIONAL PROGRESS REPORTS

This session will feature presentations from England, Germany, Japan, France, the People's Republic of China, and United States on current developments in the motion picture and television industries.

Fellows Luncheon (noon)

Wednesday afternoon

PRODUCTION AND SPECIAL EFFECTS

A unique electronic ballast for straightforward use of HMI daylight lamps.

HMI lighting—a realistic evaluation of the pros and cons.

Considerations for motion picture film coverage and film production at the XIII Olympics winter games.

An in-camera pre-flash system: an update.

The evolution of motion picture equipment.

UltiMatte system.

New developments in the Todd-AO anamorphic lens system.

TELEVISION SOUND TECHNOLOGY

Stereophonic sound and multilingual television broadcast services by multiplex.

Vidi-Mag: a new system for television audio post production.

The peak program meter and the VU meter in broadcasting.

Progress report of the multi-channel sound sub-committee.

Effects and measurements of videotape mechanical modulation of the audio signal.

Automated mixing.

Thursday morning, 25 October

MOTION PICTURE SOUND TECHNOLOGY

A closed loop MMF maximizing reproduce system.

The Kintek mono/stereo photographic soundtrack.

Quality control instrument for optical sound tracks.

The academy curve from a psycho acoustic perspective.

The relationship of film parameters to photographic sound track quality.

The new sound negative film.

A proposal for a simplified cross-modulation test procedure.

CONSUMER VIDEO TECHNOLOGY

A survey of stereoscopic home television systems.

SMPTTE

Teletext and viewdata.

Technology and copyright protection.

QUBE television.

The future of high definition television: report of SMPTTE study group.

PANEL DISCUSSION: consumer television.

Thursday afternoon

SCIENTIFIC/INDUSTRIAL FILM AND VIDEO SYSTEMS

The technology present and applications future of the video disc.

Dynamic applications of unique camera systems.

Rotating prism cameras.

International aspects of photographic instrumentation.

Evaluation of photographic data management.

Report on video systems.

Report on light sources.

MICROPROCESSOR SYSTEMS CONTROL

Getting aboard the microprocessor bandwagon.

Microprocessor control in audio visual projection equipment.

The promise and reality of the microcomputer.

Application of microprocessors in automated film re-record consoles.

Maximized microcomputer for television.

Innovative self-tailoring techniques with microprocessor controlled editing systems.

Microprocessors in special effects motion control.

Microprocessor based decoder that provides on-screen captions.

Thursday evening

Cocktail party, banquet and dance at the Century Plaza Hotel.

Friday morning, 26 October

INTERNATIONAL IMAGE DISTRIBUTION

Reaching the global village.

Olympics in Moscow, distribution in SECAM.

Tutorial on the NTSC-SECAM and PAL Systems.

ADVANCED TRANSMISSION TECHNIQUES

Advances in ENG/EJ systems concepts.

DATE system for audio transmission.

Digital television terminal for multiplex television signals.

Fiber optics interconnection for a Minicam.

PBS captioning for the deaf.

SMPTTE Exhibitors

A record number of exhibitors is expected for this year's convention. A complete listing of these firms is not yet available, but a partial listing as of press time is shown below:

AATON Cameras	Listec TV Equipment
ADDA	Lowel-Light Manufacturing
Agfa-Gevaert	L.T.M. Corp. of America
Allen Products	L-W International
Amperex Electronic	Macbeth Sales
Ampex	Magnasync/Moviola
Arriflex	Magna-Tech/Quad Eight
Arvin/Echo Science	Marconi Electronics
ASACA	Marco Scientific
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Christy's Editorial Film Supply	NEC America
Chyron	Network
Cine 60	NL Film Products
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Cine/Precision Engineering	Nurad
CMX Systems, Div. of Orrox	O'Connor Engineering Labs
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Electronic Applications	RCA
F & B/Ceco	Recortec
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Image Devices	Tentel
Image Transform	Thermodyne International
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KEM Editing Systems	Videomedia
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Another Harris First.... FM-25K—25,000 Watt, One-Tube—High Power FM Transmitter.

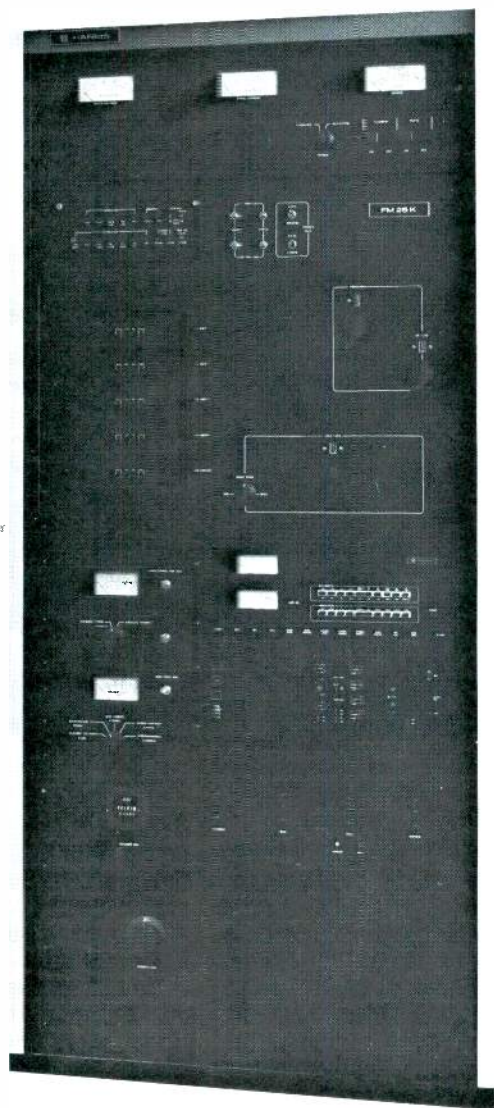
Introduced at the 1979 NAB show, Harris technology has combined advances in both tube and solid-state designs, bringing to the broadcaster the new FM-25K, 25 kilowatt transmitter, a major step forward in high-powered FM transmitters.

The FM-25K reflects the Harris design philosophy of delivering RF power efficiently, without degrading exciter performance. Dependable solid-state control logic, broadband solid-state IPA, single tube design, and the world's most advanced FM exciter, the MS-15, combine to provide the highest performance available.

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Radio powered by Solar Photovoltaic Cells

With the flick of a switch at 1:30 PM August 29, 1979, WBNO(AM), the first commercial radio station powered by solar photovoltaic cells was put into operation in Bryan, OH. The daytime station began drawing its power from an 800-module solar array with the utility connection providing back-up service.

Headed by Paul Maycock, the Department of Energy's Photovoltaic Systems Branch has a continuing program to bring solar cells into widespread use by the mid 1980s. With a broadcasting application of the experimental PV system, another step has been taken in exploring commercially feasible uses for a promising energy alternative.

The project is being jointly undertaken by Lincoln Laboratory and WBNO, with the radio station furnishing the building and site, the transmitter load, and the interface equipment. Committed to informing the general public as well as experts about the experiment, Luke Thaman, general manager of WBNO, expects to welcome many visitors to the station. In addition, WBNO will monitor the system, re-

laying data to Lincoln Laboratory so that performance can be evaluated over a period of several years.

Because a solar array's output is not constant, a battery is used to store excess energy when array output exceeds the demands of the transmitter; the battery saves the energy for use by the transmitter when the array output is low. According to Burt Nichols, Lincoln Laboratory's engineer in charge of the project, the PV system will supply up to 90% of the total energy required by the AM transmitter on an annual basis, with the remainder supplied by the local utility. The system will only draw on the utility when the sun is hidden by clouds and the state-of-charge of the battery is low.

Surplus energy will be available from the array, however, on clear, bright days when the battery is at full charge. Then the control system will automatically connect additional studio, newsroom or production room loads to the system. "If excess array power is still available," says Nichols, "the control system will then disconnect portions of the array output."

"Extensive commercial use of PV power in the field of communications can be foreseen," states Marvin D. Pope, manager of the Lincoln Laboratory Photovoltaic Project, "with power provided by this means to many AM, FM and TV stations."

He explained that a daytime radio station provides an excellent application of the experimental system, with constant, predictable direct current loads and daytime operational hours. Also a plus is the space necessary to accommodate the array (in WBNO's case, one-third of an acre) which is available at any station where ground-based guy wires anchor an antenna.

Pope stated that although the cost of solar-generated electricity is presently greater than that from conventional utility sources, the gap is rapidly narrowing as a result of decreasing costs for solar cells and rising costs for conventional energy.

Cost, however, is not uppermost in the minds of Luke Thaman and Bill Priest, program director at the station. They and other staff members are enjoying WBNO's experience of being first with an exciting and hopeful technology. □

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Circle (30) on Reply Card



Audio processing: Keep that clear, punchy sound... just make it **loud**

By James M. Lies, chief engineer WRBR(FM) and WJVA, South Bend, IN

Make it hard to tune out by correctly using discriminate processors, limiters and clippers.

Most stations have characteristic processing—induced sound. Often it's there as a sacrifice for other desirable characteristics. The truth is that, to the extent limited by its specifications, each component of the audio chain (Figure 1) contributes to that sound. Thus, if each piece of gear were noiseless, non-dynamic, non-distorting and flat, the chain would have no sound. While studio equipment affects air presentation, most of the consideration here will be given to the processing chain.

Loudness

Competitive loudness today often requires relatively heavy processing. Simply put, when equipment is put on the line, noise and distortion will be picked up that can ultimately be traced to other parts of the station. A good place to start cleaning

up the act is the AM antenna. By all means, at least check the line impedance at carrier and sideband frequencies at the transmitter to ensure low VSWR throughout the spectrum. It is better to take these data at the PA output with the tubes in place.

Getting the air monitor to sound nearly identical to the console output sample may not be the goal, but that's a good place from which to build new sound. Since many stations are competing with the phono button on home receivers, some will choose to retain clear audio identity.

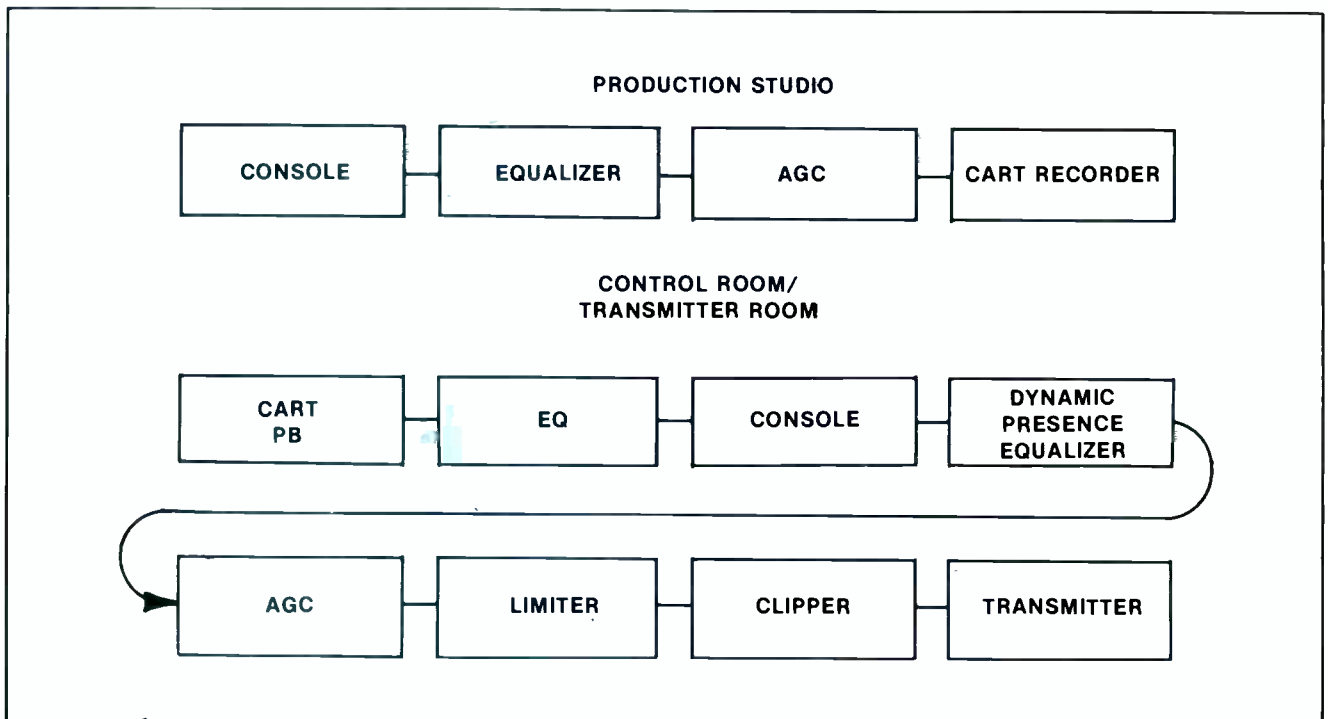
For most stations, noise and compression anomalies will be among the differences heard. Practically every processor has its own distinct *cardiopulmonary* deficiency. If a station has its processing off the

shelf and working too hard, an experienced engineer can often tell the type of equipment being used.

So, look at equipment and format and see if moderating the use of what is there will achieve the desired goals. Decreasing the AGC recovery time and cutting the peak limiting depth to 3dB maximum may keep the sound loud and may reveal music that was hidden before.

Contrary to some claims, format can make a critical difference. A disco beat is going to be pretty hard on a broadband peak limiter with even a moderate recovery time. There are a few devices on the market that can handle this without breathing or significant transient loudness loss. It is possible to build a clipping device and place it after a gain reduction block with a moderately slow attack time. Building it personally usually gives the ultimate in flexibility.

If the elements to achieve Kilo-cycle Salvation are already available in the audio rack, great. If the items must be purchased, the fol-



These flow diagrams indicate a production room and air chain capable of producing a pleasing, consistent and loud air signal. A specific system may have some of these added to create this special sound.

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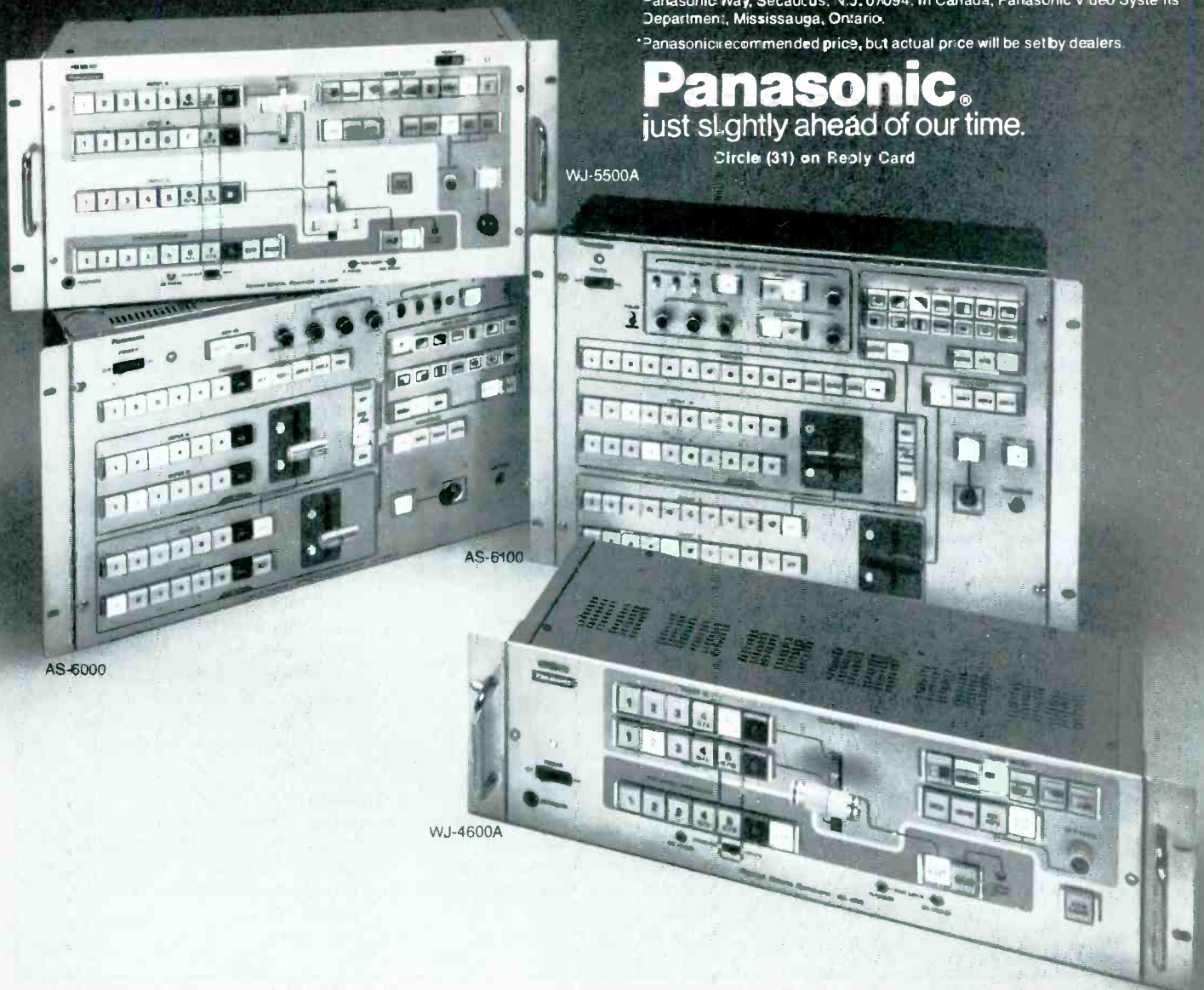
For more information, write: Panasonic Company, Video Systems Division, One Panasonic Way, Secaucus, N.J. 07094. In Canada, Panasonic Video Systems Department, Mississauga, Ontario.

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WJ-5500A

AS-6100

AS-6000

WJ-4600A

Audio processing

lowing pointers will be helpful.

Station updating

When opting to re-process the station, try to either buy (or build) equipment that will be as loud as possible within acceptable fixed limits of breathing and distortion; or minimize those faults and maximize dynamic range while achieving a goal of some fixed loudness. Essentially, trade breathing, distortion and loss of dynamics (in acceptable proportions) against the quiet, hard-to-find dial location that otherwise results.

To achieve a high level of processing without the usual side effects of breathing (Rock and Country) or a mushy quality (Adult MOR and Easy Listening), discriminate processors prove indispensable. These systems have been commercially available now for about three years. Some are built to perform as AGCs, others as peak limiters. A

well-designed unit can greatly compress the program without apparent breathing. Used in moderation, however, a sizeable increase in loudness can be achieved with very little other difference between the source and the output.

Before the unit breathes, it can severely limit dynamic range. Peak detecting processors, when presented with loud material, may excessively reduce the perceived loudness; a processor that, instead, responds to the RMS power of the audio may be preferred. But to see how the basic unit operates, look at the program spectrum and consider why broadband limiters have apparently become less accurate lately.

Using processors

Early recordings utilized peak energy in the 1-3kHz range (Figure

2A). Because the human ear is very sensitive in this region, a loud part of the spectrum was causing the gain reduction activity. Within reasonable limits of gain reduction and recovery time, this situation did not yield apparent breathing. Some recordings of the popular formats lately have been processed with much greater energy in the lows and highs, so now sibilance and bass sounds are intense enough (Figure 2B) to cause gain reduction on their own. When they do this in the company of the loud presence material, severe breathing usually results. It is particularly annoying to the listener whose receiver rolls off the offending high or low frequencies.

Discriminate processors avoid this problem by expanding and compressing various parts of the spectrum separately, with a by-product of changing the output spectrum. Regardless of thin or full program

Glossary of Terms

AGC (Automatic Gain Control): A gain control device employing an attack time at or below the metre of normal program material and/or a compression ratio below 5:1.

Attack time: The time required for a gain control device to achieve a steady state gain (or a large fraction, say 90%, of it).

Breathing (or pumping): Activity of a dynamic device that causes portions of program material to be perceived louder or softer than adjacent material would lead a listener to expect.

Clipper: A device that causes amplitude reduction by truncating the input waveform.

Clipping frequency: The frequency above which a clipper acts to restrain peak program amplitude to the same level, or to lower levels, than all other frequencies.

Compression: The parameter indicating the maximum gain reduction achieved under program conditions.

Compression ratio: The ratio of input change to output change in a compressor or limiter, measured within its gain reduction range.

Discriminate processor: A dynamic device that divides the spectrum into two or more ranges and applies gain control to each range separately.

Dynamic range: 1. Ratio of peak program level to noise floor, usually expressed in dB. 2. Perceived loudness difference between loud transients of program material and parts that immediately follow.

Equalizer: A processor that allows an operator to raise or lower specific frequency bands of the program on a time-independent basis.

Expander: A device that upon sensing an input signal, increases its gain according to design parameters of attack time, expansion ratio, expansion threshold, etc.: (with little or no signal, it returns to its nominal gain according to recovery time, etc. See also compression ratio.)

Limiter: A gain reduction device that employs relatively fast attack and recovery times and a high compression ratio.

Recovery time (release time): Defined similarly to attack time, but the components of the step function are reversed in time and duration to zero-signal gain (or 90% thereof) is measured.

Trackability: The ability of a cartridge/stylus assembly to retain contact between the stylus and groove walls of a record over required amplitudes and frequencies.

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Audio processing

material, the output is tailored to a specific spectrum dictated somewhat by the number, width and location of bands, the compressor input levels, but mostly by its output controls. To this extent the processor is a *dynamic equalizer*. The effect of additional bands of processing is to give increased control over the output spectrum and to increase the density (the watts per peak power level of the program). The hitch is that now the device may start *misequalizing* quieter passages and that the normal program output may become too dense.

Used as an AGC, a discriminate processor should be set up with enough gain reduction to cover some amount of program dynamic range plus operator errors. Excessive gain reduction will invite noise rush and affect the recovery times. A system employing both compressors and expanders will greatly ease noise rush. To emphasize some portion of the spectrum, say the highs, use

both the compressor input and output controls moderately. The highs would begin to sound artificial if the compressor is used excessively. Several anomalies may occur if the output is advanced too much.

Many products affect phasing for asymmetrical AM operation at a point where AGC output levels are established. Asymmetrical operation allows increased loudness with less gain reduction and distortion since most audio is naturally asymmetrical. Many of the switching schemes provided are indeed audible in operation. Check by reputation, or do a personal evaluation, before deciding upon a product, and it may be best to provide a means of phasing asymmetrical program sources. Forcing asymmetry upon the audio generates distortion and should be avoided.

Peak limiting

The device chosen for peak limit-

ing need not offer as much gain reduction capability as the AGC, but a 15:1 or better compression ratio (input-to-output) is desirable. For a multi-band limiter, something in its output circuitry should assure this range for the sum of the bands.

Recovery time should be long enough to allow a natural decay of the crescendos that typically comprise the station's music, but not so short as to cause bass material to modulate the gain control circuit. Many manufacturers offer bass or beat reduced recovery times to alleviate this problem. Be sure that the AM limiter peak detectors can be set to match the asymmetry of material presented by the AGC.

Finally, the attack time, a somewhat controversial parameter, should be sufficiently fast to catch any peaks wide enough to light the modulation monitor peak flasher. Extremely fast attack times cause distortion, typically on cold voice.

There are FM limiters on the

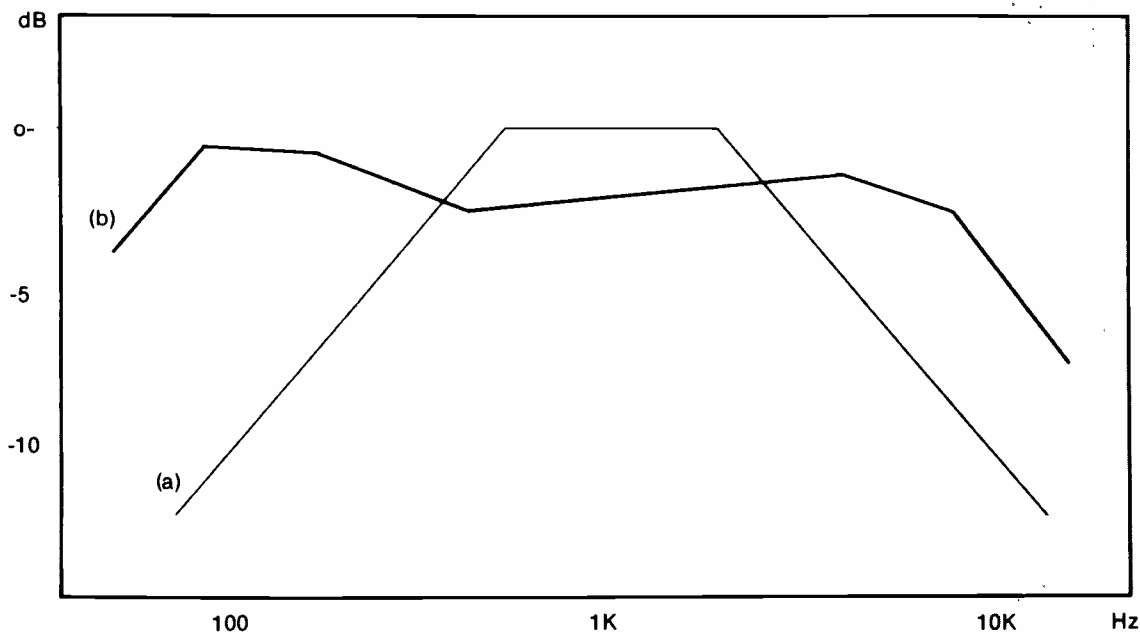
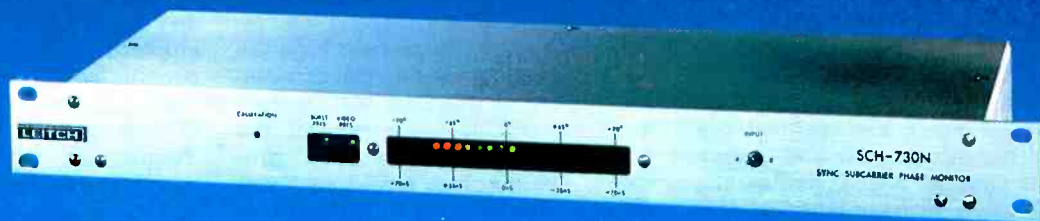


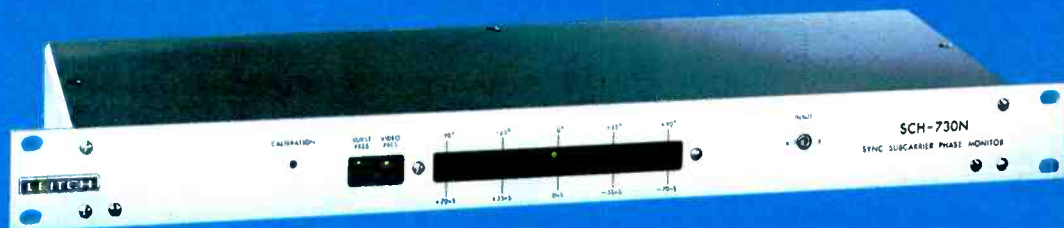
Figure 2. Peak spectral levels for audio-chain input: (a) an average representation for various, older music and speech samples; (b) an average curve for several contemporary discs judged to be very bright and/or very boomy.

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Circle (34) on Reply Card

Audio processing

market that have a separate high frequency limiter for the purpose of reducing distortion due to clipping. These high frequency limiters appear after pre-emphasis with both presence and sibilance information. They are an open invitation to breathing unless bandpass and dynamics parameters are carefully set. They also tend to reduce the high end in the program, something that doesn't happen nearly as much in conventional limiters. But the alternative of clipping the highs in a flat passband is unattractive. This latter clipper will be discussed out of turn in order to justify using the high frequency limiter.

Consider again the spectral content of recordings past and present and the case of an FM limiter/clipper. With a distribution that rolls off to 10dB down at 15kHz, comparatively little clipping normally occurs, even after pre-emphasis. The distortion that is generated is mostly hidden by the receiver de-emphasis. With modern discs, some said to be equalized and compressed until there is an equal per-octave energy distribution, the 4kHz sibilance material may be clipped as much as 6.5dB.

If the result is approximate as a 4kHz square wave and its Laplace transform evaluated at the second and third harmonics, and if de-emphasis is included, there is an embarrassing 10% distortion. Everytime such a disc is played through this processor, set to clip at 400Hz or 1kHz, this distortion will be on the air. The current state-of-the-art calls for some kind of limiter to handle just the highs to prevent the creation of 4kHz square waves and the like. Replacing the clipper with a soft clipper to keep the 4kHz note from approximating a square wave would cost so much peak control that it would be better to clip frequencies of 3kHz and above (raising the clipper threshold 5dB).

Broadband clipping

If, after squeezing the audio until breathing threatens, the loudness is still insufficient, consider adding a stage of broadband clipping. To avoid excessive distortion, this must

be accomplished with the utmost care.

The clipper must follow a peak limiter to assure control over the resulting distortion. Clippers may be designed to produce a hard, flat truncation or a soft one with rounded corners. Hard clippers generate harmonic distortion (HD) and intermodulation distortion (IMD). Soft ones tend to generate less HD but more IMD; also, they have a finite compression ratio, providing less control of program peaks. While FM clippers depend on receiver de-emphasis to help hide the distortion, clippers on AM processing depend at the poor high end on most AM receivers to roll off the harmonic and IM distortion products. The optimum would be a soft clipper with fairly stiff peak control and producing IMD not greatly above 3% at 3% HD. It should be adjustable to clip asymmetrically if the preceding processing is set up that way. Amplifiers and the (AM) modulator that follow any clipper should have low frequency response flat at least four times as low as the lowest frequency for which clipping is anticipated.

Console/cart noise

While waiting for the console noise processing equipment to arrive, consider reducing the noise coming out of the console. Hisses, clicks, hums, rumbles, distortions, crosstalk and extraneous noises in the studio are going to be more apparent than ever.

Do everything possible to reduce noise and distortion on carted music. After all, the console noise is -75dB, the preamp -60dB, the proc amp -65dB, and the transmitter -65dB (-50dB for AM); into this chain hiss is blowing in from a cartridge that's effectively -45dB (-40 for stereo). This is where the noise comes from when a pause comes up and the present limiter recovers 10dB of gain.

Cartridge tape is a result of many electrical compromises. One brand reads 5% IM operated at program level (equivalent peak) with a slight overbias applied. When peak biased, the figure is 13%. Furthermore, audio peaks can be 10dB higher than the VU indication; at that level the overbiased recording has 21%

IM. It would be over 30% if the tape were peak-biased. However, the transient nature of the music or speech leaves it sounding better than the figures suggest. Also, flutter in the cart system may account for a 2% IM reading. For comparison purposes, open-reel tape has been loaded into cartridges with considerably better test results. So, get a good grade of tape and overbias and re-equalize the equipment for optimum performance.

Production room equalizers can do more harm in harmonic and phase distortion than the aesthetic benefits justify—unless they are designed, purchased and used carefully. It is best not to emphasize those frequencies that the tape medium has difficulty handling until a point after the playback units in the chain.

Mistracking styli produce an irritating sound, so purchase the best tracking capability possible. Tonearm parameters affect tracking; judge them in the light of the cartridge selected or its trackability may never be fully realized.

Finally, consider the microphones and the studio. Try to acoustically re-dimension the room to make it neutral or to emphasize some frequency. Reverberation time should be appropriate to the type of mic chosen and how the talent works it. Otherwise, the sound will be comparable to standing in a warehouse, or cornfield, or on a tall soapbox.

With these guidelines it should be possible to process heavily enough to hear problems on the air not created in the station. Of course, there'll be an upper practical limit on processing. But, when trying to sound loud and uncommonly natural, clean up the air chain and use a carefully chosen state-of-the-art processor. It can be amazing. □

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Methods of Signal and System Analysis, Cooper, McGillem, pages 167-169.
NAB Handbook, pages 6-43, 6-44.

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Playback Frequency Response (MRL test tape): 31.5 Hz to 20 kHz ± 2 dB.

RELIABILITY: An unmatched four-year track record of on the job performance for the original compact professional recorder. Day in, night out. Just ask someone you trust.

ALIGNABILITY: Any tape recorder must be aligned to achieve maximum performance. With the MX-5050-B, all primary alignments are on the front panel. So is a 1-kHz test oscillator. Secondary alignments are inside the bottom panel. You or your maintenance people can align it fast and easy. This saves you time, money, and enhances your reputation.

INTERFACEABILITY: With a flick of the output switch you can plug-in to any system: +4 dBm 600 ohm or -10 dB high impedance. No line amps or pads to mess with. A perfect match everytime.

ADDITIONAL BENEFITS: Three speeds, dc servo $\pm 7\%$, $\frac{1}{4}$ track reproduce, full edit capability, over-dubbing, noise free inserts, XLR connectors, NAB/CCIR switching, unique three-position alignment level switch.

PRICE: Suggested retail price \$1,945 (USA).

MX-5050-B:
The best value
in a professional
tape recorder.

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416/675-2425

Circle (35) on Reply Card





Automation at Fisher Broadcasting's radio and television stations has resulted in more effective operations and a happier staff. As shown here, Patti Wallace (left), KOMO-TV traffic manager, confers with author Mike Eguchi regarding the station's daily skim avail while Teresa Woon (second from right) and Connie Quigley (right) work on broadcast order entries and contracts.

The hidden value of station automation

Michael S. Eguchi, information systems manager, Fisher Broadcasting

Enrichment of the staff morale through higher productivity and more creativity has been just one reward from station automation.

The increased use of automation for various operations at radio and television stations has been tremendously beneficial to stations in terms of increasing efficiency, productivity, accuracy and information timeliness. However, one of the most important aspects of the increasing use of automation in broadcast operations has been almost completely overlooked. In the excitement over the technological achievements

of the computerized systems the positive effects that automation has brought to the activities and duties of the people involved in the administrative functions so vital to smooth station operations are tremendous.

Glenn Gormley, secretary-treasurer of Fisher Broadcasting, after watching some of the activities performed by traffic staffs utilizing the new computerized equipment, put the change in perspective when he pointed out, "They're not clerks any more." This is true. The pencil pushers of the manual traffic operations era are becoming a thing of the past. These clerks have been replaced by decision makers holding increased responsibilities associated with this automated revolution that has, in effect, provided a motiva-

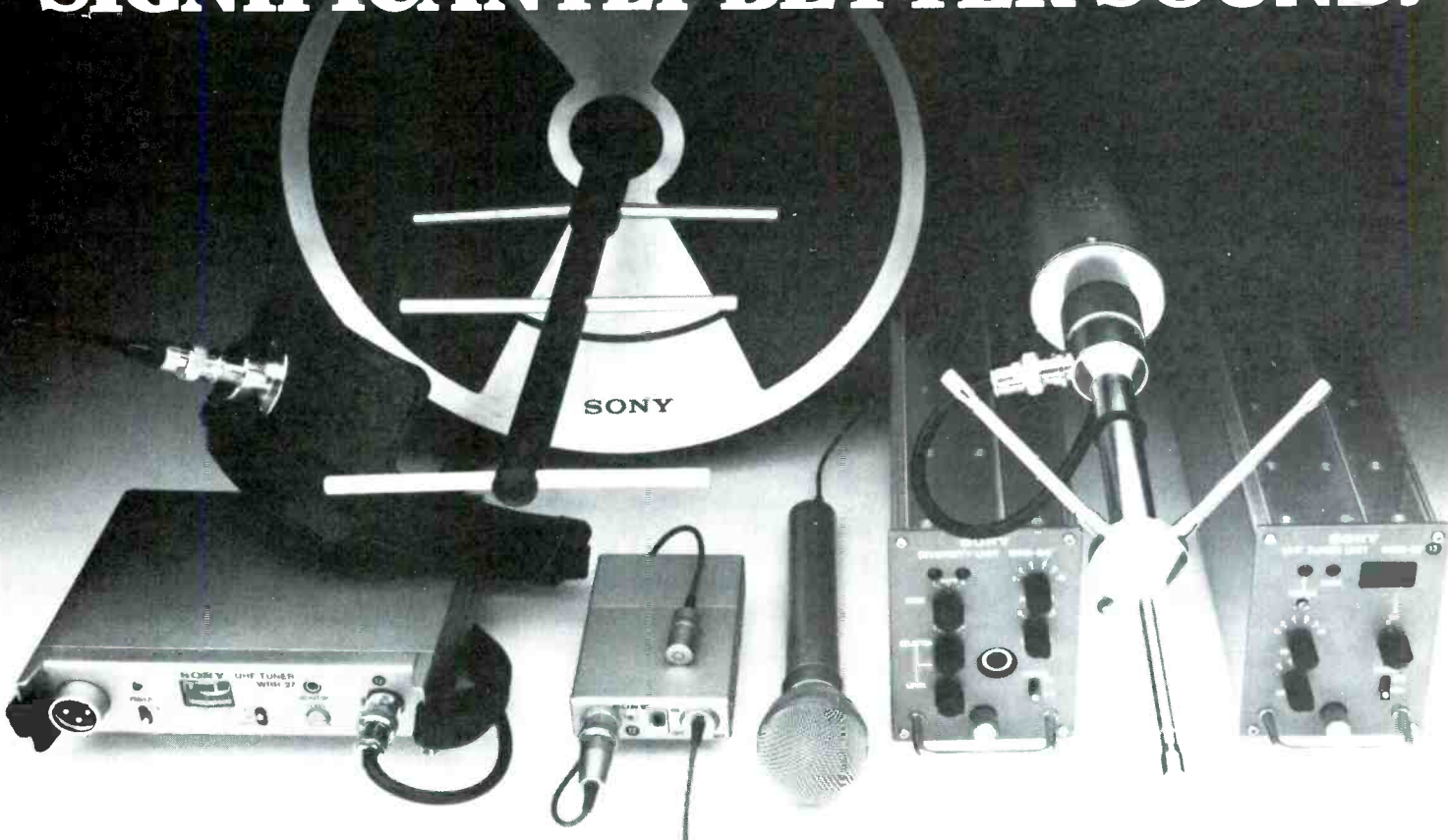
tional incentive for all involved with the computer.

How it came about

What brought about this startling evolution in staff status? Obviously, it was the decision to upgrade operations to keep pace with advances being made in the state-of-the-art in computer technologies and broadcasting. In 1974, Fisher Broadcasting recognized the ever-growing need for a more accurate and efficient system for handling broadcast orders, commercial rotations, and accounts receivable. John Behnke, executive vice-president and general manager for the stations in Seattle and Portland, (KOMO-TV/AM, KATU) set up a committee to analyze all computer services. BIAS (Broadcast Industry Automation System), a division of Data Communications was selected, and the station went into automated operation for the first time. Since then two updates have been made on the television software system in Seattle as well as the initial software conversion at KATU in Portland. In 1977, KOMO-TV/AM, which has experienced a

Fisher Broadcasting Inc. is owner and operator of KOMO-AM/TV (Seattle, WA) and KATU (Portland, OR) which have undergone considerable automation.

SONY INTRODUCES WIRELESS MICROPHONE SYSTEMS WITH AN INNOVATION NOBODY ELSE HAS: SIGNIFICANTLY BETTER SOUND.



Until now, using a wireless microphone system meant sacrificing the quality of the sound in a trade-off for portability.

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The CO90 miniature condenser microphone was designed by engineers who understand the "real world" requirements of a studio microphone. They've included things like cable assemblies that can be easily and inexpensively replaced in the field. But the CO90 has one feature that no other manufacturer can offer — the Electro-Voice warranty.

Electro-Voice backs up the CO90 with the only two-year unconditional warranty in the business. That means Electro-Voice will repair or replace your CO90 when returned to Electro-Voice — *no matter what caused the damage.*

Electro-Voice can offer that type of warranty because the CO90 was designed to withstand the rigors of professional use. If your application demands a miniature condenser microphone that can take less-than-gentle treatment, the CO90 is the one you should buy.

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Station automation

tremendous growth in business, was also converted to the BIAS system, and it too has undergone an additional conversion to an upgraded software package.

The morale shift

After a period of time working with the BIAS system, several noticeable changes took place. The most impressive was the changing morale of the people in the traffic departments. Once the staff realized that computers were not going to replace them, and that the new automated system required individual and knowledgeable expertise, a new sense of togetherness and self-importance pervaded the personnel working with the automated system. Where the daily log had been the most onerous task of the group via the manual system, automation simplified the process so that the talent and skills of the people could be better utilized.

With considerable hard work and dedication, all traffic people were transposed from clerks to decision makers. The staff was now required

to make individual decisions in harmony with each other. The challenge of added responsibilities generated by the ability of the computers to make instantaneous information available, and the sense of total involvement provided a motivational incentive that elevated the spirit of the entire staff.

With the blending of people and equipment to provide maximum efficiency and effectiveness in the traffic, program, and accounting departments, a sense of teamwork has affected other departments in the station. This phenomenon has created a better understanding of what others do at the station, a situation unique in a large corporate organization.

A broader scope

The change in personnel attitudes was only one of a number of benefits KOMO-TV/AM and KATU enjoyed as the automated systems became an everyday reality. As equipment and software changed with the increasing sophistication of computerization, the tremendously



In the KOMO-TV traffic department, Claudia Whipple resets controls on the Data General Nova 2 minicomputer system following the BIAS documentation.

Circle (37) on Reply Card

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SINCE 1968. We've been at it longer and better than most. Consequently, we know TV cameras. In 1977 we committed CEI to a new direction in broadcast color television cameras. At last components were small. Needs were different. Flexibility was key. And portability was a must. So, we developed the 310 system and not just one more bulky contraption with unnecessary flaps, doors, handles, corners, louvers, wires, cables ... and weight.

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The CEI 310 is a camera designed to be used. It is a true two-in-one camera which performs beautifully in either studio or field applications. When you want to change from one to the other, you can do so simply in a matter of minutes. Plus CEI cables hook together without special-ordered adaptors — for a range of up to 2400 feet. The CEI 310 is built for real live people. When field equipped, it's naturally suited for the shoulder. The eight pound head rests easily for hours at a time. The cord's exit path follows a normal line down the back of the cameraman.

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OUR EU. A six-sided box, blank on four sides: The front panel has all the controls. The rear has all the connections. That's it. Simplicity itself. Inside, the first five of our printed circuit boards handle the normal functions you'd expect. But what we call "board 6" is for today's engineer. Because it's for tomorrow. And it's empty. That's where we put such things as automatic pedestal, iris window shade and a SMPTE time code generator. That's today. For tomorrow there'll be more. The point is, once you've got our basic unit we can offer you bells and whistles for years to come. They'll always fit your 310.

RUGGED RELIABILITY. Kick it around. A lot. The 310 has been places you've never seen: Coal mines, helicopters, surgery, sports fields, studios, wheel wells, fishing piers and cable cars. CEI stands behind our guarantee of service and parts in less than 48 hours. But you don't have a broken 310? We're not surprised. Few people do. That's why we offer you an unedited list of uncoached users. We're betting you'll find a preponderance of good comments about CEI and its cameras.

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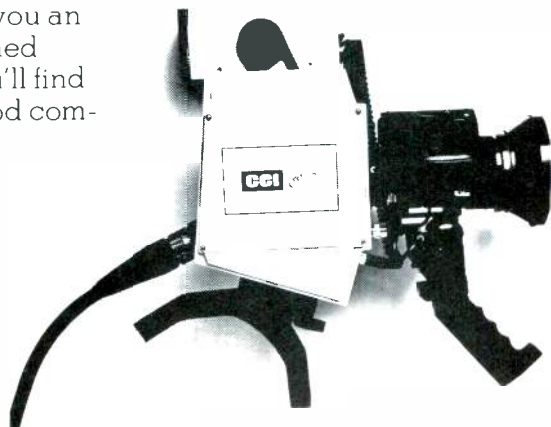
SHOOT-OUTS. Everybody claims to meet their specifications. And finely-tuned, in a clean room, some do. Ours goes the next step better, in actual use, every day: The 310 actually beats our published specs. We would be happy to lend you a camera for an evaluation in your facility. Our Chief Engineer speaks your language and he is here every day to answer your technical questions. Give us a call.

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Once the recording studio has delivered the lacquer disc to the plating plant it is sprayed with liquid silver making it electroconductive, and then electroplated with nickel which is separated from the lacquer. The nickel is now a negative image called a master and has, instead of a groove, a ridge that comes to a point. The master is treated and nickel plated again and upon separation forms a mother, a positive metal record. Engineers rely on the Stanton 881S cartridge in playback evaluation of the mother.

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Circle (39) on Reply Card

Station automation

broad potential that automation offered above and beyond its instantaneous information capabilities was realized.

Thus, in 1977, experimentation began due to the availability of other system enhancements. The basic equipment configuration for KOMO television traffic includes two Hazeltine 2000 CRTs, one ADDS CRT, a Centronics 101 Line Printer and a Centronics 503 Line Printer. All this equipment is interfaced with two Data General Nova Mini-Computers—unusual for two stations housed in one building but essential to the operation as it provides redundant back-up that offers fail-safe security in the event of a mechanical failure by one of the minis. In addition, KOMO-AM was one of the first stations in the country to go to the new BIAS radio system, which has increased the radio station's ability to compete in the marketplace and better control inventory.

One of the unique aspects of the automated operation is that due to the two mini-computers on-line, radio or television data can be accessed into either station via central information files. This provides a flexibility of operation not previously available.

It is intriguing to note that as the

automated systems have become more sophisticated, the staff has responded enthusiastically. This type of reaction is gratifying to management, and it smooths the way for the additional innovations that are already on the way in the continuing upgrading of automated systems. KOMO-TV/AM and KATU have utilized several services and enhancements offered by the industry (especially BIAS), but the future holds even more promise for the station with vision and imagination.

The future may well see a merging of office automation devices, word processing and computers into a single central information center. This information processing center would provide all departments of the station (news, traffic, engineering, programming, public affairs, promotion, sales and accounting) with any information needed provided the proper access code was input. Word processors would be interconnected with computers for ultimate information handling as well as the total office integration of all automated equipment feeding this central file center.

Automation has provided a unique combination of technical advances and personnel involvement to create a dynamic atmosphere at Fisher Broadcasting. □



Because automation has helped motivate the staff and has made order processing more efficient at KOMO-TV, Connie Quigley (left), Theresa Woon (center) and Nancy Wilde (right) work rapidly and with up-to-date records on broadcast orders.

The Amplifier Everyone is Talking About!



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 in BROADCAST
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 in SOUND REINFORCEMENT

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- "I produced that record, but I've never really heard it until now!"
- "I didn't think it was possible for 'X' brand speakers to perform like that!"

If you have been to places such as: the GRAMMY DISCO PARTY, SPECTRA SOUND STUDIOS, or the CONCORD PAVILION (all tops in their field) you already know why such comments are being generated. However, most comments about the SPECTRA SONICS Model 701 Power Amplifier are unbelievable . . . until you've heard it!

For the very best in power amplification, see your SPECTRA SONICS professional audio dealer today, or contact:

SPECTRA SONICS

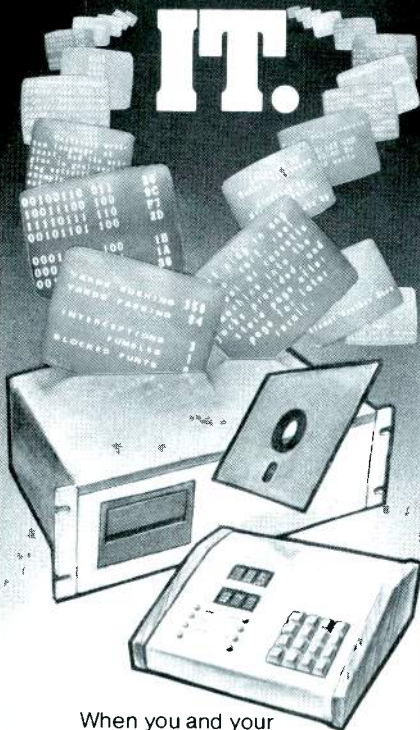
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And it's programmable. With a single keyboard, you can create your copy and write a program — onto the same disc — that will completely cue the playback. Roll or crawl non-sequential pages



Have random pages recalled and displayed for a preset amount of time. All day, if you want.

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You should see what you can do with it.

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Circle (41) on Reply Card

hardware report

Videotape editors: Product Update

A status report on current videotape editors appeared in the August issue of *Broadcast Engineering*, pp. 60-66, but a couple of systems were inadvertently omitted. These units, from NEC America and United Media, are described briefly here so that data may readily be obtained on these manufacturer's products.



Model BC-101 from NEC America

The BC-101 editing controller from NEC provides full remote control for all functions of the 3/4-inch VC-1010 videotape recorder. It guarantees easy location of program segments anytime, with insert and assemble edits accurate to +2 frames. Other features of the BC-101 include:

- Microprocessor controlled programmed auto edit sequence with fast, precise pre-roll action
- Single-button automatic edit and automatic preview (rehearsal) of edits

- Single-button edit review capability
 - Four tape speeds (x2, x1, x1/5, x1/10) in forward and reverse playback mode for easy edit point search
 - Edit shift capability for bi-directional edit point correction
 - Dual LED counters to display minute, second, and frame from each VTR
 - Remote controls for each VC-1010: forward/playback; pause; reverse/playback; record; fast forward; rewind; and stop
 - Edit controls for each VC-1010: counter reset (player and recorder); edit mode select—assemble, insert (video/audio 1/audio 2); edit point entry—in/out (player and recorder); edit point frame shift—+ (in/out) x2, x1, x1/5, x1/10, pause.
- For a data sheet describing the BC-100 and VC1010 complete system, contact NEC America or use the **BE** reader service card.

Circle (100) on Reply Card



The Commander I editing system from United Media is claimed to provide exceptional quality plus artistic freedom, accuracy and speed for videotape editing. Designed for desktop operation, the system is fully integrated with two time code readers, interfaces for two VTRs, has SMPTE/EBU time code and user bit capability, and provides computer assisted editing for controlling any combination of 2-inch, 1-inch, or 3/4-inch VTRs.

Other features include:

- Servoing for exact frame editing depending on VTRs
- Servoing for exact frame editing
- Industry-compatible punched tape
- Back timing of edits
- Memory storage—up to 25 events

- Automatic assembly capability
- Integral keyboard entry and display for edit point duration, and show length
- Variable search and log, depending on VTRs
- Separate VTR motion controls
- Automatic and manual color framing
- On-the-fly marks (IN/OUT) for video/audio 1/audio 2
- Auto search, cue, review edit preview.

In comparison, UMI's Commander II videotape editor has a separate keyboard entry and CRT display and provides 1000 events of memory. Its key feature is expandability to simultaneously control from two through eight VTRs. While it has all the features offered by the Commander I, the expanded memory in the Commander II provides additional flexibility and capabilities for more complex editing.

Complete details of the Commander I and II editing systems are available from the manufacturer or by use of the **BE** reader service card. □

Circle (101) on Reply Card

What makes these new Sintronic FM transmitters so exciting?



SI-10-T (10 Watt)

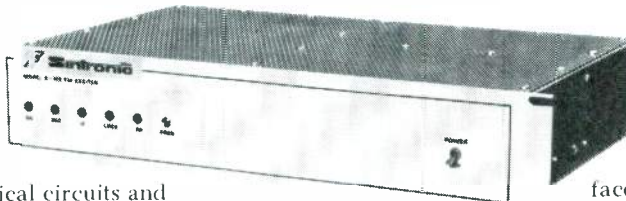
SI-F-25 (27.5 kW)

SI-F-5 (5 kW)

Well for one thing...

The new Sintronic SI-10-E solid-state, direct-carrier FM Exciter! Why? Because it does not have crystal ovens, or thermostats to burn out. It provides continuous LED monitoring of critical circuits and has low distortion and a very flat frequency response for excellent stereo and SCA operation. It utilizes a protected, regulated power supply and has a truly conservative specification throughout... We find this exciting... and the SI-10-E "excites" all of our new FM transmitters too.

Our new transmitters' conservative design can also be exciting! They use stable zero-bias, grounded-grid power amplifiers, eliminating neutralization and the screen and bias power supplies. Their tuning and loading lines are really heavy duty, made for long-term reliable service. The entire transmitter's design is clean, straightforward and mechanically conservative. Standard features on all our FM transmitters include automatic step/start switching, full protection



against overload, recycling with a memory-type visual indicator that tells you the status of all critical circuits. Further, they will interface with any standard STL or wire-type remote control and have a built-in, automatic power output control.

The 1.5, 3.5, and 5 kW models each occupy a single modern style cabinet. The 15 and 27.5 kW models are housed in a single dual-section cabinet. All models are self-contained other than the RF harmonic filter and use our new "12 pulse" power supply. We find this pretty exciting stuff. If you ask us about price we think you will find our transmitters pretty exciting too!

Call or write to learn all the other exciting details of our FM transmitters—and our AM transmitters are exciting, too! Sintronic Corp., 212 Welsh Pool Road, Lionville, PA 19353. (215) 363-0444. Ask for Tom Humphrey.

Sintronic CORPORATION
Sintronic is a subsidiary of Singer Products Co., Inc.

Circle (42) on Reply Card

D.C. Servo Drive Runs Smooth Steady Cool



Of course, it's Telex/Magnecord

Telex Magnecord broadcast cart machines run cool and steady. So cool no ventilation is required, so steady not even voltage or frequency fluctuations will alter their speed. Thanks to our dc servo flutter-filter drive. Completely immune to RFI and EMI, it meets or exceeds all NAB standards and is suited for local or remote/automated operation.

Standard features at no extra cost.

- An edit pushbutton to add stop cues in playback and omit stop cues in record
- LED indicators show end of tape, status and secondary/tertiary cue tones
- Front panel headphone jack
- VU meters for each channel

Convenient, Flexible

MC-Series is field convertible from mono to stereo, or play to record. Optional remote controls simply plug in.

Four broadcast cart machines to choose from in the Telex/Magnecord

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CANADA: Telak Electronics, Ltd., 100 Midwest Road, Scarborough, Ontario M1P3B1, Telephone: 416-752-8575

Circle (43) on Reply Card

64 *Broadcast Engineering* October 1979

business news

Film processing for Olympic games

Allen Products is working with Eastman Kodak and the Lake Placid Olympic Organizing Committee (LPOOC) in providing film processing for the Olympic Games. Two of Allen's RVNP-82 quick turn-around film processors will be on site in Lake Placid at the LPOOC's broadcast center. The Allen equipment is designed to meet the needs of Kodak's Rapid Video News Processing chemistry. According to the company it will enable the nearly 200 accredited cinematographers covering the 1980 Winter Olympics to turn their Eastman video news film around in minutes.

American satellite commended by NASA

American Satellite has received a commendation from NASA for installing and placing in operation an earth station within seven weeks after receipt of order. The 10-meter SDX (Satellite Data Exchange) station was installed at Rockwell International facilities in Downey, CA, to support the space shuttle program.

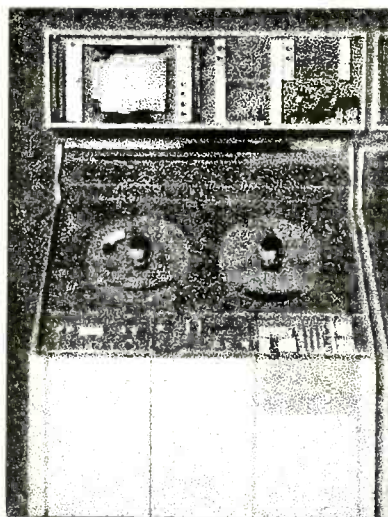
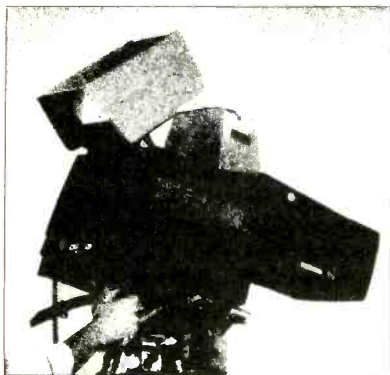
Kikusui International opens California office

Kikusui International, a wholly owned subsidiary of Kikusui Electronics of Kawasaki Japan, opened its office for business at 17121 S. Central Ave., Unit #2M, Carson, CA 90746. Kikusui is one of Japan's leading manufacturers of general electronics testing equipment such as oscilloscopes and ac/dc-regulated power supplies. The new subsidiary is headed by Kimiaki Miyamoto, executive vice president. The company will coordinate Kikusui's nationwide sales network and oversee the company's aftersales services, including the maintenance of performance standards for all of its products through recalibration and other services.

William B. White, formerly with Tektronix has been appointed marketing and sales manager.

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If you are independent, enjoy travel, and can solve technical problems in state-of-the-art broadcast equipment, RCA has the opportunity of a lifetime for you. RCA Broadcast Systems TECH ALERT is looking for people with in-depth technical knowledge of broadcast equipment: TV cameras, video tape recorders, transmitters, etc. While we prefer an engineering degree and experience with RCA equipment, technical excellence is what really counts. You will travel to customer locations to check newly installed RCA systems, resolve problems, and train customers in the operation and maintenance of RCA broadcast equipment.



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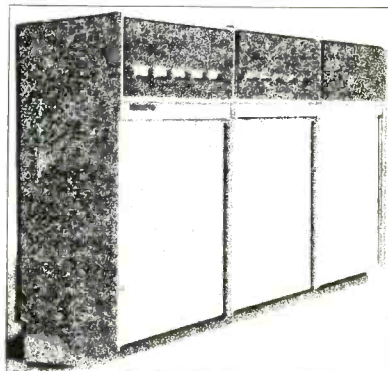


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FOR BROADCAST AUDIO MEASUREMENTS, if you compare features . . .

	Hewlett Packard 339A	Sound Technology 1710A	Potomac Instruments AT-51
AUDIO GENERATOR	Combined With Analyzer	Combined With Analyzer	Separate Unit
Intermodulation test signal	No	Option	Yes
Wow & Flutter test signal	No	No	Yes
Simultaneous L&R Outputs	No	No	Yes
600 ohms and 150 ohms Source	No	Yes	Yes
Stereo Matrix Switch (L,R, L+R, L-R)	No	No	Yes
Switch to remove signal and terminate line for S+N/N	No	Yes	Yes
10 dB, 1.0 dB, 0.1 dB Step Attenuators	No	Yes	Yes
AUDIO ANALYZER	Combined with Generator	Combined with Generator	Separate Unit
Harmonic Distortion Mode	Yes	Yes	Yes
Automatic Nulling	Yes	Yes	Yes
Automatic Set Level	Yes*	Option*	Yes
Intermodulation Distortion Mode	No	Option	Yes
AC Voltmeter Mode	Yes	Yes	Yes
Stereo Phase Meter Mode	No	No	Yes
L/R Amplitude Ratio Mode	No	No	Yes
Wow & Flutter Meter Mode	No	No	Yes

* Limited to 10 dB capture range.



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AUDIO TEST SYSTEM

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Circle (45) on Reply Card

Business news

Kodak to assist in Olympic film processing

About 150 accredited television photographers are expected to cover the Winter Olympic games. Lake Placid Olympic Organizing Committee (LPOOC) will provide processing on a no-charge basis for motion picture news film shot by them. The motion picture film processing will be done in the Olympic Broadcast Center with technical assistance from Eastman Kodak. The company's motion picture and audio-visual markets division will have sales and engineering representatives on hand to monitor laboratory operations, to provide technical assistance to cinematographers and to staff a motion picture film sales counter in the broadcast center.

It is expected that about one-quarter of a million feet of Eastman Ektachrom video news film will be processed during the 2-week duration of the Olympics.

Audio & Design Recording moved

Audio & Design Recording moved its US base of operations to a location near Seattle, WA, effective August 1, 1979. The new correspondence address is P.O. Box 786, Bremerton, WA 98310, Telephone (206) 275-5009.

New representative

Burns Audiotechnics, distributors of Beyer headphones, microphones, transformers, microphone stands and accessories has announced the appointment of a new representative firm for professional headphones and microphones. Serving metropolitan Chicago, Southern Wisconsin, Northern Illinois, Lake and Porter counties in Indiana will be Ted Pappas, 5218 W. Diversey Ave., Chicago, IL 60639.

Satellite system requested

COMSAT has asked the FCC for authority to construct a new \$7.7-million earth station in Cayey, Puerto Rico to operate with the

Tektronix has become synonymous with measurement instrumentation that has helped make color television quality what it is today. The TEKTRONIX 1980 Automatic Television Measurement System continues this tradition. Based on advanced digital technology, the ANSWER™ System is designed to meet the industry's current and future video measurement needs.

The ANSWER System offers:

REDUCED OPERATING EXPENSES. Automatic operation requires little or no operator attention, freeing personnel to pursue other tasks. Measurement speed and repeatability reduce time spent evaluating signal paths in broadcast plants and common carrier links.

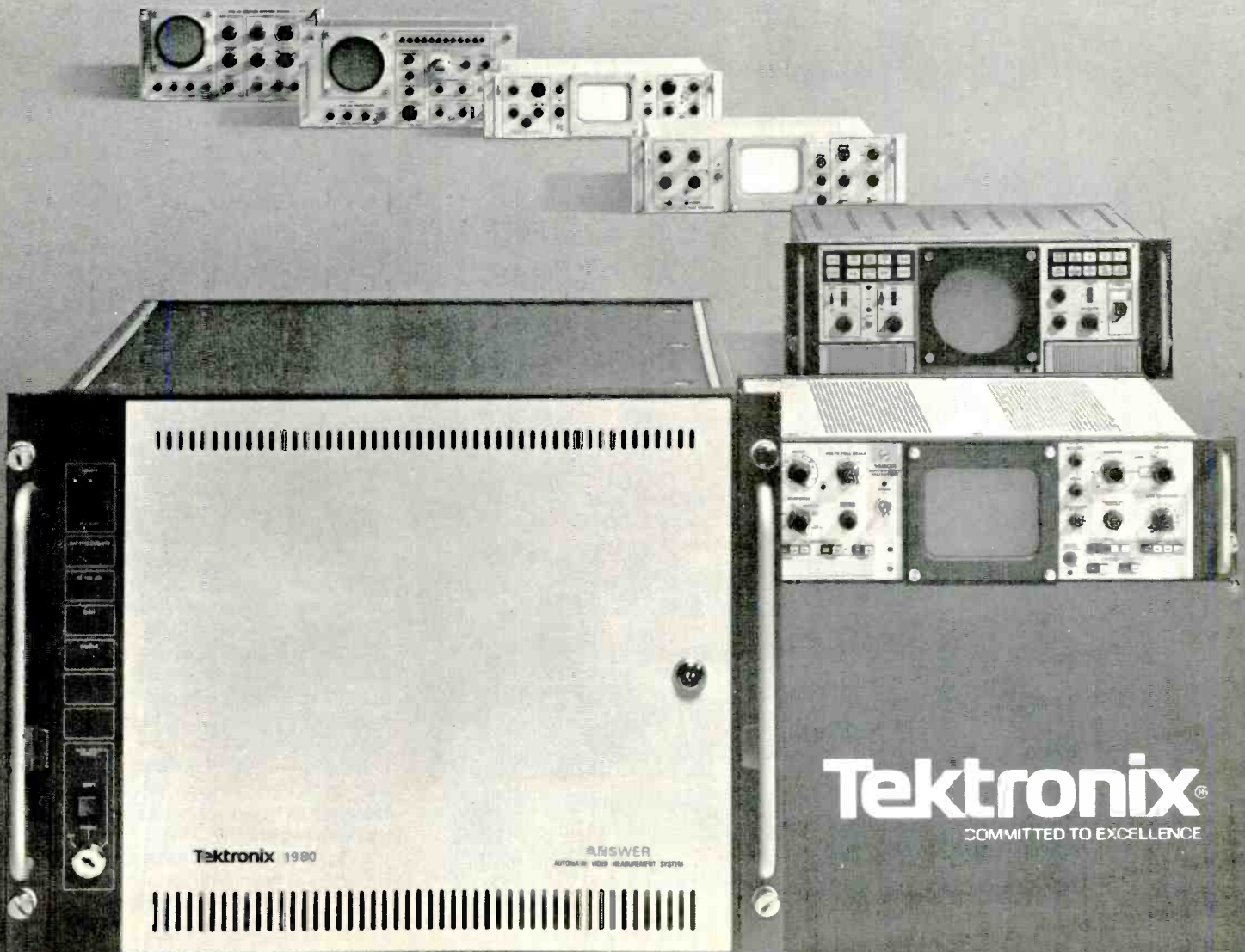
MORE EFFECTIVE MAINTENANCE PROGRAMS. Use the 1980 to proof major equipment. Our graphics/package and hard copy capability can help you establish long-term performance trends.

COMPATIBILITY. RS-232C (Standard) and GPIB (optional) interfaces give you maximum flexibility in integrating the ANSWER System into your operation.

A SOUND, LONG-TERM INVESTMENT. The 1980 is programmable and will not become obsolete if industry standards, test signals, or measurement techniques change.

For more information, contact your local Tektronix Video Sales Engineer. Or dial our Toll Free Automatic Answering Service at 1-800-547-1512, in Oregon 644-9051.

THE ANSWER WORTH WAITING FOR



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COMMITTED TO EXCELLENCE

INTELSAT international communications satellite system. COMSAT pointed out that Puerto Rico's international message volume unexpectedly shot up approximately 65% between 1976 and 1978 and that projected service will more than double from 1979 to 1985. It also noted that Puerto Ricans today have no access to the INTELSAT system.

Dublin facility

Memorex has announced plans to open a new facility in Dublin to help supply the company's growing European audiotape market. The new facility will begin tape slitting and packaging operations in late 1979. The 40,000 square foot plant building is located in the Clover Hill In-

dustrial Park in the Clondalkin section of Dublin.

West Coast office

Listec has announced the opening of a West Coast office located at 4527 San Fernando Road, Glendale, CA 91204. West Coast operations manager will be Howard F. Stucker, previously with Marvin B. Jacobs Television Optics.

Add a Touch of Class to Your Studio

Broadcast Electronic's new Series 350 slide-attenuator, ten mixer stereo or monaural consoles are as elegant as they are functional. What a combination ... crisp wear-resistant front panel graphics, fashioned control knobs, hardwood end panels, brushed stainless covers and superb audio from field proven modular electronics.

The result? A classic appearance which enhances any broadcast or production environment, and performance that most more expensive consoles can't match: Distortion .05% IM and THD from 30Hz to 20kHz at +18dBm output, with ± 0.5 dB frequency response.

Both mono and stereo models accommodate 22 inputs and every mixer has a preamp selectable for either microphone or high level, plus a full complement of line, monitor, cue and headphone amplifiers ... all plug-in.

For more information, contact your local Broadcast Electronics distributor, or write for our new brochure.



Creative center

Peters Productions has opened its \$2 million studio and creative production center at 9590 Chesapeake Drive, San Diego, CA. The complex, located in Hazard Commercial Park, will span over 24,000 square feet, offering a complete broadcast, audio/video creative outlet. According to the company, capabilities range from the initial research and marketing, to creative planning, design and production.

Facilities include a 24-track recording studio, radio programming rooms, a complete graphics department and a video post-production studio. Future plans include film animation capabilities.

SALES/CONTRACTS

RCA

KGMC-TV, an independent commercial television station in Oklahoma City, OK, has ordered RCA TV studio and transmitting systems valued at more than \$1 million. WJET-TV, Erie, PA, is upgrading and modernizing its studio and transmitting facilities with television broadcast equipment valued at more than \$500,000. WBTW, Florence, SC, will begin broadcasting a maximum-power circularly polarized TV signal in mid-1980 with a new RCA transmitter and antenna valued at more than \$1 million.

WLYH-TV will increase its effective radiated power with an RCA transmitter and antenna valued at approximately \$600,000. WFUM-TV public television station will begin broadcasting early next year with RCA transmitting equipment valued

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ENG/EFP and BCTV lenses...to improve your image.

F/1.4
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F/1.4 7x9 zoom
12" MOD



F/1.7 17x9 zoom
with built-in
2X extender

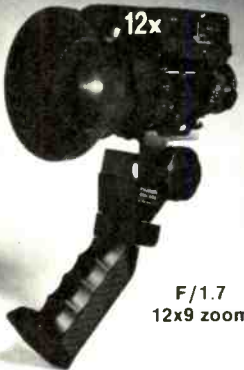


16X lightweight
4-range wide angle zoom



12x

F/1.7
12x9 zoom



14x

F/1.9
14x10 zoom

with built-in
2X extender



10x close-focusing
wide angle zoom



14X ultra high resolution zoom,
constant F/2.1 and built-in test
pattern projector



F/2 22x12.5 zoom
with built-in
2X extender



F/1.6
10x10.5 zoom



30X twin range
field zoom



14X zoom



Here's the FUJINON line. With more ENG/EFP lenses than anyone else. All available with studio conversion kits for extra economy. All with adjustable back focus for faster lens changing.

If you want to get in close, consider the new 22X zoom with built-in 2X extender. It gives you F/2 speed with a total range of 12.5 to 550 mm. If you're already in close, use the unique F/1.4 6 mm ultra wide angle distortion-free lens. It

gives you a "0" MOD with a 70° horizontal field of view.

For studio and field productions, FUJINON BCTV lenses are now offered with built-in test pattern projectors for the fastest, most accurate computerized camera set up. (Not available on 10X wide angle zoom.)

For maximum definition, the new 14X ultra high resolution lens reads 1300 TV lines and maintains a fast F/2.1 in all zoom and focus ranges.

Quality, performance and service make FUJINON best. Camera manufacturers, networks, stations and production companies around the world have made FUJINON first. Before you buy any camera or replace any lenses on your existing cameras, see the difference for yourself. Specify FUJINON. It will improve your image.



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Telex: 171-200

Circle (48) on Reply Card

at approximately \$750,000. The Los Angeles Community College District has ordered RCA equipment and installation services, valued at more than \$1 million, for a complete on-campus TV studio for student education. Golden West Broadcasters is upgrading the transmitting facilities of two stations in its FM radio group with RCA transmitters and antennas valued at approximately \$250,000.

Ampex

Ampex has sold four VPR-2 helical scan videotape recorder/reproducers and two HPE-1 helical editing systems to the National Broadcasting Company. The systems will be used in two mobile vans for coverage of sports and other remote events.

A lease agreement has been signed to supply CTV with a variety

of broadcast video equipment for its coverage of the 1980 Winter Olympics. The agreement calls for the delivery of nine Ampex VPR-2 1-inch videotape recorder/reproducers, six BCC-10 broadcast color cameras and two DRC series video production switchers. Also included are ENG units consisting of three VPR-20 1-inch videotape recorders and three BCC-14 portable cameras.

Marconi

Under a contract from Granada Television, Marconi is to supply and install complete studio equipment to a new center at Derby House, Liverpool. Designed to carry local Merseyside programs into the Granada network, this 3-camera studio will be linked by visual and audio lines to Granada's main television center in Manchester.

Scientific Atlanta

The receipt of an order from Storer Broadcasting of Miami Beach for seven satellite receiving ground stations has been received. The equipment will be used to bring a wide variety of TV programming of sports, news, films and special events to the Storer television stations located in major US cities.

COASTCOM

RCA Americom has awarded a contract to COASTCOM for the supply of over 3000 model 937 voice frequency (VF) companders over a 3½-month period. They will be installed in RCA Americom's New York, Los Angeles, San Francisco, Chicago, Houston, Atlanta and Camden, NJ, central offices for use on domestic satellite voice circuits.

3M

A major agreement has been signed by 3M, Nippon Electric and NEC America giving 3M exclusive marketing rights in the US and Canada for the recently announced NEC Type C helical scan videotape recorder. The agreement is intended as a long-term working arrangement specifically for five years with options to renew. It includes equipment, parts and warranty backup.

3M is offering its digital 2-recorder system or its individual 32-track pre-mix and 4-track master digital recorders for outright sale. The equipment had formerly been available only on a lease arrangement.

Now—you can add Rotary Matrix & Star wipes to any size switcher!

with CDL's new Extended Effects Generator EEG-1980

It's easy. EEG plugs into your switcher's external key input, and EEG effects can be used simultaneously with your own effects, such as a Clock Wipe within your circle pattern... or use them independently. Plus you can use your key softness control for some spectacular Rotary, Matrix & Star effects. See how affordable and easy it is to update your switcher. Write or call for a demo.

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"We evaluated all carts and have standardized on the Audiopak® AA-3"

—Bob Kanner
Chief Engineer
KRTH, FM 101
KHJ, AM 93
Los Angeles

"Our test results show that the Audiopak® AA-3 holds stereo phasing better than any other cart on the market."

"The excellent phase stability of the AA-3 will be of major importance as AM stations convert to stereo."

"The High Output, Low Noise (HOLN) tape in the AA-3 gives us excellent frequency response combined with 6db more headroom."

"The AA-3 maintains excellent tape motion with low wow and flutter."

"We had had previous cart pressure pad problems with our multiple playback machines — these have been resolved by the durability of the AA-3 pressure pads."

"The AA-3 is the state of the art in cartridges — it meets or exceeds the specifications of the current NAB standards."

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The Very Best FM Exciter Wilkinson Model FME10

378 TRANSMITTERS USE IT!
POSITIVE PROOF!

- * Frequency response $\pm 1/4$ DB 15 HZ-350KHz.
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- * Stability 1 part in 100,000.
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The Very Best Stereo Generator Wilkinson Model SG1E

196 TRANSMITTERS USE IT!
POSITIVE PROOF!

- * 60 db separation 50 Hz-7500 Hz
- * 55 db separation 7500 Hz-10000 Hz
- * 50 db separation 10 KHz 15 KHz
- * FM Noise — 75 db Cross Talk — 60 db



COMES COMPLETE WITH POWER SUPPLY
REQUIRES ONLY 3 1/2" RACK SPACE
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meetings, events & seminars

October 21-26—The 121st Technical Conference and Equipment Exhibit of the Society of Motion Picture and Television Engineers (SMPTE) will be at the Century Plaza Hotel in Los Angeles, CA. The conference will feature five days of technical sessions on motion pictures and television. The SMPTE equipment exhibit, beginning Monday, is expected to have more than 250 booths of equipment with many of the major film and video equipment manufacturers participating. For additional information write SMPTE Conference, Dept. BE, 862 Scarsdale Ave., Scarsdale, NY 10583.

October 27-November 3—Telemark '79, the 2nd Exhibition of Installations and Equipment for radio/television stations and the 2nd Borsa Programmi for producers and distributors of programs for radio/television will take place at the Exhibition Park of Novegro, Airport Milan/Linate. For more information, contact COMIS Lombardia, Via Boccaccio, 7 - 20123 Milano, Italy, Telephone (02)80 92 81.

October 29-31—Scientific Atlanta's 5th annual Satellite Earth Station Symposium will be held at the Marriott Hotel in downtown Atlanta. The meeting is offered to executives and technical managers of cable systems, broadcasters and other communications firms. The symposium will feature the experiences of communications firms now receiving satellite-relayed programs and signals by the use of satellite earth terminals. For additional information contact Kenneth F. Leddick, broadcast marketing manager, Scientific-Atlanta, Dept. BE, 3845 Pleasantdale Road, Atlanta, GA 30340.

November 2-4, 1979—10th Annual Loyola National Radio Conference, Loyola University Water Tower Campus and Water Tower Hyatt House, Chicago, IL. Features include an Air Personality Contest, 12 technical seminars on the 2nd and 3rd, and 40 informative sessions. For details contact Maribeth Meno or James Wagner at (312) 670-3116.

November 2-5—The 64th Technical Meeting and Exhibits fall conference of AES will be held at New York City's Waldorf-Astoria Hotel. Convention chairman is Eric Porterfield, Columbia Records, 51 West 52nd Street, New York, NY 10019, (212) 975-4461.

November 11-15—The National Association of Educational Broadcasters will hold their 55th Annual Convention at the Conrad Hilton in Chicago. Highlights include the 2nd Annual Video Fair, a preview of programs being distributed to public broadcasting.

For more information, contact: National Association of Educational Broadcasters, Dept. BE, 1346 Connecticut Avenue NW, Washington, DC 20036.

November 19-20—National Association of Broadcasters is planning meetings for television at the Hyatt Regency, Houston, TX on TV for the 1980s: workshops on basics, UHF, CATV, programming, local and national issues, dealing with the FCC, and training on

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Tower, the SUPERQUADs™, together with the 2

GHz and 7 GHz Nurad QUAD Horns on the Sears

Tower, give NBC in Chicago a capability for multi-

ple remote pickups equal to or exceeding that of

any other television station.



Nurad is the pioneer in circularly polarized antennas for electronic journalism and electronic news gathering. Our QUAD and SUPERQUAD™ Receive Antenna Systems, as well as the famous GOLDENROD™ family of transmit antennas, are now in widespread use throughout the world. We offer full capability for planning, designing, installing, and placing in operation complete microwave television systems. With advanced high-quality proven products such as the SUPERQUAD™, reliable coverage is now possible over ranges far beyond that of predecessor systems and from previously marginal locations. Let us work with you in augmenting your present ENG/EJ capability.

WE UNDERSTAND AND CARE ABOUT YOU, THE TELEVISION BROADCASTER

See the Dual-Band SUPERQUAD™ on display at the SMPTE 121st Technical Conference Equipment Exhibit, Century Plaza Hotel, Los Angeles, October 21-26, 1979

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Meetings, events & seminars

computerization, satellite technology, and videotext. For details, contact NAB, Dept. BE, 1771 N. Street, N.W., Washington, DC 20036, (202) 293-3570.

November 26-27—Video Rights '79 is being held at the Cafe Royal, London, under the chairmanship of John Johnson, program consultant, and professional broadcaster in sound and vision. It was designed to examine the solutions to the rights tangle. For more details, contact Agneta Moe, Nord Media Ltd., Dept. BE, 37 New Bond Street, London W1Y 9HB, England, 01-629 9381., telex 25567.

November 27-29—The National Telecommunications Conference will be held at the Shoreham-Americana Hotel in Washington DC. NTC '79 is co-sponsored by the Communications Society, Aerospace and Electronic Systems Society, and Geoscience Group. For more information contact Dr. Thomas P. Quinn, chairman, Technical Program NTC '79, Dept. BE, P.O. Box 31031, Temple Hills, MD 20031.

December 1—The SMPTE, Chicago Section Annual Midwinter Symposium/Chairman's Reception will be held Saturday evening at the Ramada Inn O'Hare near O'Hare airport in Chicago. For more information contact Ken Knaus, Eastman Kodak, Dept. BE, 1901 W. 22nd St., Oak Brook, IL 60521, (312) 654-5338.

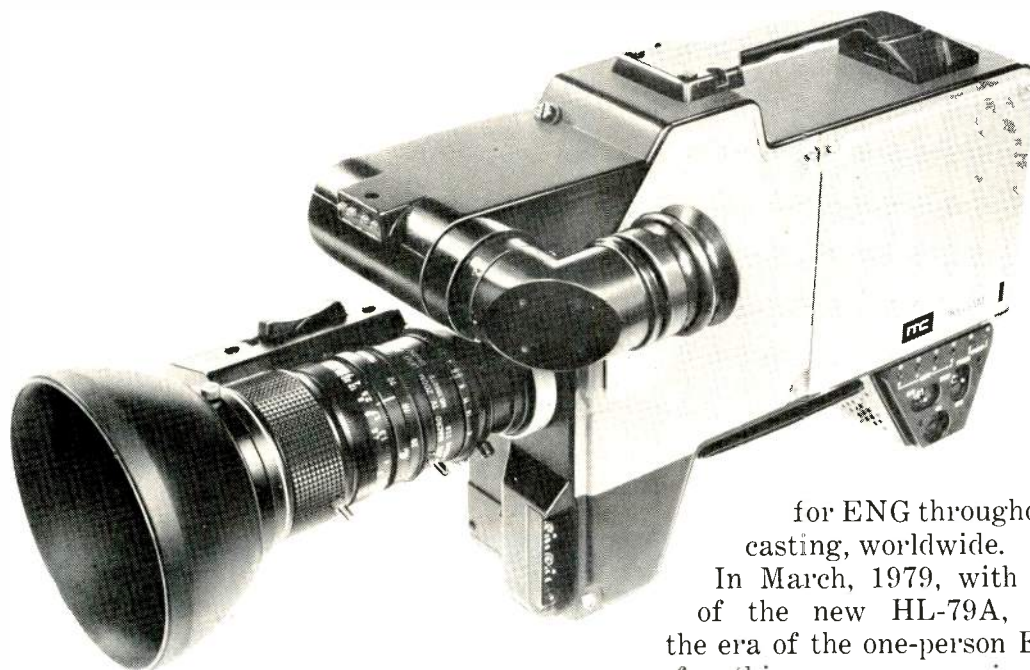
January 20-23, 1980—37th Annual Convention of National Religious Broadcasters will be held at the Washington Hilton Hotel in Washington, DC. For information contact Ben Armstrong, executive director, Dept. BE, P.O. Box 225R, Morristown, NJ 07960.

April 13-16, 1980—Las Vegas will be the site of the 1980 convention of the National Association of Broadcasters. For additional information contact NAB, Dept. BE, 1771 N St., NW, Washington, DC 20036.

April 28-30, 1980—ISCAS/80 will be held at the Shamrock Hilton Hotel, Houston, TX. Workshops will be conducted by various technical committees of the Circuits and Systems Society immediately preceding the symposium on April 27. The symposium, sponsored by the IEEE Circuits and Systems Society, will be the 13th annual international conference devoted to all aspects of the theory, design and application of circuits and systems. Authors may contribute either a full paper, summary or abstract for presentation at the symposium after July 1, 1979, to the technical program chairman, Professor T. A. Bickart. For additional information contact T. A. Bickart, Dept. of Electronic and Comp. Engineering, Dept. BE, Syracuse University, Syracuse, NY 13210.

May 14-16, 1980—International Conference on Telecommunications is accepting papers on case studies of teleconference systems, telemedicine, economics of telecommunications and many others. For information contact Dr. Lorne A. Parker, Dept. BE, Center for Interactive Programs, UWEX, Old Radio Hall, Madison Hall, Madison, WI 53706.

Ikegami inaugurates the era of one-person ENG camera crews.



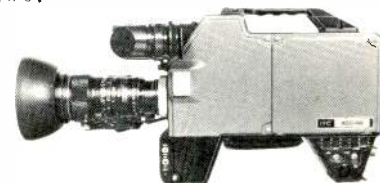
A remarkable new television camera is ready for ENG broadcasters, a new-generation camera significantly more compact, yet higher in performance than any prism-optic ENG camera now offered.

The new HL-79A is like other Ikegami cameras in its performance and reliability. This tradition is well-known in the industry. It dates back some six years to the pioneering HL-33 head-plus-backpack camera that first made broadcast-quality ENG truly feasible. The HL-33 and its successor, the HL-35, carried on this tradition of reliability. And the current HL-77A head-plus-battery camera is today's standard

for ENG throughout broadcasting, worldwide.

In March, 1979, with deliveries of the new HL-79A, we enter the era of the one-person ENG camera crew, for this new camera is an all-in-the-head design — fully integral, with no power cord to a separate battery. Its reduced weight and size enable the camera-person to slip solo in or out of vehicles or through crowds, unhampered as never before. In performance and reliability it is the ENG camera of tomorrow in the authentic lineage of Ikegami cameras of yesterday and today.

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"An endless variety of acoustic spaces..."



Our versatile new digital reverb unit is the most useful sound processor that a broadcaster can buy today. The SPACE STATION can give added presence and body to a live announcer's voice, enhance music and speech for more sophisticated in-house commercials, simulate an endless variety of acoustical spaces, and generate unusual special effects. Moreover, the SPACE STATION can add four delays and/or reverberation to each of its two outputs, creating a spacious mono-compatible "stereo" version of the source that is especially effective for anyone listening in the limited confines of a car.

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B-2

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association news

AMERICAN SOCIETY OF
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Take 1: Radio and the Big Bands follow-up. This article, submitted by Bob Zweck, is in response to reader interest based on BE's 20th Anniversary issue high-lighting, in part, the past years of radio & TV)

Imagine listening to the music of one of the top swing bands in the country with your wife or your best gal with you, perhaps even dancing one or two sets together. The waiter assigned to your station asks if you or the young lady would care for a drink or something to eat, however, remembering the company's policy, you politely decline.

How much is all this costing you? Not a cent. As a matter of fact, you are being paid to take part! A fairy tale? No, it's not Liberace, but rather the Dorsey Brothers orchestra that you're assigned to put on the air from the world-famous Cafe Rouge of the old Hotel Pennsylvania (now the Statler-Hilton) directly across from New York's Penn Station.

How did this all come about? How were you so blessed? The answer was to be assigned to the NBC dance band nemo (remote) pick-up as often as possible. Let's back up a bit and run this past you in more detail this time.

... a legacy of innovation ...

He's been our hero for a long time, that father of modern innovation, Benjamin Franklin. Through his example and Moseley's dedication to broadcasting we've built a reputation for being first in the industry. Moseley finds itself jumping into the forefront once again with a new line of audio processing equipment, engineered with the quality today's listeners demand.

The TAL-320 AM Audio Limiter brings AM broadcast sound to the quality level it deserves. With the advent of AM stereo, Moseley offers a product that maximizes the AM station's modulation while minimizing those undesirable by-products commonly associated with audio processing. The TAL-320 does just that.

Moseley's TFL-280B FM Audio Limiter, in service around the world, allows TV and FM stations loudness and clarity without distortion caused by old-fashioned clippers. Built-in 15 kHz audio lowpass filtering provides protection to the pilot and subchannels.

The TGR-340 Audio Gain Rider complements these limiters perfectly by subtly riding gain on the program line. A recovery-enabling gate freezes the gain-riding activity during pauses in program, preventing background noise from creeping up or fading down. Switchable, treble AGC cleanly solves the problem of STL, satellite-feed or tape-deck overload due to the pre-emphasis in those items.

The TAL-320, the TFL-280B and the TGR-340 join the Moseley family of products responding to today's needs in the broadcast industry. If listener fatigue is of concern, consider the Moseley audio line.

If Ben could see us now!



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The logic behind the Revox B77.

The logic is the logic which is built-in.

It's an ingenious and highly sophisticated system — much like the human nervous system — which controls the deck's functions.

You can push any button in any order with no chance of damaging your tapes. Our motion sensing system constantly feeds status reports to the logic circuitry which activates your commands in proper sequence.

The logic also permits full-function remote control, and an editing mode that keeps the playback circuitry live, even when the motors are stopped. You can make your splices right on-the-beat, and our built-in splicing block makes it easy.

The design and construction of the Revox B77 further guarantee smooth and accurate operation. To get the

long-life advantage of ferrite without static build-up or heat degradation, we use Revox's exclusive Revodur heads, made of metal to dispel heat and static, and vacuum-coated with permalloy for durability.

The B77 has a unique capstan motor that's monitored by a tacho head to precisely control speed and limit wow and flutter to professional studio standards.

Revox offers many options with the B77 including a full range of speed configurations from 15/16 IPS to 15 IPS, variable speed control, ¼ track record/playback and more.

All this professional quality is neatly engineered to fit in a deck you can carry. After all, if you own a machine this good, it's logical to take it with you.

Experience the B77 and the full line of Revox and Studer professional products at your franchised dealer today.



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ASTVC

As every old radio buff recalls, at about 11:15 PM each night, right after the late evening news wrap, every major station (and some of the minors) featured live pick-ups from some of the biggest hotels and nightclubs in the country. Almost every large hotel had a supper room featuring some well-known band or, at the very least, a top combo or group. For example: At the Waldorf-Astoria we danced to Xavier Cugat and his Latin-American band. The

Hotel Roosevelt featured Guy Lombardo & orchestra (replaced during the summer months by Lawrence Welk and his Champagne Music.— The Hotel Edison, right in the heart of the theater district, presented Henry Jerome and that singing brass section. We could go on and on and on but suffice to say that the networks had more than an ample supply of great bands to choose from and thereby satisfy the musical tastes of the late-night listening

public. And satisfy they did.

As noted, the musical pick-ups might have started at 11:15 but after a fifteen minute visit with one band, the next half-hour would feature another orchestra from another hotel or supper club. After that, a break for a late news item or weather report and then back for yet another 15 or 30 minute broadcast, possibly from a well-known Chicago hotel such as the Palmer House. All in all it was a parade of talented music-makers brought to you live each and every night with some exceptions on the weekends.

And what did the engineer assigned to these broadcasts have to do? After receiving his assignment from the Master-Control desk, he would stop at the Field Shop on the fifth floor (overlooking the Rockefeller Center garage) and pack his gear with the equipment designated for that particular location. Usually, this would include two RCA 88s (the salt-shaker mic, possibly a 50A mic, maybe even a 77, set up unidirectionally. Add to this the ND-10 or OP-5 amplifier (portable, they said) and various lengths of cable, PL, and possibly some emergency ac lines. After leaving the field shop, it would be down to the street to flag a taxi, or load one of the NBC station wagons (if available). "OK driver take us to the Rainbow Room." He would start to shift into gear, stop, turn to us and then say in a voice that only New York taxi drivers have: "Are you kidding me buddy? That's right here in the RCA building/ Well, we laughed. He didn't. And we hoped that by the time we reached the Cafe Rouge and had presented him with a large tip he would forgive our little joke. He did.

At the Hotel Pennsylvania, we were greeted by a friendly doorman who is only too happy to relieve us of our load and struggle with it into the dining room. The doorman was used for this for two reasons. First, it tended to cut down on the incidence of hernias in the engineering ranks, and second (and from their viewpoint, more important) the hotel management was rather uptight about the possibility of having diners, dancers or waiters bowled over by someone trekking through with a load or equipment. So you see, everything was made easy for us.

If air time was to be at midnight, then the engineer was to be set up for the initial test with Radio City transmission no later than one hour



Wang Time Tunnel™ Digital Unit because: What they don't hear can't hurt you!

All it takes is one inadvertent obscenity or ethnic slur and away goes a chunk of the market you are trying so hard to nail down.

Wang Time Tunnel™ Digital Unit solves the problem for 26 cents an hour with a six second digital delay that lets you drop, chop or bleep anything you don't like, long before it hits the air.

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WHY JBL FLATTENS THE COMPETITION.

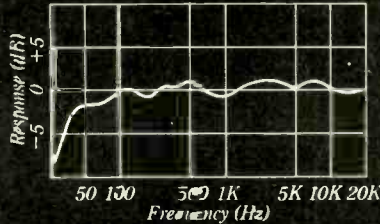
INTRODUCING THE 4313.

Flat frequency response. It means accuracy. Naturalness. Reality.

JBL gives it to you without the bigger box that you'd expect along with it, since the 4313 only measures about 23" by 14" x 10".

This new, compact professional monitor produces deep, distortion-free bass. And does it with a newly developed 10" driver.

Its massive magnet structure and voice coil are equivalent to most 12" or 15" speakers. Yet it delivers heavy-duty power handling and



On-axis frequency response,
4313 monitor.

a smoother transition to the mid-range than most larger-cone speakers.

The 4313's edge-wound voice coil midrange accurately reproduces strong, natural vocals and powerful transients.

Up top, a dome radiator provides high acoustic output with extreme clarity and wide disper-

sion. A large 1" voice coil gives it the ruggedness needed in professional use.

Working together, these precision-matched speakers offer superb stereo imaging, powerful sound levels and wide dynamic range.

Audition the 4313 soon.

We think you'll agree that its combination of flat response, power and moderate size flattens the competition.

James B. Lansing Sound, Inc.,
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91329.

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ASTVC

prior to that. This meant setting up the amp, patching the radio lines (one emergency) and also the PL fax into the telco terminating point. Once this was done, one of the mics was used to set peaks (levels) with Radio City. When that first step was out of the way, we hopped backstage, attached the mics to the stands left at the location, connected the cables to the mics and waited for the break just before air

time. The mics and stands could not be placed before the orchestra until the band took its break.

This left almost 50 minutes before our next scheduled task; that being placement of mics and the attachment of cables to amp with a final check of all mics and a level on the announce mic (which usually doubled as a vocalist's microphone). How did we utilize that time before final preparations for air? Well, as

we said earlier, if accompanied, we were usually invited to get onto the dance floor and join the crowd. If alone, there might be a sarsaparilla or egg cream at the bar. But just to sit at the table and enjoy that music was treat enough.

At break before air time we would complete the set-up and check in with RC transmission. This was it. The entire Red (or maybe the Blue) network awaiting our turn of the fader. "Standby...Cafe Rouge!" says our buddy in transmission, next the countdown and then: "Take it away, Cafe Rouge!" The engineer points to the announcer with one hand, opens the pot with the other, and the Dorsey orchestra is on the air pleasing people from Manhattan to Milwaukee, from Staten Island to San Francisco. □



(What happens next is the difference between Fidelipac Blank-IT and your current bulk eraser)

Break the law of gravity with your current bulk eraser and go pick up another one. Do the same with Blank-IT, and just go pick it up. Blank-IT goes right on bulking.

Fidelipac houses Blank-IT in a lightweight, balanced case that's virtually indestructible. Installs a high mu core with a longer ON duty cycle and more magnetic strength than any hand-held

eraser. Builds thermocouple protection into that core for burn-out proof operation. Tops it with a balanced, contoured handle that stays where we put it. And unconditionally guarantees Blank-IT against electrical burnout and mechanical breakage for a full year after purchase.

\$59⁹⁵ Manufacturer's Suggested Retail Price

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State associations

Ohio Educational Television Network

Discussions concerning the merger of WBGU-TV Bowling Green, and WGTE-TV Toledo, have been broken off at the suggestion of Bowling Green State University President Hollis A. Moore. Moore said that while he was pleased that a genuine attempt had been made in weighing the merits of the entity, he felt the general public would not be served by such a liaison at this time.

Ohio history was made when WVIZ-TV, Cleveland, offered coverage of a court trial to its viewers. The coverage was made possible by a recent decision of the Ohio Supreme Court to allow television cameras into the courtroom for a 1-year test period.

Kentucky Broadcasters Association

The Awards Committee and the board of directors of the KBA fall convention have authorized three station or people awards this year. The awards will be formally presented at the fall convention at the end of the banquet October 25.

Kansas Association of Broadcasters

Bill Bengston, vice president and general manager of KOAM/TV in Pittsburg, is the new KAB president-elect. Bengston was elected to the position during the June convention and brings more than 20 years experience to the job. □

Eight good reasons to be a Beyer Buyer.

one The first reason is Beyer. We have fifty years experience making the world's finest microphones and headphones. And an unmatched reputation for quality, reliability and innovation. The choice of professionals everywhere.

two M 160. One of the world's best-loved and most versatile microphones. Warm, soft sound favored by vocalists and musicians alike. Dual ribbon design for high strength and fast transient response.



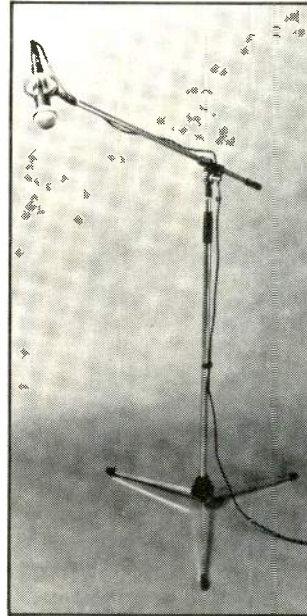
three Beyer headphones. A full range of high quality professional models for critical monitoring and reliable communication. DT 109 combines stereo headphones and boom-mounted microphone, ideal for on-air use and disco deejays. DT 444S wireless headphone receives sound from an infra-red LED transmitter up to



300 feet away. Full 20-20,000Hz frequency response. Six hour stereo operation on rechargeable NiCad batteries.

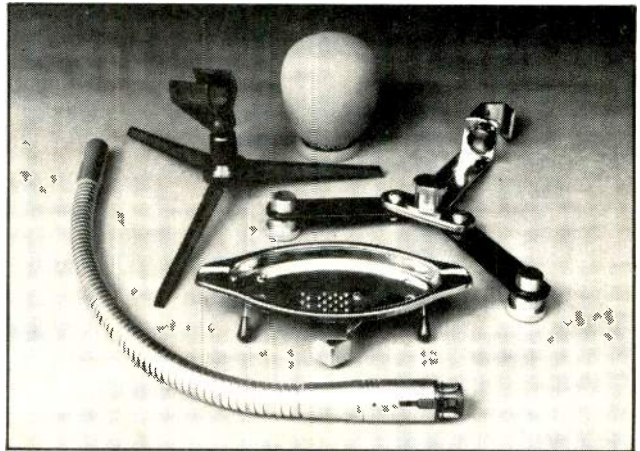
four The new M 400. A great performer's mic. Supercardioid pick-up pattern to minimize feedback. Rugged design for long life. Tapered frequency response with rising high end and rolled off lows, plus midrange presence boost. Built-in humbucking coil and pop filter. Dynamic design is unaffected by heat and humidity.

We're looking for a few more great dealers to handle the Beyer line. Contact Norm Wieland at Burns Audiotechnics.



five Beyer microphone stands and booms. A full range of mic mounts for floor and desk use, with fixed and folding bases. Available with collapsible tubes for easy packing. Also heavy-duty stands for speaker cabinets.

six Beyer microphone accessories. Wind screens, impedance matching transformers, in-line switches, power supplies, wireless transmitters, stereo arms, goosenecks, clamps, thread adapters, anti-shock suspensions, and even a mic stand ashtray! The whole works. If you can use it with a mic, we make it.



seven M 713.

One of our unsurpassed studio condenser mics. Modular system: accepts different transducer capsules and power supplies. Gold-vapored mylar diaphragm for high transient response. Mu-metal shield. Temperature and humidity stable.



eight See your dealer or write for information on our product line. You'll have many more reasons to be a Beyer buyer.

Beyer
Dynamic

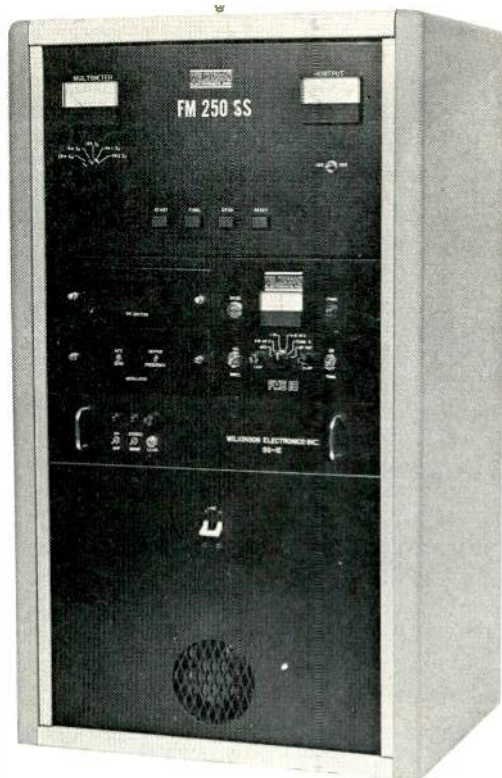
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WILKINSON ELECTRONICS
**FM-250SS SOLID STATE
 250 WATT FM TRANSMITTER**



- FEATURES - Pure Perfect Sound**
- Proven High Quality Exciter - More than 300 In Service
 - Small - Light Weight - Requires Little Space
 - Drawer Construction for Simple Maintenance
 - Self-Testing Power Supplies
 - All Solid State Including Timing Controls
 - Safe - Reliable - Efficient
 - Exceeds U.S. FCC Specifications

The Wilkinson Electronics FM-250SS all solid state FM broadcast transmitter is housed in a steel cabinet finished in a hard durable enamel finish. Only four square feet of floor space required and it is light enough for table mounting. All operating controls are on the front panel and access to the interior of the Power Amplifier is through the PA cubicle. A sliding drawer directly beneath the PA houses the power supplies and control ladder circuits. Overload indicators as well as overload reset controls are on the front panel of this slide-out drawer. All components of these circuits are completely accessible when the drawer is opened.

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 ELECTRONICS, INC.**

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**people
 in the news**

Radio/Television

The University of Maine Board of Trustees recently appointed **Edward E. Winchester** to the position of general manager of the Maine Public Broadcasting Network. Winchester has been with the network since 1963 most recently as director of engineering services.

Greg Miller has been named to the position of chief engineer for KGMC-TV, Oklahoma City. Miller was previously chief engineer at WQRF-TV, Rockford, IL.

The Denver based public television station, KRMA, has recently appointed **W.W. Anderson** chief engineer and **Warren Wright** as production operations manager. Anderson joins the station from the Rocky Mountain Corporation for Public Broadcasting where he served as director of engineering. Wright was formerly project production manager at KOCE, Huntington Beach, CA.

Harold J. Maupin was recently named assistant chief engineer at KHON-TV, Honolulu, with responsibility for maintenance and technical operations.

Pat Kavanagh has returned to WATE-TV as promotion director from Rich's of Atlanta, where she served as broadcast manager. Kavanagh was employed as a copywriter for the station before moving to Atlanta.

Recent staff appointments at KOMO-TV, Seattle, include **Forrest M. Bullard** as account executive and **Michael Hamilton** as night assignment editor. **Kathryn Linwood** has been promoted to the position of producer of the weeknight newscasts and **Margaret Bowman** will serve as production assistant on the program.

Linnea Crowe has been named promotion manager at KSTP-TV, Minneapolis, and **Colleen Bagley** as staff-producer of the *Twin Cities Today* program. Crowe was most recently public relations director for two different firms as well as producer and talent for KCRG radio, Cedar Rapids, IA. Bagley was producer of the *Newswatch Noon* program for WFCA-TV, Tampa, FL.

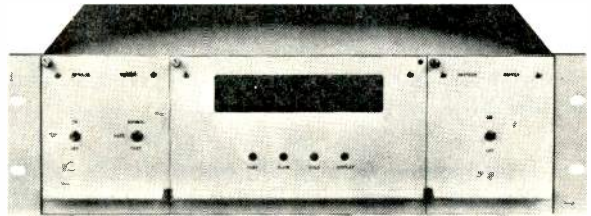
Howard J. Karlin has been named vice president and general manager of WEZV radio, Fort Wayne, IN. Karlin most recently served as sales manager at Fairfield Broadcasting's Kalamazoo, MI, station, WQLR.

Ralph E. Green has been promoted to the position of vice president, engineering, CBS Radio Division. Green joined the company in 1950 as a staff engineer at WCAU-AM FM-TV, the CBS owned stations in Philadelphia. He was named director of engineering for WCAU-AM and WCAU-FM in 1962 and director of operations for WCBS-AM and WCBS-FM, CBS owned stations in New York, in 1965.

Charles H. Warner, former vice president and general manager of WNBC, New York City, will be a visiting lecturer in SIUC's (Southern Illinois University at Carbondale) department of radio-television for the fall and spring semesters.

Perfect Timing

MASTER CLOCK SYSTEMS



Agencies/Associations

Robert Comstock, vice president and executive editor of The Record, daily newspaper of Bergen county, has been elected as chairman of the board of commissioners of the New Jersey Public Broadcasting Authority. Comstock will serve a one year term.

The National Cable Television Association recently named two executives to serve as senior vice presidents: **Kathryn Hilton**, currently vice president for research, has been named senior vice president of industry affairs and **Robert W. Ross**, counsel to the Southern Pacific Communications Company, will serve as senior vice president of government affairs.

William F. Turner, president and general manager, KCAU-TV, Sioux City, IA, has been elected chairman of TARPAC, The Television and Radio Political Action Committee. He succeeds Richard D. Dudley, president of Forward Communications, Wausau, WI. He is a past chairman of the ABC Affiliates Association, past president of the Iowa Broadcasters Association and has served as chairman of the National Association of Broadcasters' Hundred Plus Market Committee and was a member of NAB's Public Affairs Committee.

Dwight M. Ellis, coordinator of the National Association of Broadcasters' Employment Clearinghouse, has been named director of the Department of Minority and Special Services (formerly the Department of Minority Affairs). Ellis will coordinate the Association's activities in minority ownership of broadcast properties, establish and maintain relations with minority and other community groups, serve as NAB spokesman on minority matters, and supervise the operation of the Clearinghouse for minority employment in broadcasting.

Manufacturers/Distributors

Charles E. Smith, Jr., was recently elected president of Six Star Cablevision and will establish headquarters in Los Angeles. Smith most recently served as vice president and regional manager for Warner Cable.

Gordon G. Hurt has been appointed president of Trans World P.S., a wholly owned subsidiary of Stanton Magnetics. Hurt will also serve as corporate vice president of national marketing for both Stanton and the associate firm of Pickering and Company.

Ampex recently announced the election of **C. Ridley Rhind** to the position of vice president of marketing. Rhind will be responsible for the overall marketing strategy and coordination of new business development.

Hiroyasu Sugimoto was recently named executive vice president of NEC America having most recently served as vice president of Nippon Electric, the parent company of NEC. Sugimoto will have administrative

If seeing the same time on all your clocks is important, select **ES 192** - Line Frequency timebase, for only \$300.

If a guaranteed accuracy of three seconds per month is what you want, choose **ES 160** - \$966.

How about one second per month? **ES 160/1** - \$1134.

Or National Bureau of Standards accuracy! **ES 190** is synchronized to Radio Station WWV to provide a Master with unquestioned accuracy. \$1134 with receiver and antenna.

For a Time/Temperature Master, ask for **ES 196** - \$709.

ESE Master Clock Systems are simple to install. All Masters have a Serial Time Code output, able to drive twenty slave displays without buffering. Slaves range in size from .3" LED to 3" gas discharge displays, priced from \$146 to \$415.

IF YOU ALREADY HAVE A SYSTEM AND WANT TO EXPAND IT, get the **ES 167** Serial Time Code Generator (\$136), then add any number of our low cost slaves.

Many, many options and accessories are available. Ask us about them. Our brochure tells the whole story, but not for long. We keep adding new products.



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People in the news

responsibility for the radio & transmission, mobile radio and broadcast divisions.

James L. Fischer has been promoted to the newly created position of vice president, technical development and planning for Warner Cable, from the position of vice president, technical operations. **Larry Wangberg**, formerly vice president of marketing, has been named vice president and general manager. Also promoted was **Miklos B. Korodi** to the position of senior vice president of new business development from vice president and general manager for the QUBE service.

RCA Photophone Systems recently named **Anthony Severdia** as manager of engineering and manufacturing. Prior to joining RCA, Severdia served as a marketing consultant in the audio-visual and data display fields.

Robert C. Szymborski has been named engineering manager for data communications products and ADC Telecommunications, a division of Magnetic Controls Company. Symborski will be responsible for directing the new product development projects in data communications.

Robert Switzer has been named director of domestic

sales and **Thomas S. Butler** has been promoted to director of international sales at McMartin Industries. Switzer most recently served as western sales manager and Butler was eastern sales manager.

Keith Dickey, recently named chief programmer for Consolidated Video Systems, will be responsible for development and organization of software programs for the firm's computer-aided videotape editing system and other computer-based video systems.

Robert J. Livergood has been appointed national sales manager for Gusdorf Corporation, having most recently served as national sales manager with Lloyd Electronics.

The Antenna Specialists Company recently announced several changes in the staff of its professional products division sales group. **Al Dolgosh** has been named product marketing manager and **Mike Sciulli** assumes the position of OEM sales manager for professional products.

Christopher Donoyan has assumed the presidency of Vital Industries of Gainesville, FL, manufacturers of television production and master control switchers, automation systems, and the SqueezeZoom 4-channel video manipulation unit. Donoyan, brother of the late Nubar Donoyan, founder of Vital Industries, has been

superb time code

4400 Decoder

4100 Edit Code Generator

4300 Reader and Video Display

4200 Reader and Digital Display

BTX guarantees superior SMPTE time code performance from 1.5 to 1,200 IPS at -18 dBm and with any degree of time jitter.

BTX guarantees superb reliability through rigorous engineering design, and assures it with 100-hour production burn-in prior to shipment.

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operating Donoyan Enterprises, a large import/export firm in Los Angeles for the past 10 years and has been directing export sales for Vital Industries for some time.

David Speed has been appointed digital communications marketing manager for the satellite communications division of Scientific-Atlanta. Speed has been with the firm since last May and served as domestic marketing manager.

James B. Lansing Sound recently announced the appointment of **Jim Phoenix** to the position of manager of transducer engineering. Phoenix will direct the transducer engineering staff in investigating, developing and improving component transducers and system designs.

Homer Hull was recently named director of marketing at Commercial Electronics. Hull joins the company from Dictaphone where he served as marketing manager.

Ralph J. Files has been named chief engineer and **Richard F. Hall** has been appointed marketing executive at Windsor Total Video. Files was most recently chief engineer at Unitel Production Services and Hall was administrator and executive producer at Lenox Industries-General Media Corporation.

Philips Test & Measuring Instruments recently named **Dan Lippman** to the position of sales manager, manufacturers' representatives and **Frank Bostrom** to district manager of the Garden Grove, CA office. Lippman most recently served as district manager for the Santa Clara, CA office and Bostrom served as a senior salesman in the office.

Paul E. Welcome, formerly regional manager with Central Dynamics, has been named technical services manager with E & O Systems.

Tele-Image recently announced the appointment of **Roger A. Mathison** as marketing director, a newly created position. Mathison will coordinate the sales activities of the company.

Ron Means has been appointed manager of the professional division at James B. Lansing, and will supervise all sales and marketing activities for the professional product lines.

RCA Americom recently announced a reorganization of responsibilities within the division. **Lawrence Driscoll** is manager, broadcast services; **Lou Donato** has responsibility for network relations; **Bradley Dusto** is manager of video services; **Jim Grady** is manager, audio services; and **William Kopacka** is manager, CATV services. □

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in 5 seconds!**



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Now you can completely automate your video tape erasing jobs with Garner's new Video Raser unit. It's a simple one-step, in-and-out operation. Tapes pass on a continuous belt over high flux coils, giving you tape erasure depth exceeding professional standards. Built rugged and compact, it easily handles video cassettes. You'll also like the Video Raser's competitive price.

Look to Garner for quality electronic audio and video products. For more information, write or call:

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NOW! COMPLETE REPRODUCE HEAD CALIBRATION

The new Magnetic Tape Reproduce Calibrator (Flux Loop Test System) accurately establishes and isolates the magnetic characteristics of the reproduce head. It allows one to use a Reproduce Alignment Tape to isolate and establish losses produced by gap characteristics and spacing effects. Gap losses and reproduce equalization are tabulated in the recently introduced Standard Tape Manual.

In addition to the new Reproduce Calibrator and the Standard Tape Manual, STL offers the most complete selection of magnetic test tapes available - Frequency Alignment - Pink Noise - Sweep - Speed & Flutter. All are available in reel-to-reel, cassette and cartridge.

Write or phone for fast delivery. Write for free catalog and detailed information on the new calibrator.

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October 1979 *Broadcast Engineering* 91

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Holds all sizes of ENG/VTR equipment!

MODEL 900A

This totally modular console has every feature for editing efficiency—shelves that adjust on 1" increments, sliding pullouts for added working space and easy maintenance, total access to VTR's, editors, monitors and equipment. Rolls easily on large casters—even into a van to create a mobile unit! For full-line catalog of video consoles, tape and film trucks, film / videotape storage systems, call or write

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Winsted

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new literature

Slide presentation

Buhl Optical—The "Care and Feeding of the Mobile Multiplexer" is a booklet which describes how to produce slide presentations and how to transmit their programming to video using the Mobile Multiplexer filmchain. The booklet also provides information on techniques for making slides, a sample story board for planning slide presentations and choices and recommendations for dissolve controls.

Circle (105) on Reply Card

Test equipment catalog

Sencore—The 1979-80 edition of Test Equipment is available. The 24-page catalog contains prices and illustrations on capacitor and inductor analyzers, digital multimeters, picture tube testers and many other items.

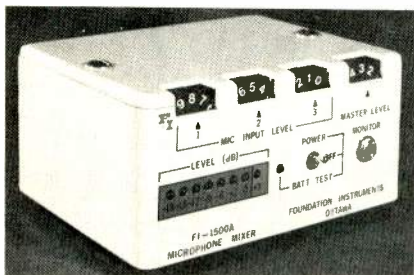
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Electronic kits

Heath Company—A 96-page catalog describes nearly 400 electronic kits for the do-it-yourselfer and includes test instruments, security products, stereo components, color televisions, auto accessories and personal computer systems.

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HOT New Products From Foundation Instruments



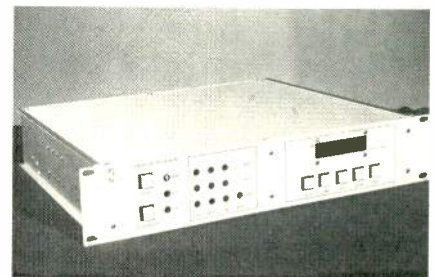
FI-1500A BROADCAST MIXER

- Compact, belt worn.
- Rugged die-cast aluminum box.
- 3 inputs.
- Selectable output level.
- 8 LED level meter.
- Phantom supply for shotgun mics.
- Low noise.
- Suggested price \$595.00.



FI-1300A TIME/DATE GENERATOR

- Plugs into R F module of Sony Betamax, VO-3800, etc.
- Inserts Hr., Min., Sec., Day., Mo., Yr.
- Crystal controlled accuracy.
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- Rugged



FI-2800R VTR SEQUENCER

- Operates three VTR's.
- Video sensing.
- Internal audio/video switching to output.
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- Single pass or re-cycle mode.
- May be initiated from internal real-time clock.
- Lots of other features.



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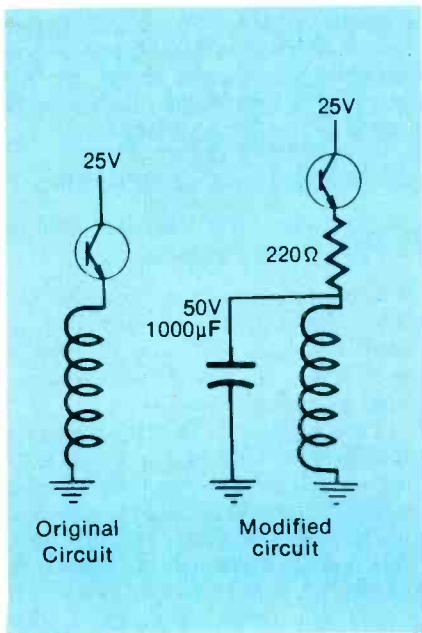
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station-to-station

Modifying a circuit to incorporate small time delay

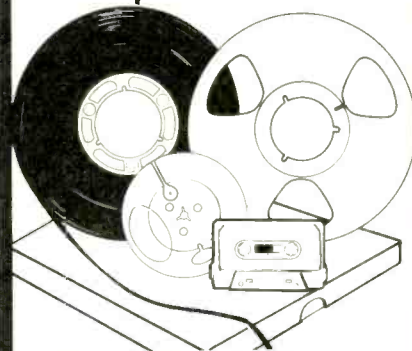
By Barry Routson, chief engineer, WHVR, Hanover, PA



About a month or so ago, our news network changed one of their program feed times to an earlier slot. This being the case, we found it to be advantageous to install an IGM tone decoder unit instead of having our newsmen come in an hour or so earlier every morning. The unit was rigged to activate a tape deck and record the program cuts. Unfortunately, we found that the audio which was fed would also sporadically activate the stop function in the decoder unit, and shut off the tape deck in the middle of the various program cuts. The problem was to modify the circuit to incorporate some type of small time delay to eliminate the voice activation of the stop function, and yet still allow the one second stop tone to stop the recorder.

The answer was to delay the relay activation for a fraction of a

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REEL TO REEL TAPE

Ampex, 3M. All grades. On reels or hubs.

CASSETTES, C-10-C-90.

With Agfa, Ampex, 3M tape.

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FOR REMOTE & SMALL PRODUCTION FACILITIES

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\$7,400.00



12-input, 4-output mix-effects amp with downstream mixer, includes downstream preset & program busses with cut bar, RGB chroma key

Standard Features

- 12 inputs including Black-burst and Color Background
- Built-in Black Burst Generator
- Built-in Colorizer
- Built-in RGB Chroma keyer
- Four Switching busses
- Downstream Preset and Program Busses with cut bar
- Rack-mounted electronics
- Adjustable Soft Wipe
- Adjustable Border edges
- Color Matte
- Vertical Interval switching thru-out
- Illuminated Momentary Contact push buttons
- Internal, external, Chroma-key, and matte inputs to keyer

- Built-in pattern modulator with frequency and amplitude controls
- Full Tally
- Pattern symmetry control
- Illuminated Momentary contact push buttons for effects selection
- Normal/Reverse/Normal-reverse wipe transitions
- Pattern limit controls for presetting size of patterns or varying vertical and horizontal aspect ratio
- Loop-through inputs
- Input amplifiers with clamping
- Synchronous/Non-synchronous inhibit
- Modular construction with front access plug-in modules

Options:

Downstream Keyer

Prices and Specifications Subject to Change Without Notice.

FOR MODERATE SIZE FACILITIES

MODEL B1-154

\$10,990.00



15-input, 4-bus mix/eff/key amp with downstream mix/key amp. Many optional features including DSK & quad-split, etc.

FOR SOPHISTICATED FACILITIES

MODEL B1-156

\$21,795.00



15-input, 6-bus with two full mix/eff/key systems & dir. pgm & pre busses: many options available, DSK, quad, etc.

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FAVAG MASTER CLOCK SYSTEMS

Available with accuracy better than 1 second/yr.

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- Routing switchers with AFV

CHECK BEAVERONICS FOR:

- Specialized custom switchers
- Selected terminal equipment



New maintenance Kit makes tape head cleaning easier . . . and more effective

Texwipe's new Audio Tape Head Cleaning Kit, TX250 contains everything a maintenance engineer needs to keep heads in top working order to ensure high sound fidelity and low incidence of failure.

Specially designed cleaning pens, one for pressure rollers, one for heads feature replaceable lint-free absorbent Clean-Wicks that can be cut to exact shape to suit the job.

Each kit, which costs only \$27.50, contains enough material for more than 900 cleanings! Subsequent cleanings cost less than a penny a piece.

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TEXWIPE



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Complete Kit includes:

- One 7-oz. can Audio Tape Head Cleaner
- Two aluminum Audio Cleaning Pens, with 6" Clean-Wicks
- Ten replacement Clean-Wicks
- One Clean-Wick Cutter
- One Space-Saver Rack
- One Roller Activator
- Audio Tape Head Cleaning Kit TX250 . . . \$27.50

Station-to-station

second so that the short duration voice pulses could not get through to activate the relay. After checking the pull-in voltage and current of the relay, I realized that it would be possible to use a capacitor charging arrangement as shown in the diagram. After a couple of calculations, I decided on a 220 ohm resistor and a 50V 1000uF capacitor. This combination gives approximately 0.5 second delay for this particular relay and an end to the voice activation problem.

Audio delay that costs nothing

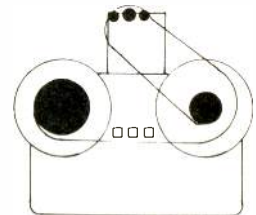
By Ed Ray, chief engineer, WLSQ/WREZ FM, Montgomery, AL

We needed a tape delay for our live call-in program, but our old cart delay machine was plagued with splice thumping, poor erasure, and rapid tape wear.

Two alternate choices presented themselves: Shift the heads around on a reel to reel machine, thereby removing a good machine from normal service (and keeping about the same problems) or spend the money for a solid-state delay.

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This gizmo was glued to the top of a reel to reel machine, dead center. The line from the machine's play head was unplugged and connected to the outboard delay head. We threaded the tape through this device, and it worked perfectly, the first time.

This gives a spacing of about 25 inches between the record and play heads—that's 3.3 seconds delay for the 7½ speed, and 6.6 for the 3¾ speed. That gives over an hour's playing time for the low speed on a 1200 feet reel.

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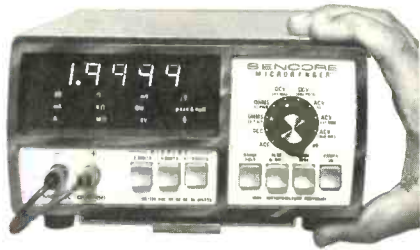
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new products

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A 100% microprocessor-controlled autoranged DVM is available from Sencore. Basically a 4½ digit instrument, the DVM56 Microranger can



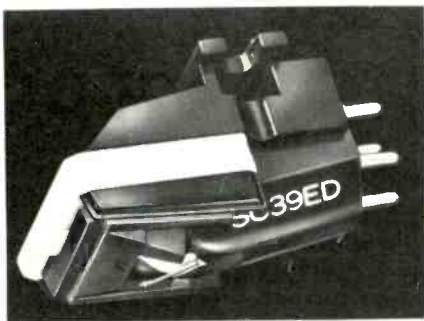
be changed to a 4- or 3-digit DVM by pushing a button when accuracy is not required or the operator desires faster readout with increased stability.

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Vertical cabinets

Scientific-Atlanta is offering an additional depth to the Optima Action vertical cabinet enclosure style. The cabinet is available in 24 or 30-inch depths. Accessories available include solid or plexiglas doors, panels, slides and drawers. Optima Action vertical cabinets range from 22-70 inches in height.

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Phono cartridges

Shure Brothers SC39 phono cartridges are designed for broadcasting, recording, disco and other professional applications. The new line includes three models. The SC39ED cartridge offers an essentially flat frequency response. The response of the SC39EJ and SC39B is extremely flat (± 1 dB) up to 15,000 Hz, with a smooth rolloff up to 20,000Hz to minimize high-frequency splatter that may result from high-frequency pre-emphasis in FM

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New products

broadcasts.

Each SC39 cartridge has an internal support wire and elastomer bearing that ensures stable and accurate backcueing without groove jumping. The models also have a lateral deflection assembly called the Side-Guard, which responds to side thrusts on the stylus by withdrawing the entire stylus shank and tip safely into the stylus housing before it can bend.

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Audiocassette deck

Thorens' PC650 Three-Head Cassette Deck offers three heads; two motors; double Dolby noise reduction with built-in test oscillator and front panel calibration; full-logic electronic controls; mute switch for noiseless fade-in/out; separate



headphone/monitor amplifier; and optional time and remote control.

The unit also includes an electronic servo tape tensioner, and a belt-driven design that has reduced wow and flutter. The PC650 has been designed for simple conversion to all standards of metal tape.

Circle (113) on Reply Card

Cartridge player

The QFX Series NAB cartridge players by Sonifex (exclusively imported by Track Audio) reproduce A-style cartridges. The QFX250 is a mono player, while the QFX500 is designed for stereo. The machines are equipped with digital Servopac dc motor drive, and an air damped solenoid is provided for rapid silent operation. The machines also feature fast winding with mute in the fast and stop mode. Connectors are XLR-3 Series. The basic machine has primary cue autostop, an equalized cue output, together with comprehensive remotes.

Specifications include 600 Ω 0dBm unbalanced independent outputs; frequency response from 40Hz-15kHz \pm 2dB; stereo phasing 45°, 100Hz and 15kHz reference 0° 1kHz; noise level of -62dBm; mute level of -80dBm; 2% maximum distortion,



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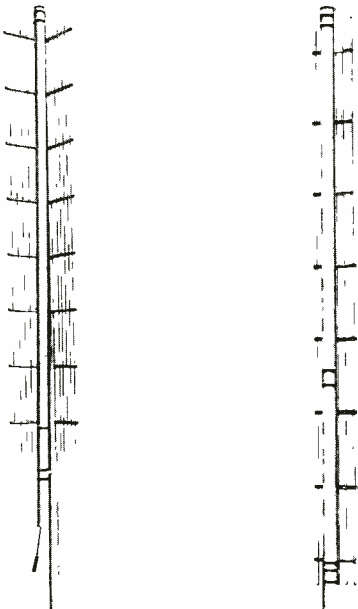
+8dB above standard reference;
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Base station antennas

Phelps Dodge Communications has added two models to its line of uni-directional 800MHz collinear base station antennas. The models PD-1132 and PD-1136 can be utilized for either top or side mounting applications.

The PD-1132 offers a forward gain of 17dB while the PD-1136 offers 10.5dB. Maximum power input for both antennas is 500W and both models have a 60MHz bandwidth of 1.5:1 VSWR. Horizontal



beamwidth for the PD-1132 is 60° and 13° for the PD-1136. Vertical beamwidth is 8° for both models. Direct ground lightning protection is a feature of the two antennas and both have a direct Type N female termination with an 18-inch flexible extension of RG-393U with Type N male connector attached.

The two models use solid copper alloy radiating elements encased in a weatherproof fiberglass housing and supported in front of a high strength aluminum reflector assembly.

Circle (115) on Reply Card

Record cleaning

The Record Sweep record cleaning system by Robins incorporates a quick-fill covered reservoir which feeds metered amounts of moisture to a plush velvet cleaning surface.

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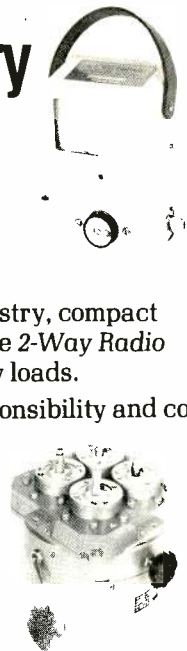
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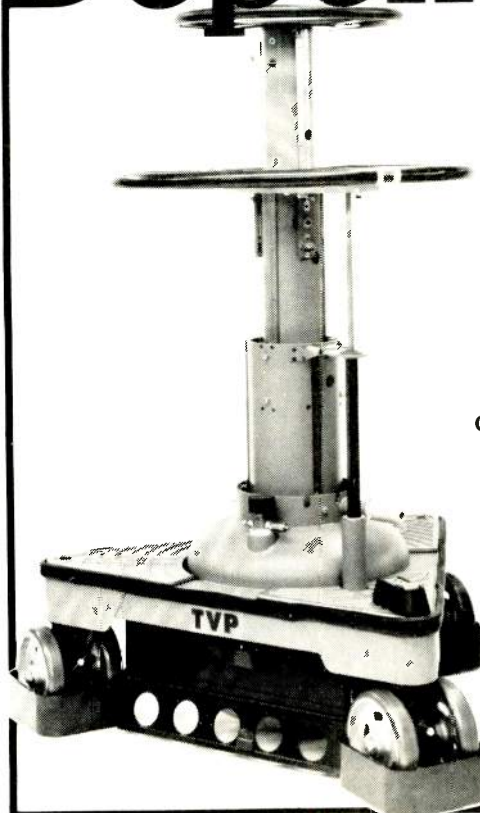
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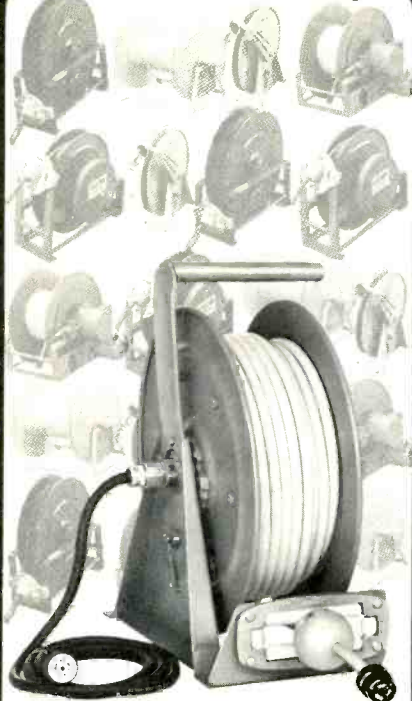
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Noise reduction

Nakamichi and Telefunken have produced a cassette noise reduction system, Hi-Com II. The system is being made available as an out-board processor which can be used with any tape deck, although the circuitry has been optimized for high-quality cassette decks. The circuitry uses Telefunken's HighCom compander IC.



The unit processes the signal in two frequency bands. Both bands use a 2:1 compression/expansion ratio to achieve a 20dB improvement in the cassette deck's dynamic range. The use of a relatively high ratio and the use of separate companders for the low and high frequencies results in virtual elimination of noise modulation.

Circle (117) on Reply Card

Headphones

Beyer has designed electrostatic headphones with a frequency range from 10-25,000Hz, capable of a maximum output of 115dB at 1kHz. Designated the ET 1000, the headphones utilize a broad, padded headband and soft ear cushions. They are supplied with an 8-foot cord and a standard stereo phone plug. □

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WANTED: Pre-1926 radio equipment and tubes. August J. Link, Surcom Associates, 305 Wisconsin Ave., Oceanside, Ca. 92054, (714) 722-6162. 3-76-tf

HIGHEST PRICES PAID for 112 Phase Monitors and for clean, 12 year old or less, 1 KW and 10 KW AM Transmitters. All duty and transportation paid. Surplus Equipment Sales, 2 Thorncliffe Park Dr., Unit 28, Toronto, Ontario, Canada, M4H 1H2. 416-421-5631. 2-79-tfn

INSTANT CASH FOR TV EQUIPMENT: Urgently need transmitters, antennas, towers, cameras, vtrs, color studio equipment. Call toll free 800-241-7878. Bill Kitchen, Quality Media Corporation (In Georgia call 404-324-1271). 6-79-tfn

MICROPHONES needed for historical archive; early RCA and Western Electric models. James Steele, National Association of Broadcasters, 477 Madison Avenue, New York, NY 10022, (212) 759-7020. 9-79-2t

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BROADCAST TECHNICIANS: Four openings; 1st F.C.C. license and TV maintenance or videotape editing experience required. Send Resume to: O&E Dept., WETA-TV, Box 2626, Washington, DC, 20013. 10-79-1t

WANTED, VIDEO TECHNICIAN—1st Phone required, ENG experience preferred. Live and work in South Texas resort community. Contact Louis Brown, KIII-TV, 512/854-4733. 10-79-2t

RADIO-HELP WANTED, TECHNICAL: Chief Engineer for 93,000 watt stereo FM in 68th market TSA. Experience in FCC rules, maintenance of transmitters, microwave and studio equipment. Need a creative, self-starter who is proud of developing and maintaining an excellent quality signal from studio to airwaves. Top pay and benefits. EOE. Full resume and references to Operations Manager, WLRG, P.O. Box 8428, Roanoke, VA 24014. 10-79-1t

STUDIO MAINTENANCE ENGINEER: Experience in maintenance of RCA VTR's and TCR 100 desired. FCC 1st class license required. \$7.54/hour and up—depending on experience. Send resume to: Adel Munger, KVOS-TV, Box 1157, Bellingham, WA 98225. KVOS-TV IS AN EQUAL OPPORTUNITY EMPLOYER. 10-79-1t

BROADCAST ENGINEERS—WMTV, Madison, Wisconsin, has 2 positions available for Broadcast Engineers. One position primarily involves control room operations. The other position is for a TV maintenance engineer with experience in state of the art electronics. Both positions require a FCC First Class License. Send resume to Doug Christenson, Assistant Chief Engineer, WMTV, 615 Forward Drive, Madison, WI 53711, an Equal Opportunity Employer. 10-79-1t

CHIEF ENGINEER EAST TEXAS AM-FM STATION. Two tower directional array. Automated class C-FM. Attractive salary and benefits. Send resume to Dept. 475, Broadcast Engineering, P.O. Box 12901, Overland Park, KS 66212. 10-79-2t

HELP WANTED (CONT.)

TELEVISION SYSTEMS ENGINEER: If you are a television systems engineer with a track record in designing color television studios, master controls, RF and baseband distribution systems, surveillance systems, and specification writing, or, if you have equivalent design experience in broadcast television or a top CCTV business, industrial, or educational operation; if you want to advance your professional future by working with the leading television and audiovisual consulting and design firm in the field with offices in New York, Los Angeles, and London; if you want to work in New York City, where the action is, with top professionals, on projects which are setting the trend—Send your resume and salary history, in confidence, to: Robert J. Nissen, Vice President, Hubert Wilke, Inc., 280 Park Avenue, New York, New York 10017. Full company benefits. Salary commensurate with experience. 10-79-2t

YOU know that you're worth more than you're getting paid—we do too. Send us a resume. Write Dept. 474, Broadcast Engineering, P.O. Box 12901, Overland Park, KS 66212. 10-79-1t

CHIEF ENGINEER for South Florida group owned TV station. Must be a hands-on man knowledgeable in RCA equipment and SONG ENG. Resume to Box Dept. 468, Broadcast Engineering, P.O. Box 12901, Overland Park, KS 66212. 8-79-tfn

ASSISTANT CHIEF ENGINEER for South Florida group owned TV station. Must be a hands-on man knowledgeable in RCA and SONY ENG. Resume to Dept. 469, Broadcast Engineering, P.O. Box 12901, Overland Park, KS 66212. 8-79-tfn

PRODUCTION OPERATOR/MAINTENANCE ENGINEER: Indianapolis based production facility expanding. Desires experienced operator/maintenance engineer with 1st phone to operate 1", 2" tape machines, computer editor and multi channel audio mixer. Strong maintenance background in digital circuitry a must. No phone calls. Send resume and salary requirements to: Telematrix Productions, 5635 West 80th Street, Indianapolis, IN 46268, Attention: Tom Parrish. 9-79-2t

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MAINTENANCE ENGINEER: Midwest major market production facility looking for experienced maintenance engineers on quad/helical VTR's. Studio and portable cameras. Digital equipment. Excellent salary and benefits. Please send resume to Dept. 476, Broadcast Engineering, P.O. Box 12901, Overland Park, KS 66212. 10-79-1t


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SUPERVISOR BROADCAST TV ENGINEER: The University of Missouri-KOMU-TV has an immediate opening for a Supervisor of Broadcast TV Engineering. Successful applicant should have an Associate's degree in Electronics, four to five years experience in TV engineering, and the ability to assume broad technical responsibilities with heavy emphasis on maintenance. First class radio-telephone license required. Competitive salary and good benefits. For more information, send resumes and/or contact: PERSONNEL SERVICES, UNIVERSITY OF MISSOURI, 309 Hitt Street, Columbia, Missouri 65211, 314-882-4221. AN AFFIRMATIVE ACTION/EQUAL OPPORTUNITY EMPLOYER. 10-79-21

MASTER CONTROL AND PRODUCTION TECHNICIAN WANTED. First Class Radio Telephone license required. Experience with Quad and 3/4" tapes, master control switching and production editing. Excellent salary and benefits. Send resume to Dept. 473, Broadcast Engineering, P.O. Box 12901, Overland Park, KS 66212. An Equal Opportunity Employer. 10-79-31

TELEVISION MAINTENANCE ENGINEER MAJOR MARKET. Must be strong in UHF Television Transmitter maintenance, FCC 1st class license and technical school education. Salary negotiable. EOE Metromedia; KRIV-TV, Houston, Texas. Call Chief Engineer at 713/626-2610. 10-79-11

OPERATING TECHNICIAN for Washington, D.C. area production company. Must be familiar with audio pickup and recording techniques and have a good working knowledge of television audio systems. Reply Dept. 465, Broadcast Engineering, P.O. Box 12901, Overland Park, KS 66212. 8-79-31

MAINTENANCE ENGINEER: Position available with major broadcast chain. Must have hands-on knowledge of ENG and TV broadcast equipment. Require First Class License. Send resume to Joe Missick, Chief Engineer, WISH-TV, P.O. Box 7088, Indianapolis, IN 46207. An Equal Opportunity Employer M/F. 10-79-11

ELECTRONIC TECHNICIAN: Maintain Audio-Visual lab including camera, stereo and facilities of TV and radio teaching studios and student radio station as well as basic audio-visual materials. Qualifications include FCC license required, completion of technical communication course in electronics, 2 years experience with radio transmitting and maintenance, good interpersonal skills. Salary negotiable. Excellent benefits. Call or apply at the Personnel Department, Northwestern University, 1812 Chicago Ave., Evanston, IL 60201, (312) 492-7507. Equal Opportunity Employer M/F. 10-79-11

MAINTENANCE SUPERVISOR for large Washington, D.C. area production company. Technical school plus minimum 5 years experience. Must be familiar with all types of studio broadcast equipment. Reply Dept. 464, Broadcast Engineering, P.O. Box 12901, Overland Park, KS 66212. 8-79-31

HELP WANTED (CONT.)

ENGINEERS/TECHNICIANS: Expanding NYC recording facility has opportunities for experienced maintenance engineers/technicians and recording engineers. Dept. 477, Broadcast Engineering, P.O. Box 12901, Overland Park, Kansas 66212. 10-79-11

TRANSMITTER MAINTENANCE ENGINEER—KCET's Engineering and Operations Department has need of an individual who possesses: • 5 years experience as a Television Maintenance Engineer. • Understanding of FCC TV transmitter regulations, transmitting system testing, video and audio processing. • Knowledge of digital circuits desirable. If interested, please submit a resume to: KCET Personnel, 4401 Sunset Blvd., Los Angeles, CA 90027, (213) 667-9232, EOE/AA W/M/H/V. 10-79-11

TELEVISION MAINTENANCE TECHNICIAN. A top ten East Coast network affiliate is seeking qualified candidates for television engineering maintenance. Professional broadcast experience preferred but candidates with substantial technical credentials will be considered. Working knowledge of digital circuitry and EDP would be an asset. An exciting city, excellent compensation and a people oriented working climate are the rewards for the successful applicant. Detailed resume to Dept. 478, Broadcast Engineering, P.O. Box 12901, Overland Park, KS 66212. An equal opportunity/affirmative action employer M/F. 10-79-11

TM PRODUCTIONS/PROGRAMMING seeks additional maintenance engineer. Degree, five years experience, and familiarity with MCI multi-track gear preferred. Send resume to Ken Justiss, Vice President, TM Productions, 1349 Regal Row, Dallas, TX 75247. No phone calls. 10-79-11

ASSISTANT CHIEF: WTRY/WHSH Albany, New York seeks an individual experienced in studio and transmitter maintenance and construction. Directional experience helpful. Contact Norm Avery, WTRY Rd., Schenectady, NY 12309. 9-79-21

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MCCC needs individual for Department of Telecommunications to assist Chief Engineer with radio, TV, and cable equipment. Must have FCC second class radio-television license and practical experience with broadcast, cable or communication facility. AA Degree desirable. Salary range \$8,900-\$13,316. Send resume to: Mercer County Community College, Personnel Services, Dept. GS, PO Box B, Trenton, NJ 08690.

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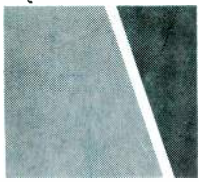
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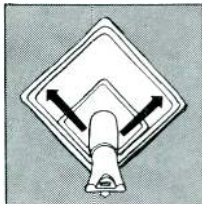
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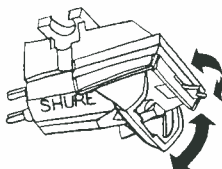
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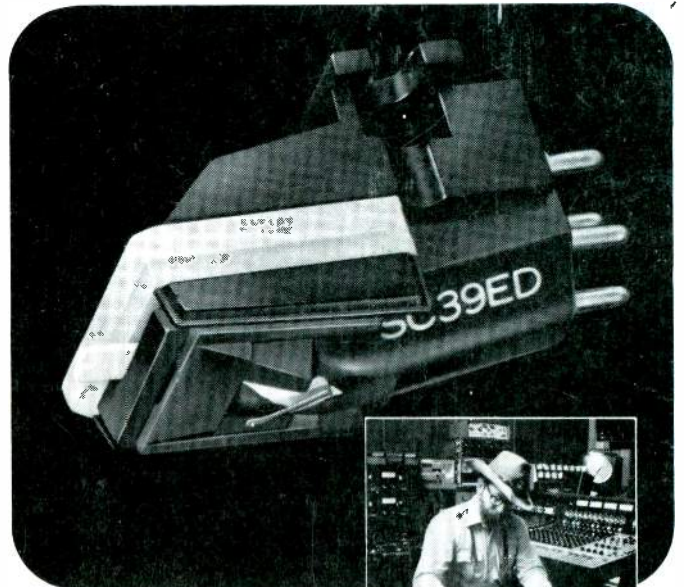
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SC39EJ	Biradial (Elliptical)	1-1/2—3 grams	Where heavier tracking forces are required. AM broadcast, disco.
SC39B	Spherical		

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