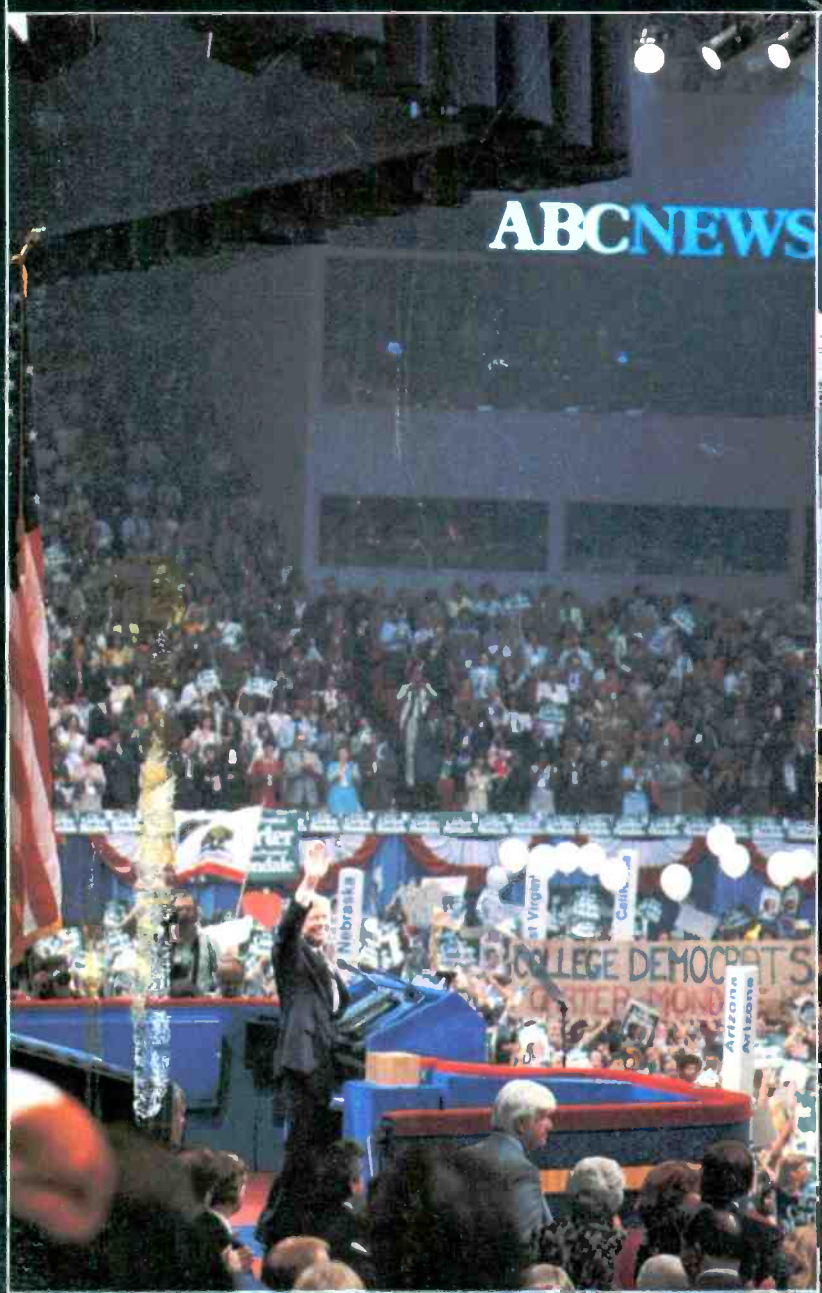
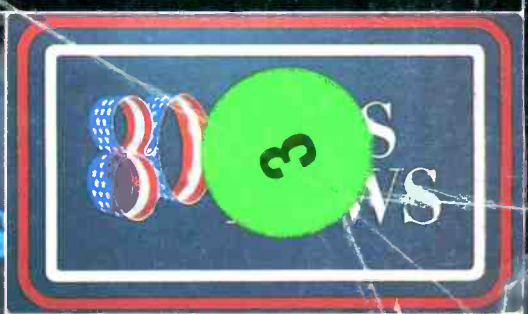
BROADCAST engineering

November 1980/$3

Conventions '80: Technology update

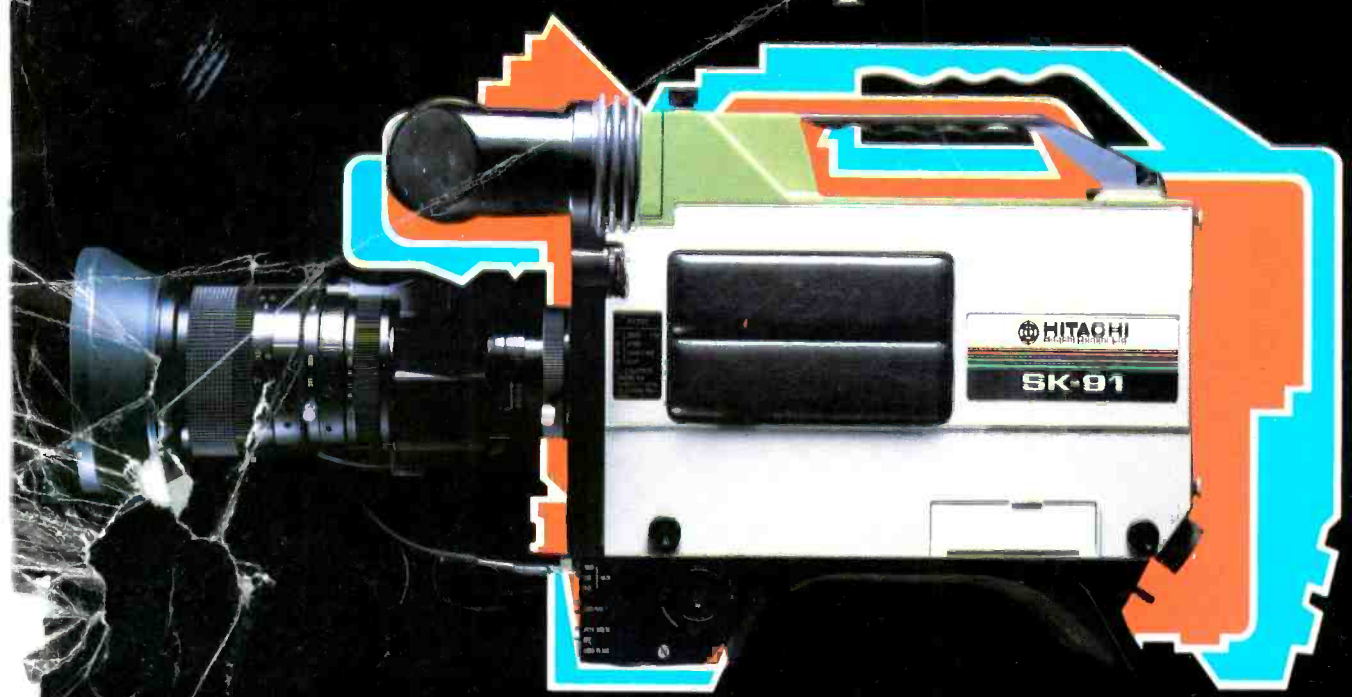




plus

Audio Processing
Noise Reduction Techniques

A Broadcast Breakthrough of Minor Proportions.



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Critical inches shorter and precious pounds lighter.

Creating the world's smallest, lightest ENG/EFP broadcast camera was no small accomplishment. But making it so without sacrificing a single spec or capability qualified as a genuine breakthrough.

Of course, the beneficiary of our advanced engineering is you. You get all the performance that high technology has to offer in a more compact, efficient package. (Cameramen are amazed at the SK-91's responsive, featherlight handling.)

Image quality naturally adheres to the highest broadcast standards, with your choice of Saticons, Plumbicons®, or diode guns®, attaining up to 57dB and 600-line resolution. Why not call your local Hitachi regional office and schedule a thorough in-person evaluation of the SK-91? We think you'll agree that a breakthrough of minor proportions can be of major advantage to you.

SK-91 SPECIFICATION HIGHLIGHTS

- Weight: 9-1/2 lbs.
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Circle (1) on Reply Card

No other 50-MHz oscilloscope gives you as many features as the LBO-517.

Compare the LBO-517 with all other 50-MHz oscilloscopes. Only Leader gives you total capability with:

- **Calibrated delayed time-base**
- **Simultaneous display of main and delayed time-bases.**
- **Two trigger-view channels.**
- **1 mV sensitivity (<10-MHz).**
- **Alternate/composite triggering.**
- **Variable trigger hold-off with B-ends-A mode.**
- **20 kV accelerating potential dome-mesh CRT.**
- **Two-year warranty.**

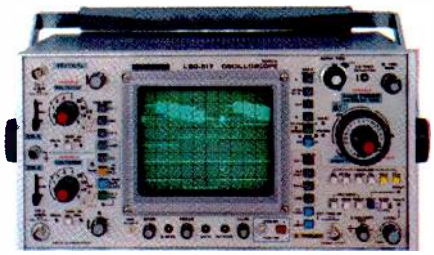
Very low-level signals, complex waveforms, fast pulses at low rep rates, asynchronous signals... no other 50-MHz oscilloscope handles such a wide range of demanding applications, and does it so well as the Leader LBO-517.

Simultaneous Dual Time Base Viewing.

Unlike many other 50-MHz units, the LBO-517 has an alternate time-base mode, ① above. This permits simultaneous viewing of both the main "A" and delayed "B" time bases ②. The delayed time-base is also shown as an intensified portion of the main time-base display ③. Ideal for studying and measuring complex waveforms.

Fast Sweep Rates, Alternate Triggering, Hold-off and B-ends-A Mode.

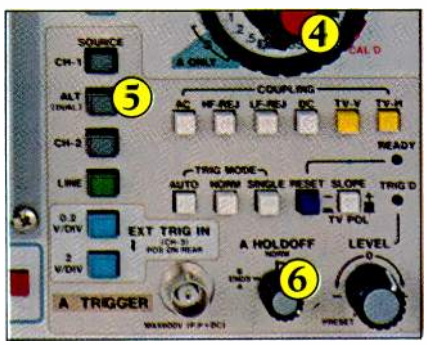
The LBO-517 provides main sweep rates from 0.5 sec/cm to 0.05 µsec/cm in 22 steps ④. Delayed sweep rates



It's the surprising leader for under $2000.

are from 0.1 sec/cm to 0.05 µsec/cm in 20 steps. For displaying very rapid phenomena, both can be increased to 5 nsec/cm with the X10 magnifier.

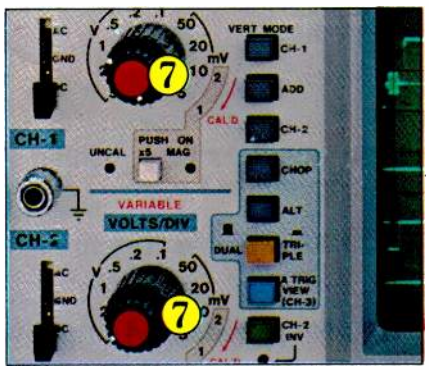
The LBO-517 also offers alternate (composite) triggering ⑤ for stable viewing of two asynchronous signals, along with variable trigger hold-off with a B-ends-A mode ⑥. Variable hold-off ensures stable triggering of complex signals by ignoring intermediate false trigger points. B-ends-A is used to increase the sweep repetition rate for brighter displays of low-frequency signals.



Outstanding Small Signal Performance.

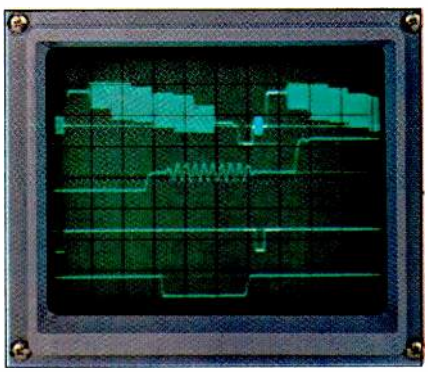
The vertical amplifiers of the LBO-517 offer calibrated deflection coefficients from 5 mV/cm to 5 V/cm in 10 steps ⑦. A X5 vertical multiplier delivers a maximum sensitivity of 1 mV/cm up to 10 MHz... 5 times the sensitivity of more expensive oscilloscopes.

An amplified output of channel 1 is also available at a rear panel BNC connector for using the LBO-517's high sensitivity to drive frequency counters and other less sensitive instruments.



Brightest, Sharpest of All.

The LBO-517 uses a recently developed dome-mesh CRT operating with a 20-kV accelerating potential. The result is an exceptionally bright, sharp display... with an illuminated internal graticule.



Call Toll Free (800) 645-5104.

Call today, to get all the facts on the LBO-517, its two-year warranty, the name of your nearest "Select" distributor, or to arrange for an evaluation unit.

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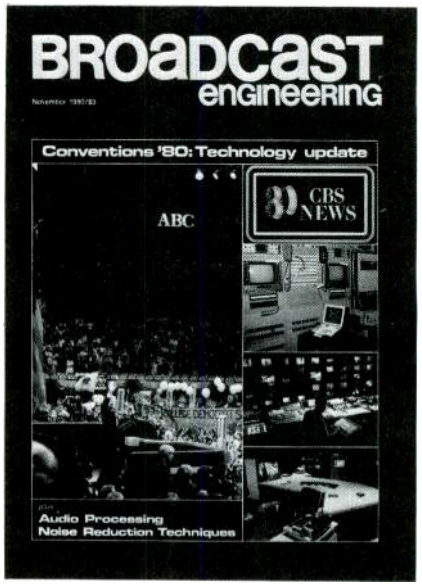
BROADCAST ENGINEERING
The journal of broadcast technology

November 1980 ☐ Volume 22 ☐ No. 11

BROADCAST ENGINEERING (USPS 338-130) is published monthly by Intertec Publishing Corporation, 9221 Quivira Road, P.O. Box 12901, Overland Park, KS 66212. Postmaster, return form 3579 to the above address.



THE COVER captures scenes from the Democratic National Convention in New York City. An article beginning on page 22 summarizes technical highlights of both the Democratic convention and the Republican National Convention, held in Detroit.

Left-side cover photograph courtesy of Jeffrey Tolvin, ABC; right-side photographs of CBS at the conventions (with cooperation from the CBS Information Services department) courtesy of Alec Shapiro, Geltzer & Company, New York, for Sony.

NEXT MONTH: What's Ahead in Broadcasting

•Leading authorities in the industry will share their thoughts on how advancing technology will shape the future of broadcasting. From their positions of high visibility, they will discuss trends under way in broadcasting and project future directions to expect in radio and television.
• More coverage of the NRBA convention held in Los Angeles October 5-8.

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When you buy Panasonic broadcast equipment you're buying award-winning technology.

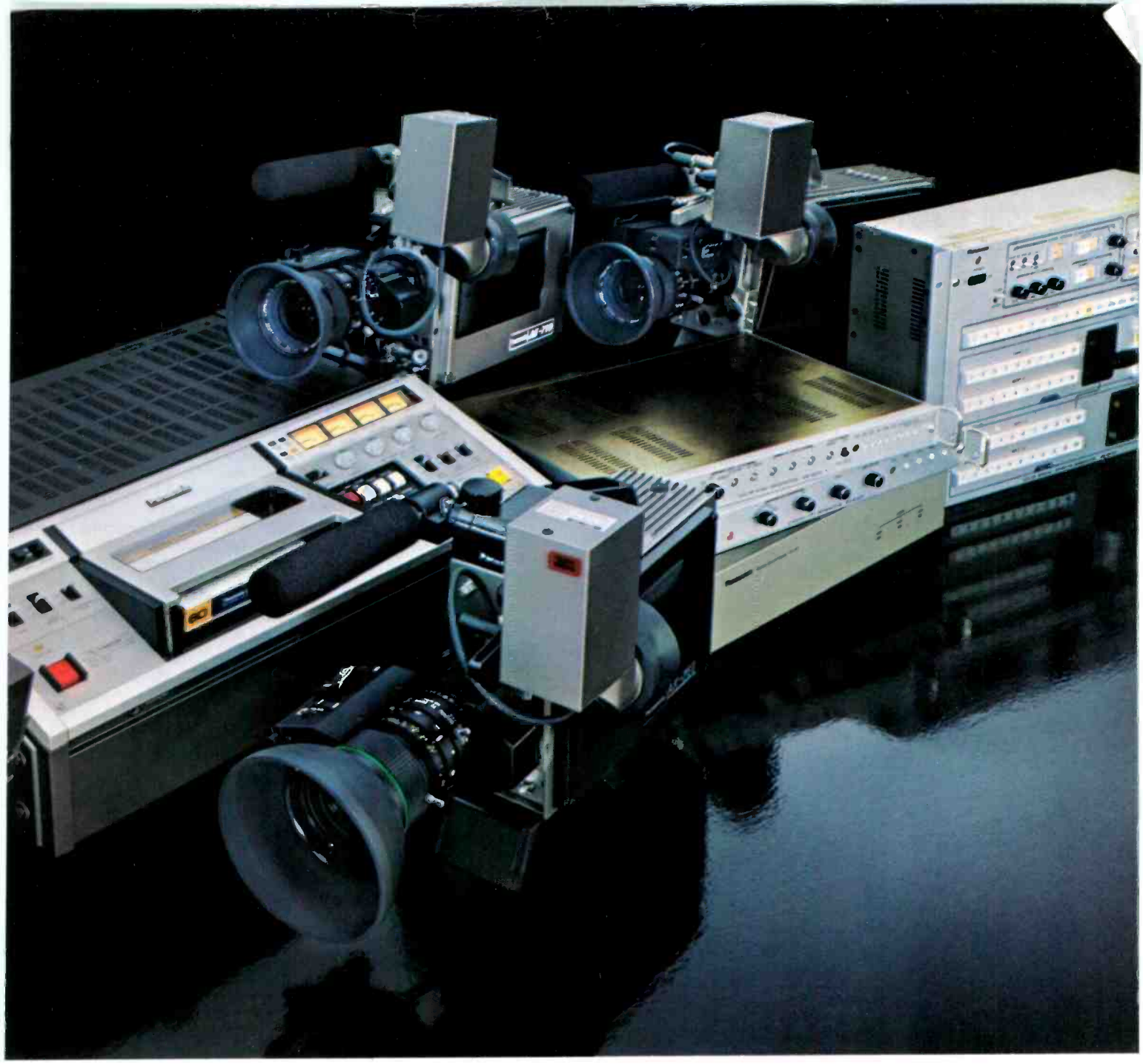
Panasonic was awarded a 1979-1980 Engineering Achievement Emmy for the introduction of digital techniques in video special effects production.

When one network executive first saw the special effects produced by the Panasonic AV-7000 video squeezer, he couldn't believe his eyes. But then he'd never seen a special effects generator that combines digital techniques with microprocessor technology. The members of the National Academy of Television Arts and Sciences were equally impressed. So impressed, they presented Panasonic with an Emmy.

The same innovative engineeering that created the AV-7000 is available in a new line of Panasonic broadcast equipment.

Take the Panasonic 700 B-2 time-code editing system. The AU-700 editing recorder, the AU-A70 programmable editing controller and the AU-J10 multiple source adapter. Together they add speed and accuracy to ¾" time-code editing by letting you do what other systems don't: Perform up to 20 automatic insert and assembly edits from multiple sources. How did we do it? By combining microprocessor technology with the precision of direct drive.

Another way Panasonic says innovation is with the AK-760 ENG/EFP camera. With its three diode-gun Plumbicon® tubes and built-in bias light, it offers incredibly high resolution (600 lines center) and extremely low lag. And with its feed-



back beam control, the AK-760 has the necessary beam current to stabilize scene highlights to the point where comet tailing is greatly reduced.

The Panasonic AK-750B also gives you three-tube Plumbicon performance along with a lot of extras that don't cost extra. Like two-line vertical enhancement, a $2,000* option last year. Plus genlock, rechargeable battery with charger, microphone, and VTR cable. All for $16,000.*

When it comes to electronic news-gathering, the AK-710 offers broadcast quality at a good news price of $10,950.* By adding three Saticon® tubes to a high-index prism optical system, the AK-710 achieves horizontal resolution of 500 lines center and a S/N ratio of 52dB.

Panasonic also says innovation with the AS-6100 special effects generator, the AS-2000 chroma key generator and the AS-1000 color sync generator. And, of course, you can look forward to even more Panasonic broadcast equipment in the future. But take a good look at Panasonic broadcast equipment now. After all, you never know: Maybe the same innovative engineering that won us an Emmy can help you win one.

To audition the complete line of Panasonic broadcast equipment, call your nearest Panasonic office for dealer locations.
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Plumbicon is a registered trademark of N.V. Philips for TV camera tubes. Saticon is a registered trademark of NHK (Japan Broadcasting Corp.).
*Manufacturer's suggested price. (Lenses not included.)

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VIDEO SYSTEMS DIVISION

BROADCAST® engineering

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BROADCAST ENGINEERING (USPS 338-130) is published monthly by Intertec Publishing Corporation, 9221 Quivira Road, P.O. Box 12901, Overland Park, KS 66212. Postmaster, return form 3579 to the above address.

BROADCAST ENGINEERING is edited for corporate management, engineers/technicians and other station management personnel at commercial and educational radio and TV stations, teleproduction studios, recording studios, CATV and CCTV facilities, and government agencies. Qualified persons also include consulting engineers and dealer/distributors of broadcast equipment.

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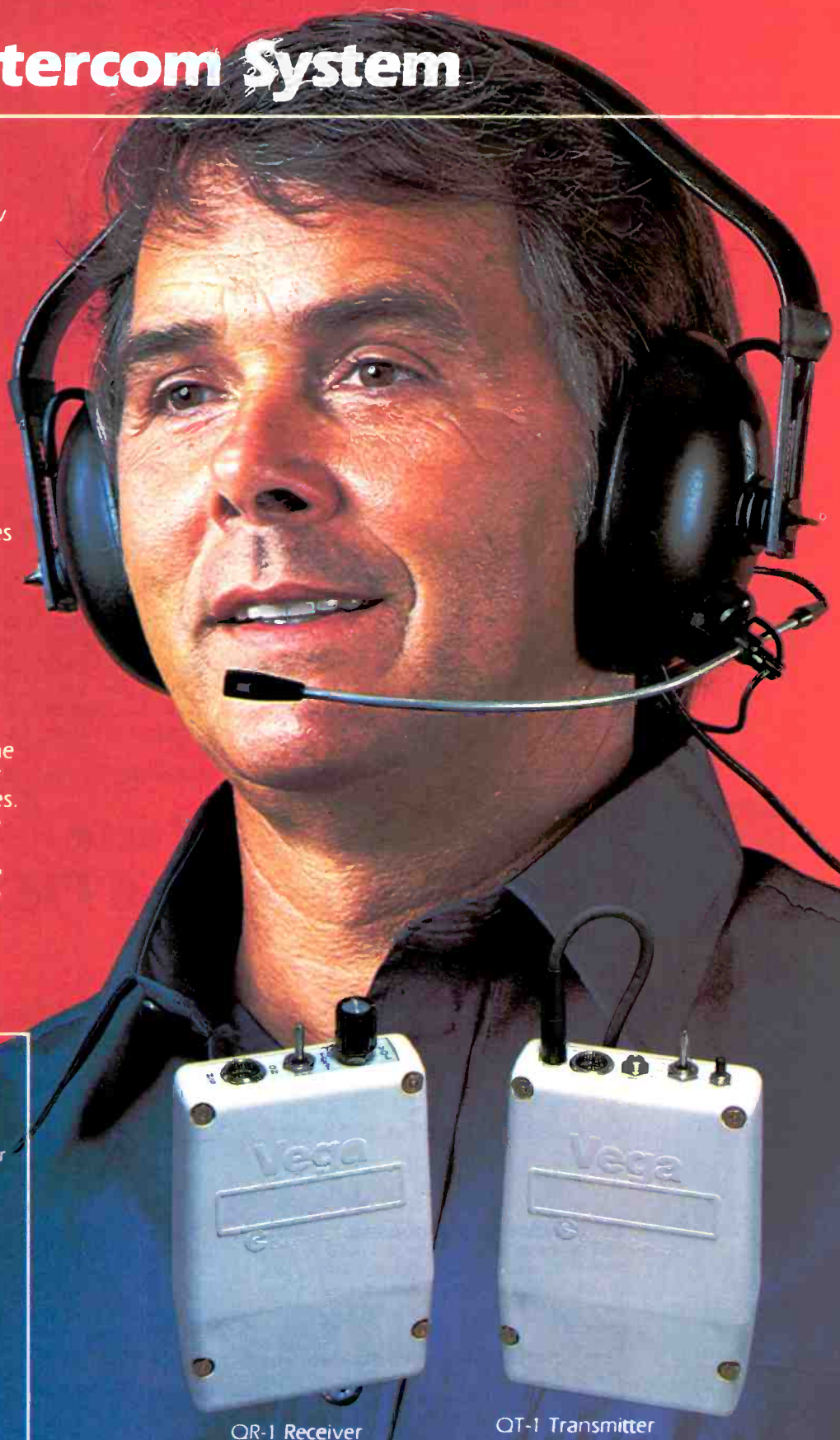
Experience the freedom of intercommunications that is now available with the new Cetec Vega wireless intercom system. Since no cables are required between users, imagine how effectively the following situations could be handled:

- Cueing for sound, light and camera crew.
- Stunt coordination.
- Performer script cueing from script person off camera.
- Sound program monitoring.
- Communications over distances beyond speaking range, thereby eliminating the confusion of hand signals.

The compact transmitter and receiver offer duplex (simultaneous transmit and receive) or push-to-talk operation up to a range of 1000 feet. The systems are available with a complete line of accessories including single or double muff headsets or earpieces.

Cetec Vega's leadership in the wireless communications field assures you years of trouble free service and application flexibility not found in other similar systems.



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QT-1 Transmitter

GENERAL SPECIFICATIONS

Frequencies
150 to 216 MHz.
Crystal controlled frequency stability.

Battery Type and Life
9 volts/Mallory MN1604 alkaline or equivalent. 8 to 10 hours operation.

Transmitter Power
50 milliwatts (Approved for F.C.C. parts 90 and 74).

Receiver Audio Level
Operator Adjustable.

Audio Bandpass
300 to 3000 Hz.

Microphone Type
Electret.

Transmitter and Receiver Dimensions
3.8" long x 2.8" wide x 1" thick.

Operation
Duplex operation capability, as well as simplex.

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Circle (8) on Reply Card

Government-industry advisory committee to be formed

The commission has agreed to requests to form a new government-industry advisory committee on AM and FM radio broadcasting, while declining to institute a consolidated inquiry on AM and FM radio.

The requests were made by the National Association of Broadcasters, the American Broadcasting Companies Inc. and its radio affiliates to look into proposed policies and procedures governing the allocation and assignment of AM and FM radio frequencies. They stated this overall approach was necessary to consider the relationships among various outstanding FCC inquiries, including AM clear channel, 9kHz AM channel spacing, nighttime power increases for Class IV AM stations, AM stereo, increasing the number of potential FM stations and FM quadraphonic broadcasting.

Specifically, they asked whether there was a demand for the additional stations that could be authorized under various proposals, whether the radio marketplace could support additional stations without degrading service, what priorities should be used to allocate whatever new spectrum becomes available and the technical effect of reduced channel spacing or addition of new stations.

The commission said it shared the petitioners' perceptions of the need to coordinate and maintain an overall awareness of the relationships among some aspects of existing proceedings and proposals dealing with the more efficient use of the aural broadcast spectrum. The commission also said it had concluded that the most expedient way to provide the requested overview of various proposals to increase the number of aural broadcast outlets would be to amend the charter of the existing Advisory Committee on AM Broadcasting in Region 2 to provide a clear basis for consideration of the broader questions raised.

The commission said it would amend the charter by changing the

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Circle (10) on Reply Card

present name to Advisory Committee on Radio Broadcasting with two subgroups: one on technical matters, which would continue the work of the previous committee, and another on radio spectrum allocations, which would pursue the issues outlined by the petitioners.

Revised broadcast forms

Forms for broadcast applications and reports are revised frequently. The revision of a form usually makes the previous edition obsolete. The use of obsolete forms can result in unnecessary delays in processing applications, requests for more information or the submission of data no longer required.

The following recently revised forms are now available for use:

Form 301-A—Application for Authority to Operate a Broadcast Station by Remote Control or Make Changes in a Remote Control Authorization. (September 1979. March 1977 edition may also be used.)

Form 309—Application for Authority to Construct or Make Changes in an International, Experimental Television, Experimental Facsimile or Developmental Broadcast Station. (June 1980. All previous editions are canceled.)

Form 313—Application for Authorization in the Auxiliary Broadcast Services. (October 1979. The June 1978 edition may also be used.)

Form 342—Application for Renewal of Noncommercial Educational Broadcast Station License. (January 1979. The November 1977 edition with EEO Supplement may also be used.)

Form 348—Application for Renewal of TV or FM Translator Station License. (October 1979. The August 1978 edition may also be used.)

STV decoders

Devices installed on television receivers to decode or unscramble television signals transmitted by a licensed subscription television station are part of complete communications systems required to be approved by the Federal Communications Commission before their manufacture, import, sale, offer for sale, shipment or use in connection with STV service. The commission's rules relating to equipment and apparatus, and subscription television systems are predicated on considerations of spectrum efficiency, prevention and minimization of harmful interference to authorized radio and television, as well as protection of the consumer against products that will degrade television reception performance.

Clear channel review

Loyola University and Capital Cities Communications have asked the US Court of Appeals for the District of Columbia Circuit to review the FCC's May 29 AM clear channel decision.

The commission had voted to take a middle course in its clear channel proceeding, maintaining the clear channel stations' nighttime service over areas of about 1500 miles diameter, while approving a plan for up to 125 new unlimited-time stations offering service outside the 750-mile clear channel radius of reliable reception.

The FCC had rejected proposals to eliminate the popular long-distance broadcasts of the 25 clear channel stations, deciding instead to permit the new stations to operate at great distances from the clear channel stations in areas where their broadcast signals generally are too weak to provide consistently good service.

It had applied the same standard of interference protection now pro-

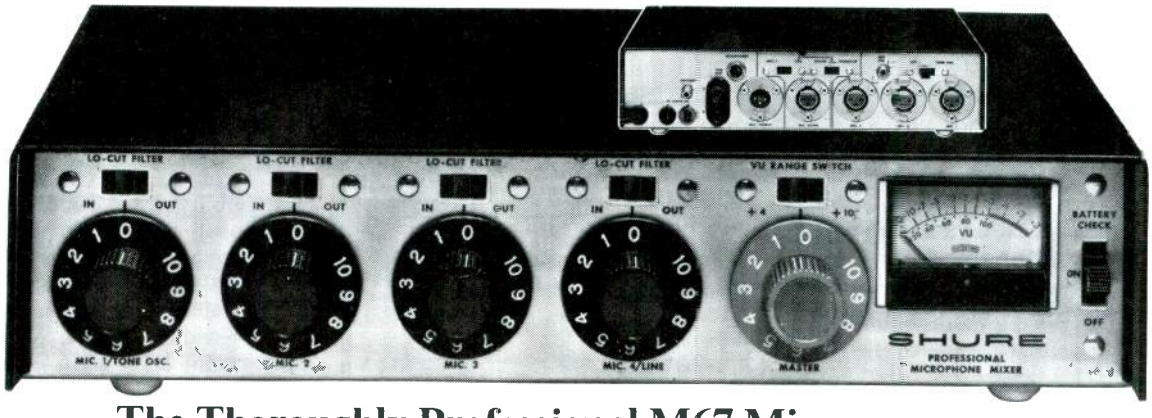
fact: some veteran products do their job so well, for so long, for so little money it's a pleasure to reintroduce them.

Through the years, Shure microphone mixers have gained the reputation of being the practical, efficient, economical way to increase the flexibility of public address, sound reinforcement, and paging systems, as well as tape recorders using multiple sound sources. In fact, they are used in almost twice as many studios as the next most popular brand. . .with good reason.

For Example:

The Utterly Simple M68 Microphone Mixer. . .

The original high-performance, low-cost mixer for professional and semiprofessional applications. Excellent for most sound system and tape recording requirements. Portable (less than 4 lbs), ultra-simple in operation and gratifyingly modest in price. Four high- or low-impedance microphone inputs plus an additional auxiliary high level input, with a master volume control and individual controls. A wide range of accessories lets you customize the M68 for almost any special installation.



The Thoroughly Professional M67 Mixer. . .

Specifically designed for professional recording, TV and radio studios, "remotes," sound reinforcement and audio-visual installations. Four low-impedance transformer-coupled mic inputs, one convertible to line input. Ideal as a self-contained compact console or as an "add-on" for existing facilities. VU meter; built-in tone oscillator for sending level test signal. Extremely low noise and RF susceptibility; two-level headphone monitor jack. . .ac or battery operation with optional battery pack—even switches automatically if ac line fails.

Microphone Mixers by

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Manufacturers of high fidelity components, microphones, sound systems and related circuitry.

Circle (12) on Reply Card

FCC update

vided to the 14 clear channel stations that already share nighttime use of their channels with other stations, and authorized establishment of new stations only outside the protected areas.

Time limit rejected

The FCC has denied a petition for rulemaking by the National Citizens Committee for Broadcasting seeking to require the commission to act on all petitions for rulemaking within 180 days of receipt.

The commission did adopt that time frame as a desirable goal.

In seeking the rule, NCCB noted that the Broadcast Bureau already has an informal policy of acting on rulemaking petitions within six months and said adoption of its proposal would simply make that policy binding.

Signals exemption denied

The commission has denied a petition by the Smaller Market UHF Television Stations Group for a stay of the exemption for significantly viewed signals from the blackout requirements of the network program nonduplication rules.

The group asked for the stay pending FCC consideration of its rulemaking petition to change the numerical test of what constitutes a significantly viewed signal, arguing that an overall stay was preferable to case-by-case action on individual requests.

Broadcast complaints show drop in July

A total of 2477 complaints from the public was received by the Broadcast Bureau in July 1980, a decrease of 1281 from June. Other comments and inquiries for July totaled 1649, an increase of 28 over the previous month. The bureau sent 1245 letters in response to these comments, inquiries and complaints.

Staff appointments

The commission has announced the appointment of **Christopher H. Sterling**, professor of communications at Temple University, Philadelphia, as special assistant and **John G. Williams**, electronics engineer with the National Telecommunications and Information Administration's Institute for Telecommunication Sciences, Boulder, CO, as engineering assistant to commissioner Anne P. Jones.

Paul J. Fox has been appointed assistant chief for technology of the office of plans and policy. □

"Working as we often do under less-than-controlled circumstances — where power is sparse, cables have to be stretched across large areas, and there are large crowds to contend with — we've come to appreciate the enormous versatility and rugged reliability of the RDS/HMI Fresnels," says Bill McManus, president of McManus Enterprises, the prominent production lighting design company (based in Bala Cynwyd, PA) and member of the official 1980 Winter Olympics lighting team.

"I applaud their original and innovative design!" says McManus. "Their unique cube-shaped design and rugged modular construction provide RDS/HMI Fresnels with distinct advantages over other HMI lights currently on the market.

Stackable

"An obvious advantage is that several luminaires can be vertically stacked for ease of transportation and convenient storage. It allows you to cut down on the size of the truck you're taking along... Stack them three or four high at the edge of a tail gate and strap them to the truck. When you pull up to a location, just undo one strap and start handing the lights off. This makes setups real quick and easy.

Convertible

"Another important feature is that RDS/HMI luminaires can be easily converted to incandescent Fresnels by simply replacing the HMI insert assemblies with optional insert assemblies which accept standard tungsten-halogen lamps. That means a lot to a company like McManus which is involved in both sales and rental of equipment, because shelf space is so valuable.

Wider Focusing Ratio

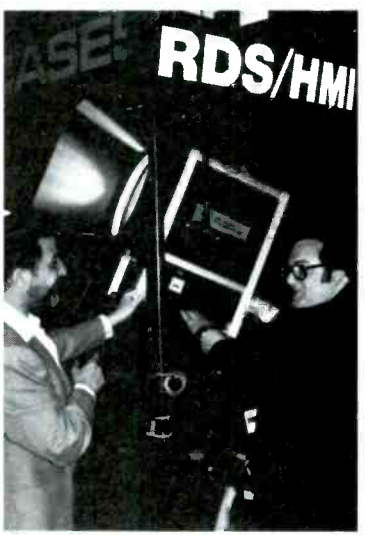
"The lights have such long range, such reach, we were able to use them at Lake Placid from the roof tops of two hotel buildings as if they were regular follow-spots!

"And the specially designed RDS/HMI Fresnel lens provides a smoother field of light as well as a wider focusing ratio from spot-to-flood.

Safe, Rugged and Reliable

"The entire RDS/HMI insert assembly — including lamp socket, ignitor circuitry and switches — can be removed easily without the use of tools for safe, convenient relamping.

"At Lake Placid, a couple of lights were knocked down accidentally. In both instances the lamps were not broken, and the fixtures fired right up within minutes of the accidents. I credit this to the specially designed, shock-mounted heat sink lamp sockets. We had no major breakage, no downtime, no leaks, and no loss of life to the lamps!"



Bill McManus (right) with Joe Tawil of The Great American Market, one of Cinema Products' major dealers for RDS/HMI 575W, 1200W, 2500W and 4000W Fresnel spotlights.

For further information, please contact:

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association news

National Association of Broadcasters
1771 N Street, NW
Washington, DC 20036

Television in the '80s

Television in the '80s was the theme of the upcoming conferences sponsored by the National Association of Broadcasters. The agenda included Congressmen's views on major issues, expert opinions on sales, news, legal problems and the expanding technology that is turning TV into a home information center.

The meetings were held in Philadelphia, October 1-2 (Fairmont Hotel); San Francisco, October 8-9 (Hyatt on Union Square); Phoenix, October 15-16 (Hyatt Regency) and Atlanta, October 29-30 (Omni International).

Minority investment fund

BROADCAP, for Broadcast Capital Fund, Inc. is the new name for the Minority Broadcasting Investment Fund founded by the NAB. NAB hosted a major reception for key donors, leaders from the minority community, government officials and other interested guests at the US Department of State September 30 to celebrate the fund's becoming operational.

The Internal Revenue Service provided a major step last week by granting the fund a favorable ruling. "This means that donors can be assured that the formation and operation of a MESBIC (Minority Enterprise Small Business Investment Corporation) will not jeopardize the deductibility of their contributions," said BROADCAP president Samuel D. Ewing Jr.

Proposed VHF drop ins

A proposal to allow up to 140 new VHF stations will harm the growth of UHF television stations, according to the NAB's executive vice president and general manager. The NAB executive, John B. Summers, commented on an FCC proposal to drop in additional VHF stations:

"At a time when UHF is finally beginning to solidify itself in the television marketplace, it is unfortunate that the commission is proposing to shoehorn in some 140 possible new VHF television stations. Such a move is sure to undercut the growth and health of the UHF service.

"Additionally these proposals present technical questions requiring substantial study. The commission has limited the ability of the industry to provide such technical input by choosing to proceed by Notice of Proposed Rulemaking which involved ex parte restrictions that tend to inhibit full industry and public involvement. A Notice of Inquiry would have permitted a much greater opportunity for examination of the technical issues involved."

Guidelines on open trials

The NAB said it is encouraged by the Justice Department's proposed guidelines regarding open trials but believes they should be strengthened and made more specific.

In a letter to Larry L. Simms, deputy assistant attorney general NAB said that because 90% of all criminal cases are resolved during pre-trial proceedings, it is "especially important" that the media, law enforcement officials and members of the judiciary assure public access while preserving the accused's right to a fair trial.

The Association also said a solution should be found to permit those who have prior knowledge of a matter to be tried to serve on juries. NAB asserted that today's public is better informed and able to make intelligent political decisions than at any time in history. On the other hand, NAB said, trial attorneys often argue successfully that those with prior knowledge are prejudiced and unfit to serve.

Cassettes on EEO requirements available

The National Association of Broadcasters' Legal, Minority and Special Services Departments have available a 20 minute cassette tape to assist broadcasters in complying with equal employment opportunity procedures.

With each purchase of the cassette tape *It's A Lot Easier Than You Think...Living With EEO*, NAB will include a copy of *A Broadcaster's Guide to Designing and Implementing an EEO Program*. Cassettes are available to NAB member stations for $5 and $15 for nonmembers. Order from: Judy Meehan, publications manager, NAB, 1771 N. Street, NW, Washington, DC 20036.

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NRBA tells members about AM stereo

On July 31st the FCC adopted a Further Notice of Proposed Rulemaking seeking additional information on the selection of an AM stereo system(s). The text, including the evaluation tables used to compare AM stereo systems, was released the second week of September.

It is interesting to see the evaluation categories and ratings used to make the preliminary *decision* last April selecting the Magnavox system as well as the new evaluation matrix. The commission has specifically asked for comments concerning any category of the evaluation table(s), the possibility of developing a universal decoder to make the five proposed systems compatible, and the pros and cons of adopting one system vs. two or more.

Comments are due December 9, 1980; Replies January 8, 1981 (Docket No. 21313).

The following table shows the AM stereo evaluation table that was before the commission when it issued instructions to the staff to prepare a *Report and Order* on April 9, 1980 and its revised table.

Asterisks (*) indicate instances in which data in the record either are inadequate or are believed to be erroneous or inconsistent with other data. This does not mean that the FCC is unable to rate the systems in the indicated categories; but that it would prefer to defer such action pending submission of additional information.

	Initial AM stereo system evaluation table					Revised AM stereo system evaluation table				
	Proponents					Proponents				
Evaluation category: Numbers in parenthesis **(x)** indicate the maximum possible scores in the various categories or sub-categories.	MAGNAVOX	MOTOROLA	HARRIS	BELAR	KAHN	MAGNAVOX	MOTOROLA	HARRIS	BELAR	KAHN
I. Monophonic compatibility (15)	12	11	7	12	11	X	9	6	*	12
II. Interference characteristics:										
A. Occupied bandwidth (10)	7	5	9	5	8	10	10	10	10	10
B. Protection Ratios (10)	5	3	8	5	7	7	10	8	*	9
III. Coverage (10)	7	6	6	5	5	*	*	*	*	*
IV. Transmitter stereo performance:										
A. Distortion (10)	8	7	3	9	2	8	8	6	8	4
B. Frequency response (10)	9	4	5	10	7	8	5	5	6	8
C. Separation (10)	9	9	6	10	2	7	10	2	6	3
D. Noise (10)	7	8	7	6	6	6	10	8	6	*
V. Receiver stereo Performance:										
Propagation degradation (5)	3	5	4	3	5	*	*	*	*	*
Directional Antenna Effects (5)	3	3	4	3	3	*	*	*	*	*
VI. Mistuning effects (5)	3	3	4	3	3	5	5	5	5	5
Tentative total score (100)	73	64	63	71	59	*	*	*	*	*

House to reconsider bill

Cross-ownership bill HR-6228, which was defeated by the House of Representatives when the vote failed to get the required two thirds majority, was re-introduced on the House floor. The HR-6228 that was considered, however, did not include two amendments that had been tacked on the original bill by the House Commerce Committee.

Specifically, the amendment, known as the "Maguire Act" that would give New Jersey and Delaware VHF TV stations, was not included. The amendment repealing the Lea Act, which prohibits anyone or anything from forcing broadcasters to hire more personnel than they need, was also dropped.

According to the House Communications Subcommittee counsel, Bernard Wunder, these two amendments will be introduced as individual bills. □

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The BCC-20 Digicam's computer-in-the-head technology combines a microprocessor and digital memory with a powerful software program to give you full-time digital control of the camera.

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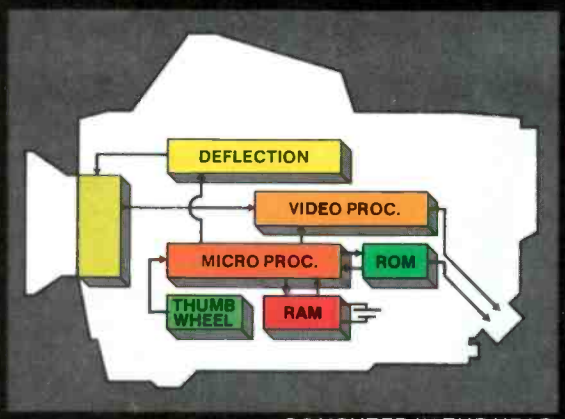
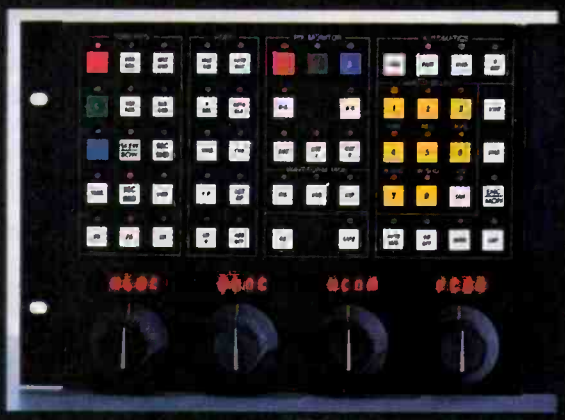


COMPUTER IN THE HEAD



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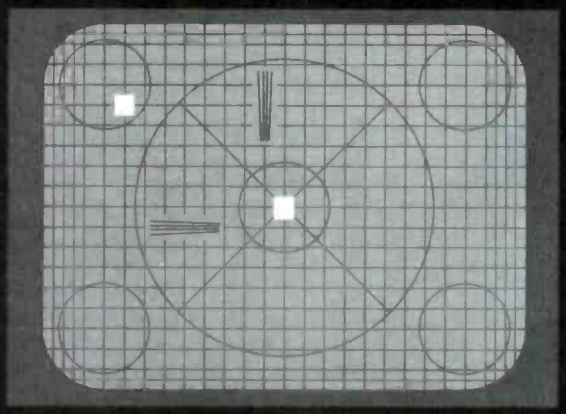

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In the self-contained mode, the Digicam head memory permits the MSP to be disconnected for true portable operation. And yet the operator can still use thumbwheel selector switches inside the camera head to make any operational last minute adjustments.

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industry news

Engineering Emmys

Emmy Awards of the National Academy of Television Arts and Sciences were presented to four major electronics organizations for distinguished achievement in the science of television engineering.

Presentation of the Emmys, by NATAS president John Cannon, was made at the Third Annual Television Engineering Dinner. Receiving the awards were: Nippon Electric Company, The Panasonic Company, Quantel Limited and Vital Industries.

All four awards related to the introduction, development and implementation of digital techniques for the production of video special effects—a computer-age breakthrough in the science of television picture information.

Harris foresees growth

Harris Corporation expects to "maintain its forward momentum as the economy passes through the recession," chairman Dr. Joseph A. Boyd told the Atlanta Society of Financial Analysts. Boyd said the recession's principal effect on Harris so far has been a "moderate slowdown in new orders for some product lines. However, total orders remained strong through August." He added, "We expect any impact of the recession on Harris to lag the impact on the general economy. Thus, we expect the second half of fiscal 1981 to be the period during which Harris may experience some effect from the recession."

Documentary programming

Boston's WBUR (90.9) FM, a National Public Radio station, received an honorable mention for news documentary programming at the 16th Annual Armstrong Awards presentation in Los Angeles on October 6, at the annual meeting of the National Radio Broadcasters Association.

The award-winning program, "Push for Pull: The Iran Crisis," was produced by WBUR news director Carol Rissman and news staff members David Williams, Christy George, and Katy Abel, and aired on WBUR in November, 1979.

The Armstrong Awards are named for the late Professor Edwin Howard Armstrong, noted for his innovative work in modern communications. They are administered by the Armstrong Memorial Research Foundation at Columbia University in cooperation with the National Radio Broadcasters Association.

Organization formed

Eight management and news officials from Michigan radio and television stations have formed United Press International Michigan Broadcasters, an organization to promote the "highest standards of electronic journalism" in Michigan.

Gene Umlor, president and general manager of WPHM, Port Huron, was elected chairman, and Bob Lee, news director of WWTV and WWUP-TV, Cadillac, was elected vice chairman of the organization.

Also elected directors of the organization were Ed Christian, executive vice president and general manager WNIC AM-FM, Dearborn; Norm Koski, president and general manager, WCCV, Houghton; Gale Olson, manager, WSJM, WIRX-FM, St. Joseph; Jon Schwartz, news director WJIM, Lansing; Jim Snyder, vice president and news director, WDIV-TV,

Detroit; and Dave White, news director, WJR AM-FM, Detroit.

The first act of the new organization was to establish a Michigan Broadcast Awards Program, open to all broadcast stations in the state. Snyder was chosen to head the awards committee.

Telecommunication services at conventions

Western Union provided a range of telecommunications services to support press coverage of the 1980 national political conventions, including high-speed facsimile transmission service, Western Union telex service and satellite broadcast services.

This year marks the first time that foreign press representatives were able to send international telex messages to their home offices using Western Union's routing service. Correspondents covering the Republican convention at Cobo Hall in Detroit were able to have stories transmitted by Western Union telex operators, or filed stories themselves using direct-dial telex terminals for transmission via LCR to overseas destinations.

For transmission of domestic press traffic, high-speed facsimile terminals were used at both Cobo Hall and Madison Square Garden in New York—where the Democratic convention was held in August. Press messages were transmitted from these terminals to one of Western Union's central telephone bureaus, where they were reformatted and sent as telex messages via the company's infomaster computer switching system.

Western Union provided television and radio broadcast services for convention coverage through its Westar domestic communications satellite system. Television broadcast customers included the Public Broadcasting System, Hughes Television, Storer Broadcasting and The Robert Wold Company. Service to Hughes, Storer and several other satellite users at the Republican convention was provided through a permanent earth station operated by Greater Starlink of Detroit.

For more information about coverage of the national political conventions, see the story on page 22.

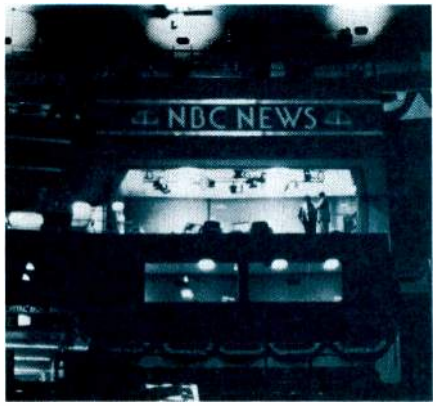
NTIA to coordinate Teletext project

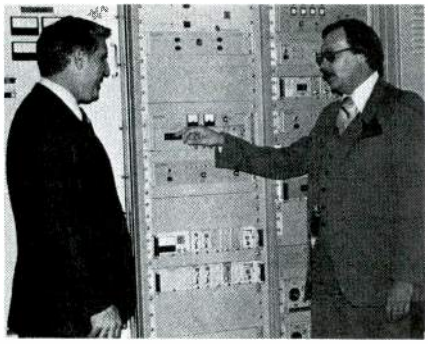
The National Telecommunications and Information Administration (NTIA) of the US Department of Commerce will coordinate government participation in a major experiment in the broadcast of public service information through *Teletext*, a means of transmitting printed or graphic information to the home television set over an unseen portion of the television signal.

The two-year project, to be administered by the Alternate Media Center of New York University, will broadcast information over the facilities of WETA (Ch. 26) in Washington, DC. Units to decode the special signal will be placed in private homes and in public libraries, schools, transportation terminals and social centers. By using a pushbutton handset attached to these decoders, users will be able to select and display specific information such as news headlines, sports scores, or consumer tips.

The project is designed to study the public service applications of broadcast Teletext. In addition to coordinating federal, state and local government involvement in the experiment, NTIA will assist with its funding. The project seeks to determine user needs for information services, evaluate the effectiveness of delivering public and federal services via Teletext technology, and determine the costs and benefits of this means of disseminating information. □

Networks labor behind the scenes for intensive convention coverage





Dennis Ciapura (right), Greater Media general manager of telecommunications, officially accepts satellite transmission systems from Dr. Allen Ecker, Scientific Atlanta Telecommunications Group vice president. The equipment will be employed by the Greater Star Link subsidiary in Detroit and was used extensively during the Republican National Convention.

Televised coverage of the political conventions in Detroit and New York was seen by people around the world concerned with US politics.

Each network prepared months in advance for its coverage of *both* conventions as a joined operation, even though they were being held more than 600 miles apart.

ABC

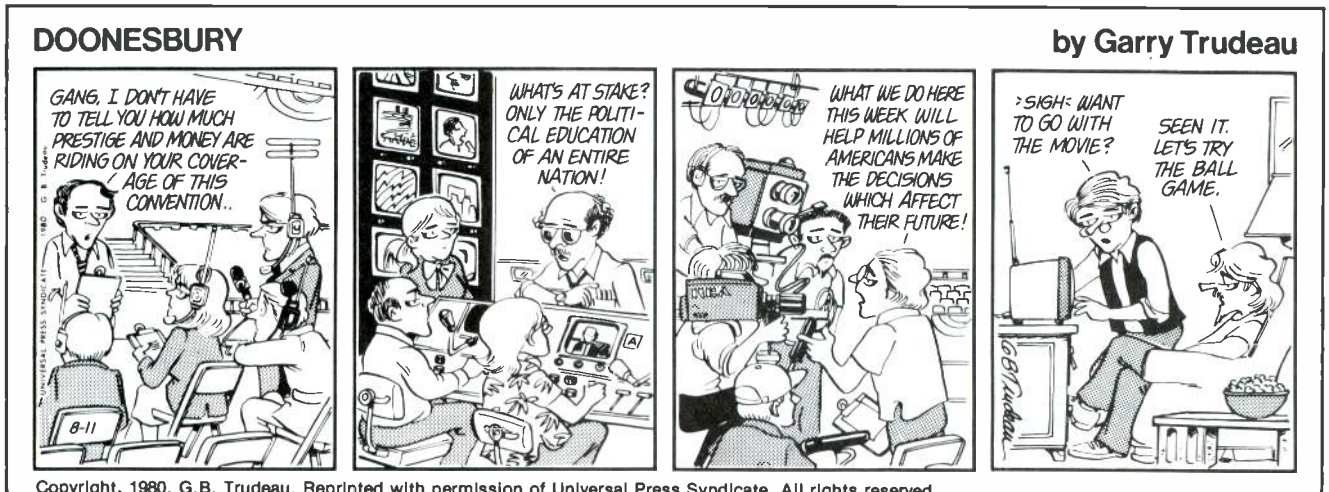
For the Democratic convention in New York, ABC had six cameras in the convention hall, one high elevation camera for panoramic view, five pool cameras to draw from, four cameras in the anchor booth, three mini-cams for floor coverage (where two were on the floor and one was being charged) and four cameras in all four studios for things like Barbara Walters and the special political panel for commentary.

Outside Madison Square Garden four permanent cameras were in periphery, such as at the delegates entrances and exits. Also, there were two cameras in each of three hotels: the Statler, which was democratic headquarters; the Sheraton Center, which was Carter headquarters; and the Waldorf, which was Kennedy headquarters. ABC had 14 permanent camera locations, seven with live microwave capability, and then had 14 more crews with one camera each. That meant a total of more than 70 cameras used by the ABC crews alone.

In addition, ABC had 400 telephone lines with 800 numbers and a satellite earth station linked to the phone system at Madison Square Garden—that way the network affiliates had a direct link via satellite between the ABC phone system and their home base of operation. During the convention, the ABC *Good Morning America* show, its *World News Tonight* and *ABC News Nightline* all originated from the Garden.

At the Republican convention in Detroit, ABC used a slightly different setup because of the Joe Louis arena arrangement. For this event, ABC had seven mobile units, each with at least two microwave transmission units, 10 mobile mini-cameras, and a remote truck with four cameras to cover stories anywhere in Detroit. Also, it had remote broadcasting facilities in two Detroit hotels where Reagan and the Republican Party had set up headquarters. Both of those facilities had direct transmission lines to the convention hall news facilities. Four microwave receivers routed incoming signals from the mobile units to the ABC central news broadcast center.

Inside the arena ABC had four cameras in the anchor booth, and on the convention floor it had six cameras on elevated platforms. For mobility on the arena floor, ABC used three wireless radio frequency cameras transmitting to the control room (again, two of those were in



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Convention

use, one was being charged.) Three cameras in the perimeter areas covered the delegate and candidate entrances. To coordinate the action, more than 10 dozen walkie talkies were used.

In Detroit, a helicopter rigged with a microwave air-to-ground transmitter gave a birdseye view of the developments outside the arena. Also, a computer system kept track of the technical and personnel statistics, including the exact location of all the mobile units and information on stories that were developing.

For ABC, the Republican convention meant a 700-person troupe of editors, writers, producers and technical personnel.

CBS

For the CBS Television Network, covering the conventions meant constructing a modern-day television station designed to stand for two weeks, operate for four days, be torn down, moved, and rebuilt across the country within three weeks.

A complete traveling broadcast facility was created—control rooms, tape facilities, transmission facilities, distribution, communications—everything.

The CBS engineering team started mapping out its plans more than one year before the Republican's July 1980 convention. They studied the many possible convention locales and drew up blueprints for each situation. They mapped out the requirements for every broadcast area, including control rooms, analyst and anchor studios, the transmission center, videotape operations and the floor control area. Once sites for the convention were selected, block diagrams and layouts were made, followed by actual fine point design, wiring, console construction, rack assembly and equipment selection.

An early hardware decision was the choice of one-inch Type "C" videotape recorders, marking the first time the network selected one-inch gear for such a major news event. "Going to one-inch was an engineering as well as an operations decision to improve the overall quality of the CBS coverage. The quality offered by one-inch is especially important in multiple generations, and the equipment has proven highly reliable," Douglas J. Hennessy, associate director, CBS Engineering & Development, said.

During construction, both news

Computer set-up and triax too

Today, broadcasters are classing computer setup and triax as necessities. Ikegami offers you a choice of two such cameras. Both are proven in the studio and field.

- The HK-312, with 1¼-inch pickup tubes, is a proven computer setup camera. More than 100 are in service throughout the ABC Network, at WGBH, and at other major stations.
- The HK-357A with 1" diode gun pickup tubes offers the same high standard of performance along with the convenience of field capability.

Both are extremely stable cameras that can be operated manually. And both accept computer control for automatic setup for on-air readiness in 45 seconds.

Both cameras can be used with multi-core cable. With triax the cameras can be a mile from their base station.

Of course, in colorimetry, automatics, circuitry excellence, and range of options, both are incomparable. But seeing is believing. Experience a demonstration soon at Ikegami Electronics (USA) Inc., 37 Brook Avenue, Maywood, N.J. 07607; (201) 368-9171. West Coast: 19164 Van Ness Ave., Torrance, CA 90501 (213) 328-2814; Southwest: 330 North Belt East, Suite 228, Houston, TX 77060 (713) 445-0100; Southeast: 522 South Lee St., Americus, GA 31709 (912) 924-0061.

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Convention

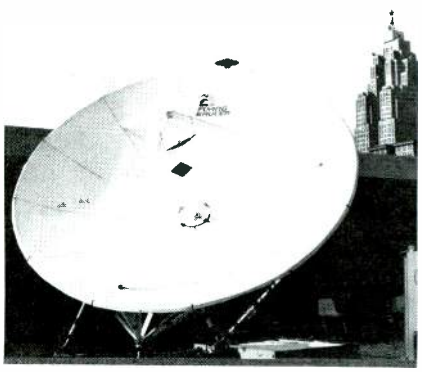
and technical divisions interfaced, offering feedback on each area's needs and goals. Right up to the last minute the technical situation remained as volatile in the control room as the political climate did on the convention floor. At any moment producers could still ask for addition systems and hardware installation. "The system design was made as open-ended and as flexible as possible within reason so it could be expanded or modified without great hardship," Hennessy continued.

A major part of the job was laying cable. All cables led to two prefitted 40-foot trailers—the transmission center carrying all the audio and video communications signals. All equipment was centralized, with the main switching, processing, and distributing performed here through 44 racks of equipment.

Everything flowed smoothly. In Detroit, when the convention ended, CBS began teardown immediately. The system that took 14 months to make and cost millions to build came down in one day for the trip back to New York where it was installed in less than three weeks for use again at the Democratic convention. Following this event, the new hardware was distributed to other CBS broadcast centers for future use.

NBC

Ernie DeRosa, manager of operations and engineering, NBC News, discussed some of the NBC's preparations for the conventions. "We installed about 68 miles of cable in both New York and Detroit," he said. "That includes about 40,000 feet of camera cable, 65,000 feet of coaxial cable for feeding TV monitors and receivers, plus microphone cable and other forms of communication. That was what we did for the Madison Square Garden as well as our affiliates and owned and operated trailers."



A Wold Communications Transportable Earth Station (Flying Saucer) transmitted television and radio programming from a heliport atop Cobo Hall, Detroit, during the Republican National Convention.

Command quarters for NBC were set up in the basement area of the St. John's Church, which NBC remodeled including the installation of a new air conditioner that was left for the church. The NBC offices were there, and the church rectory was used for additional offices and meetings. This staff had a pep rally the morning before the convention, right in the church itself with the pastor cheering.

For the Garden, NBC had 16 television cameras in the hall itself including two RF mobile cameras travelling with correspondents on the convention floor and among the delegates. There were four more in the periphery, still within Madison Square Garden but just outside the floor area, where interviews with the campaign managers and candidates could be held. In response to a leak that there would be a large demonstration area at the New York City post office, on opposite corners on top of two banks NBC had permanent installations of cameras. These were microwaved back to Radio City (NBC headquarters in New York) and sent out over the air from the Empire State Building.

"Our booth and our anchor booth," continued DeRosa, "in both Detroit and New York got all kinds of raves. We had a porch outside our booth and both Chancellor and Brinkley were able, whenever they wished, to walk out of the enclosed booth onto the porch and they were right there in the hall—with all its background noise and delegates in action. We're sure everybody's going to copy it by the next time. It was just beautiful. We had outside locations in which we covered the Carter headquarters, Kennedy headquarters and the Democratic committee headquarters. In each of those places we had anywhere from four to six television cameras, more than half of those electronic journalism cameras that are very mobile. More than 40 cameras were used to cover the convention."

In terms of tape systems, NBC was principally on one-inch, except for the strictly electronic journalism that is still ¾-inch cassette. It used very little two-inch tape.

All of the NBC mobile units now have one-inch with the editing system right on board. This permits still frame, slow motion and tape recording. □

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In fact, the U.S. Department of Commerce states that "if a computer's voltage exceeds 120% [of the rated voltage] for a duration as short as 1 to 10 milliseconds, the computer will make errors."[1] Unfortunately, interruptions and disturbances of this nature are commonplace occurrences within most computer facilities.

A comprehensive study of power line disturbances which affect sensitive computerized equipment was conducted by two IBM researchers. They concluded that such disturbances occur on an average of 128 times each month.[2] For users of computer-based equipment, power disturbances can and do create a variety of costly problems.

Effects upon data processing computers.

When these power disturbances occur in your data processing center they can cause entry errors, program changes or loss, head crash, data loss, the generation of false or garbled data, the need to rerun programs, and computer downtime.

Effects upon computerized process control equipment.

Process control equipment is also vulnerable to power disturbances. Common problems created by these disturbances include improper batch termination and even program changes. The program changes can result in the repetition of process errors and in downtime while equipment is being reprogrammed.

Effects upon energy management systems.

Most energy management systems use small computers to make energy-saving decisions, but their effectiveness can be offset by these same disturbances. Program changes and errors may prevent useful operation of these systems as energy savers.

Thus, the computers your company depends on to reduce operating costs actually may be increasing them.

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Topaz can provide the power peripherals specifically designed to keep your company's data processing, process control and energy management computers from making costly power-related errors.

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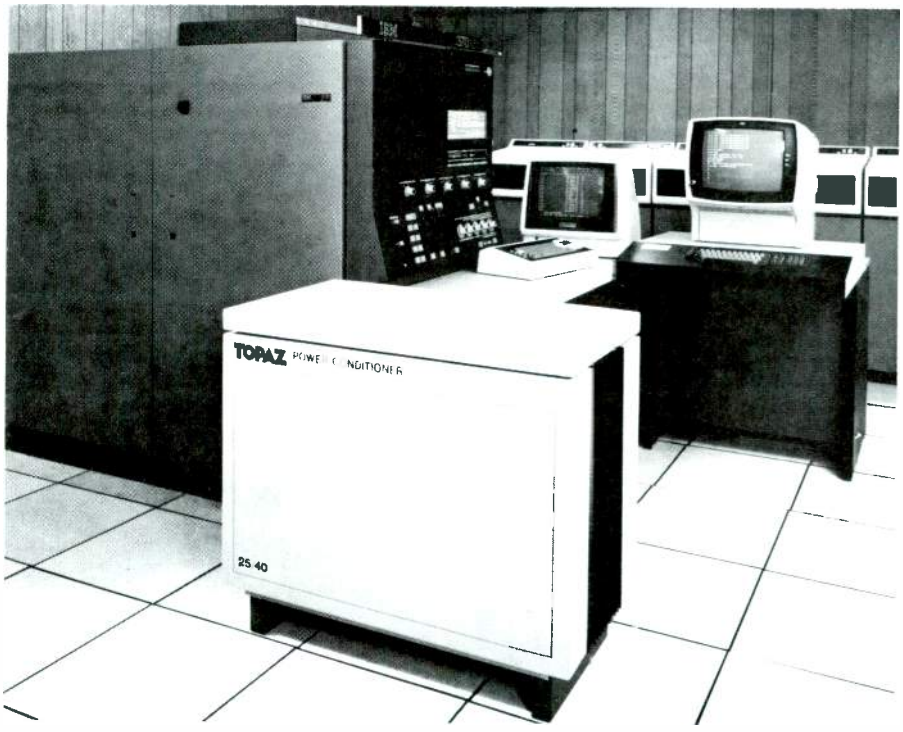
References:

1. *U.S. Department of Commerce, "The Effects of Electrical Power Variation Upon Computers: an Overview."*
2. *George W. Allen and Donald Segall, IBM Systems Development Div., "Monitoring of Computer Installations for Power Line Disturbances," presented to the IEEE Power Engineering Society.*



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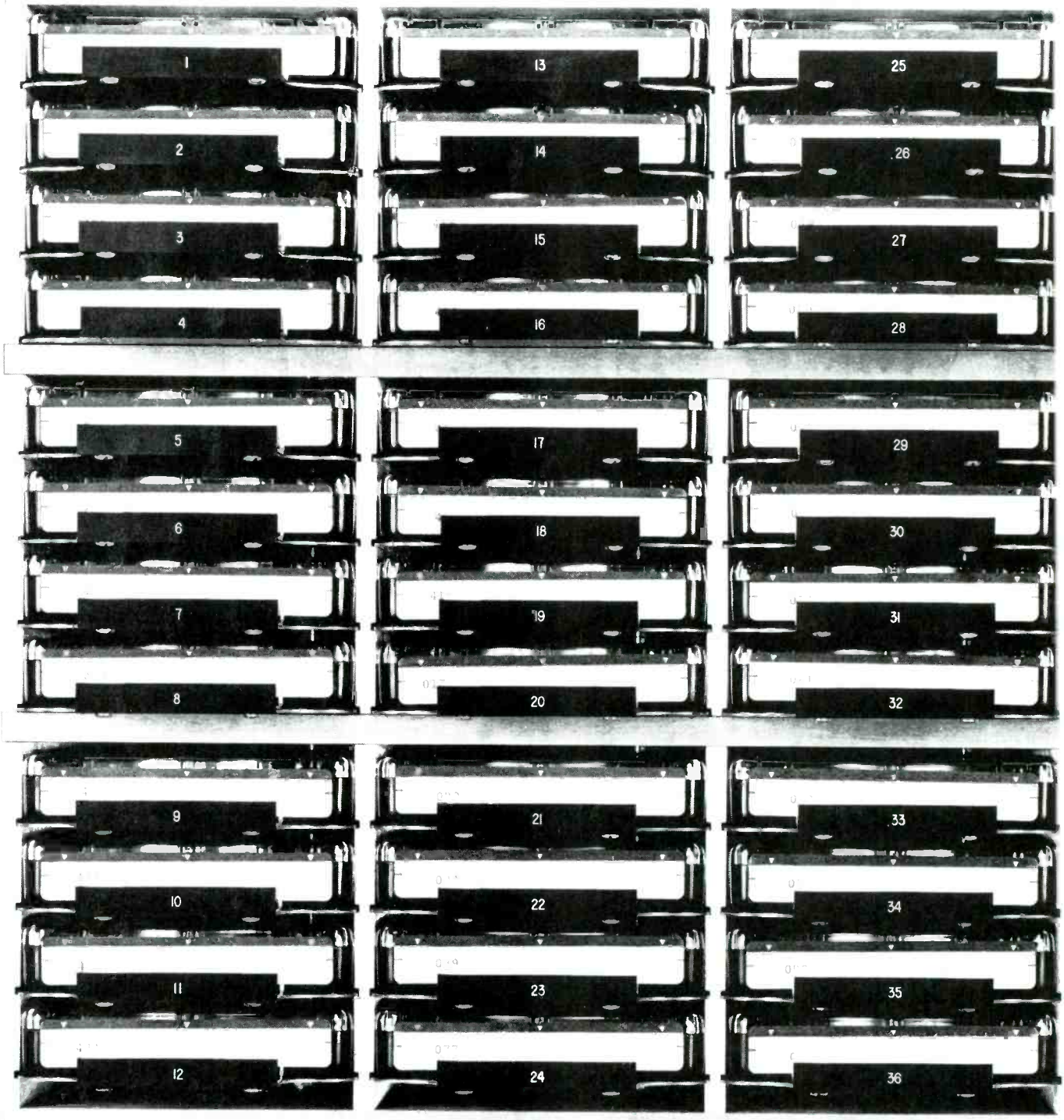

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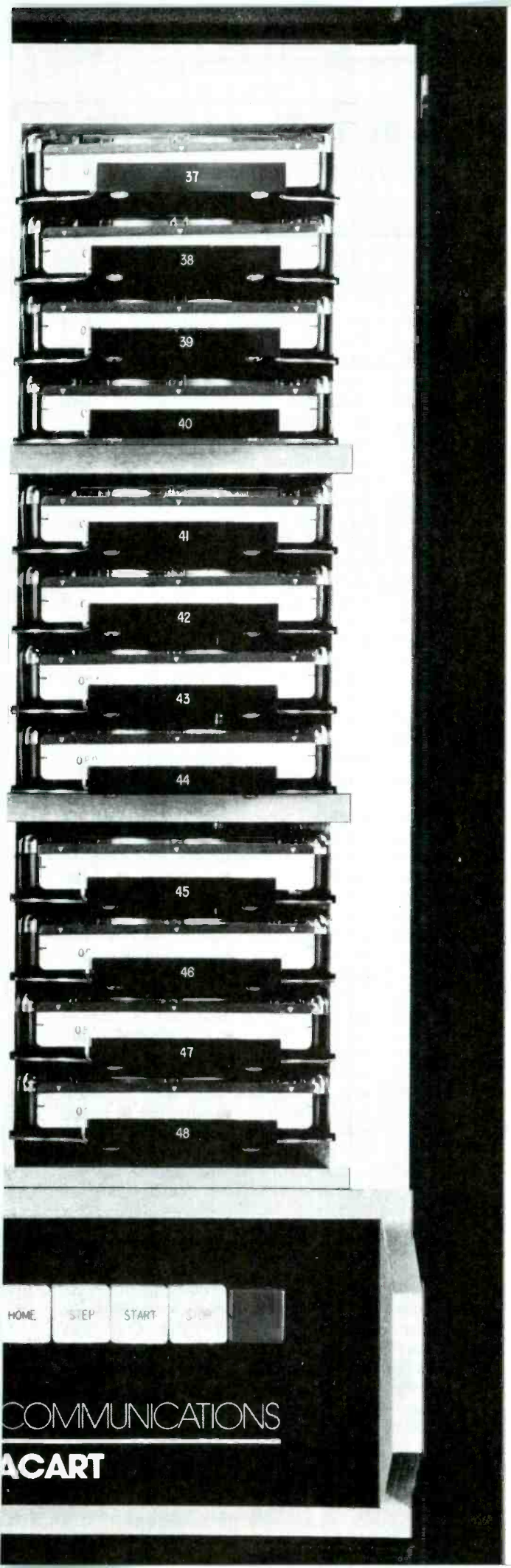

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Recent advances in audio processing

By Gary A. Breed, D.L. Markley & Associates, Peoria, IL

The intensely competitive nature of broadcasting and the growing sophistication of the listening audience have kept the innovators and manufacturers of audio processing equipment hard at work developing better ways to get a station's audio within the limits of modulation and bandwidth.

Although there are revolutionary new methods of audio manipulation on the horizon, including digital microprocessors, they are not yet available. Present technology's recent advances can be described in one word—refinement. Until the new equipment is proved reliable and is accepted, the broadcaster has the choice of many high performance equipment types.

Now that the initial wave of multi-band AGC, low overshoot FM stereo lowpass filters, and clippers have arrived, the manufacturers have taken important steps in the improvement of these techniques. The broadcast industry now has available the largest selection of equipment for audio processing ever. Nearly all of it is good; differences in options and in the choice of features are the main factors to consider in the selection process by potential buyers.

Multi-band AGC has been given much attention toward reduction of phase errors between the various discriminate passbands, and has seen some improvement in ease of adjustment of the numerous variable parameters. A greater variety of equipment has made its way onto the market; it brings every conceivable number of bands, steepness of skirts between bands, numbers of controls, meters and switches with which to undertake the task of adjustment. The added experience gained by the passage of time has improved the quality control that sometimes detracted from the early models. Added precision, sophistication and price have found their way into the latest equipment, but the basic principle remains essentially unchanged from 1974 when these units first showed up on the market and the multi-band evolution began.

Clipping has been used for years as a brute-force method of limiting the amplitude of audio signals, but has the serious drawback of harmonic generation and accompanying distortion. It also caused no small problem with some transmitters. In a period of evolution the clipper has been refined through the addition of filtering, variable threshold and its combination with conventional feedback limiting, pre-emphasis and modern transmitters. All this development has resulted in clippers that, generally, are to be used in conjunction with other types of limiting, but that allow precise control of the last 1 or 2dB of amplitude with less distortion than would be generated by simple back-to-back diodes. Those last few decibels are essential to a station whose goal is maximum loudness within an acceptable limit of distortion.

In the area of FM, TV and stereo, limiters have been in a state of constant refinement regarding the need for pre-emphasis and lowpass filters in stereo operation to keep program material out of the pilot subcarrier. In dealing with pre-emphasis, FM limiters have evolved to the point that good limiting action, coupled with well designed clipping circuits, can be accomplished with a minimum of coloration of the sound caused by the nonlinear characteristics of the pre-emphasis curve. A number of limiters accomplish this with a split-band approach, leaving the frequencies below 400Hz with flat response, using pre-emphasis above 400Hz.

The theory behind this method is that greater control can be achieved within a smaller bandwidth. The latest generation of equipment has combined the greatest accuracy of limiting and clipping with a good lowpass filter. It now seems that every manufacturer is touting its computer-designed filter that has virtually no overshoot and no phase error. They do have the right to brag. The latest computer-designed filters are much improved. Before modern computers aided design, a good filter was as much a matter of chance as it was of design. But the

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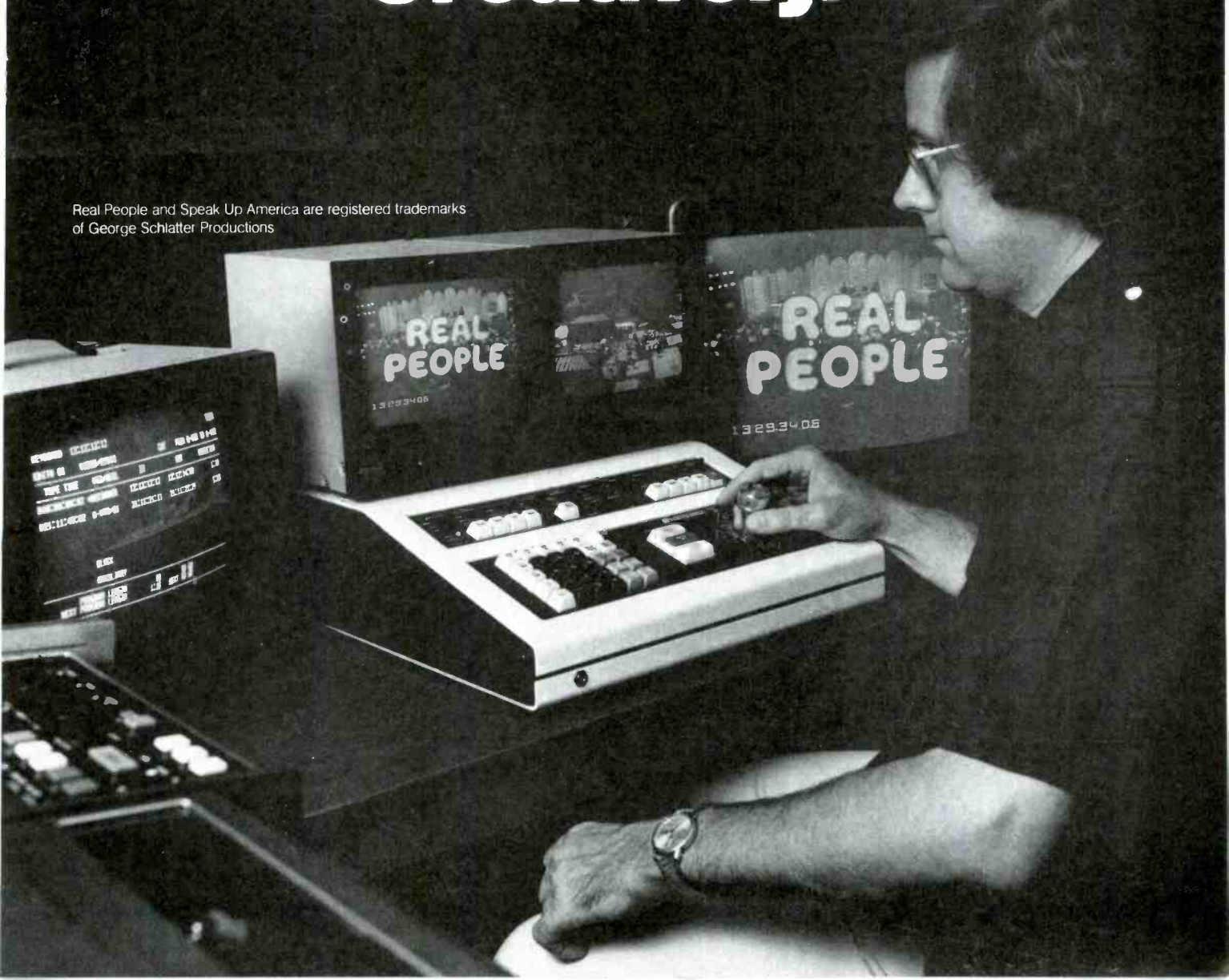

Audio processing

broadcasters have benefitted from a byproduct of IC active filter technology, as new designs and computerized optimization of designs have brought the state-of-the-art to a high level. It is now within the capability of every manufacturer to produce a lowpass filter with nearly ideal characteristics.

An area of refinement that should be singled out for attention is the instruction books. There is a lot of good information that comes along with the latest audio processing gear, including many pages of instructions on how to set up, evaluate and re-evaluate the performance of the equipment. Read these instructions thoroughly, but with careful attention to eliminate the sales pitch and the superlatives that manufacturers like to attribute to their own products. Reading the material from a number of different manufacturers can provide a good education in the practical aspects of audio processing. It is especially important to understand what a particular piece of equipment is designed to do and what things it cannot do. Many sources of information are available if you can sort out the bias from the facts.

Another area of improvement is not equipment, but the use of equipment. There are no magic black boxes that clean up mediocre audio and make it loud and clear. Total control of audio quality must take place at *all* places in the audio chain, beginning in the production room, and all other sources of audio making up the program, which is why **distributed processing** is gaining in usage. Again, the theory is that of greater control when applied to smaller areas.

Equalizers, compressors, limiters and special effects devices are being used at various points in the audio chain to enhance individual or groups of sources before they are combined in the final audio signal. This may involve microphones, discs, tapes, remotes or any source of audio, and reduces or eliminates the different ways that each responds to a fixed processing setup, as would be the case in a station with processing only at a point just ahead of the transmitter. An added advantage is that the demands placed on the processor in the main audio line are reduced, and it can operate in such a manner that it does not have to reach the extremes of its capabilities. The results achieved with the judicious and careful use of distributed processing will nearly always be significantly better than a single processing point in the audio chain.

Digital microprocessors

These words will soon be spread over all the literature, and they will signal the start of a revolution in audio processing as it enters the digital world. Soon, the first of these units will show up in the marketplace.

The possibilities are as numerous as the technology is complex, but here are some potential results of digital audio processing:

- Zero, or even negative time constants, attack times and release times, and continuously variable positive time constants.
- Microprocessors with decision-making power to adjust the type of processing according to the characteristics of the incoming audio.
- Multi-band processing with **all** parameters variable, including bandwidth and numbers of bands.
- FM processing with perfect coordination with the pre-emphasis curve and ideal filters.
- Noise levels and distortion that are truly negligible.
- Processing totally integrated with modulation, with the audio becoming analog again only at the final amplifier stage.

This absolute control will cause *problems*, too. Because of fewer audible effects caused by processing, more attention will have to be given to all other parts of the audio chain. Program directors and managers will not be satisfied as easily because they will have heard all the claims made by the manufacturers. It will become a more complicated world for the engineer who has to deal with new technology and greater demands on the rest of his audio equipment.

The manufacturers will have it tough, too. Breaking new ground will obviously have its problems because of the achievement of potential offered by digital processing. Everyone will have to sit back and wait (but not for long) to see how successfully the new techniques can be applied.

For today, the current analog technology has been refined to a high art. For the future, digital audio promises more quality than now dealt with, but it will assure that the quality of the signals transmitted will not be the limiting factor on the quality of those signals as they are received by the listening audience. □

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We scored well in all of the twelve categories tested, but especially well in the categories that commonly represent picture quality: color dropouts, high frequency dropouts, chroma noise, signal-to-noise ratio and stop motion.

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Whether you're shooting a 9th inning rally, a political rally or a network special, no other ENG/EFP color camera says broadcast more ways than the new Panasonic AK-760.

The AK-760 combines a high-index prism optical system with three ⅔" diode-gun Plumbicon® tubes. And since the diode-gun Plumbicon tube has a thinner photoconductive layer than conventional Plumbicons, the AK-760 offers outstanding resolution (600 lines center). Another advantage of the diode-gun system is the low beam resistance it generates. Add to that the AK-760's built-in bias light and the result is low beam temperature performance even at high beam current. And that also says lower lag.

The AK-760's feedback beam control reduces comet tailing by stabilizing highlights that exceed normal white levels. What it doesn't reduce is dynamic range or horizontal resolution. And because it's only activated during extreme highlights, feedback beam control helps prolong tube life and preserve edge geometry.

The AK-760 also gives you the edge with a S/N ratio of 54dB at standard illumination of 200 footcandles at f/4.0. And with the 18dB high-gain switch, all you need is 5 footcandles at f/1.8.

Mounted on the AK-760's durable die-cast chassis you'll find an impressive array of circuitry like horizontal aperture correction, 2-line vertical enhancement, automatic

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And whether you use it for ENG or EFP, the AK-760 is fully self-contained, and includes genlock, internal sync, adjustable blanking as well as subcarrier and phase controls.

For studio production, you can add an optional remote control unit, 5" CRT viewfinder and zoom lens conversion kit.

Panasonic also makes broadcast quality easy to afford with the AK-750B 3-tube Plumbicon. At $16,000* it comes complete with 2-line enhancement, a $2,000 option last year, plus genlock, a rechargeable battery, microphone and VTR cable.

There's also the AK-710. An electronic news-gathering camera at a newsworthy price, $10,950* Its three Saticon® tubes and high-index prism optical system result in horizontal resolution of 500 lines center and a S/N ratio of 52dB.

Audition the AK-760 along with the entire line of Panasonic broadcast quality cameras. You'll see what we mean when we say broadcast.

For more information about Panasonic broadcast equipment, call your nearest Panasonic office.

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VIDEO SYSTEMS DIVISION

Circle (30) on Reply Card

Noise reduction in the audio signal

In the past few years, radio and television engineers have seen a new generation of high quality audio equipment being installed in facilities throughout the industry. In many cases the installation of new state-of-the-art equipment has exposed noisy recording and transmission systems that had been previously acceptable because of the relatively poor performance of other equipment in the audio chain. Audio noise reduction systems, in use in the recording industry for many years, are becoming more popular with broadcasters as the demand for high quality audio increases.

There are various techniques used to reduce audio noise, ranging in complexity from simple filter or equalization networks to sophisticated multiband companding systems. In a single-ended or noncomplementary noise reduction system the signal is post-processed only. A simple tone control used on playback or reception, for example, might be used to reduce tape hiss or low level hum. Several dynamic devices offer a more sophisticated approach to the single-ended process; however, even with this type of noise reduction, program material in the same frequency range as the noise is altered. The use of noncomplementary systems should therefore be restricted to applications in which the noise level is unacceptable and in which there is no control over the recording or transmission process.

Double-ended or complementary noise reduction utilizes reciprocal pre- and post-processing of the signal. A simple example of this type of system would be optimized equalization circuits, that is, pre- and de-emphasis networks. Dynamic double-ended noise reduction systems are commonly referred to as companding systems.

Companders apply compression to the dynamic range of the signal during the record or transmission process and expand it by the same amount during playback or reception, thereby reducing noise. Companding systems are the most popular type of noise reduction systems in use because noise can be reduced substantially without degrading the quality of the signal.

Because a compander system offers more noise reduction with less signal degradation, it is the most applicable type of system for a broadcaster seeking improvement in quality. Some companding systems offer as much as 30dB of signal-to-noise improvement. However, this much companding carries with it the risk of side effects. Overshoots, distortion and noise modulation can be audible under some circumstances when heavy companding is used to reduce noise. If a signal-to-noise improvement of about 30dB is needed for an application, every effort should be made to eliminate the noise at its source before resorting to heavy companding. Generally, 10-15dB of noise reduction can be applied without sacrificing quality; however, a great deal

New techniques to solve the problems of noise during transmission of live broadcasts have been developed by WNCN-FM, New York's 24-hour classical music station. These techniques are used to reduce phone level noise to virtually inaudible levels during the station's regularly scheduled broadcasts of Chamber Music Society of Lincoln Center concerts, New York City Opera performances, and for taping of the operas for syndication to other stations.

Although the telephone lines used for transmission of the signal from Lincoln Center to the broadcast studio are equalized lines, WNCN's chief engineer, Richard Koziol, wanted to avoid potential noise problems during the live broadcasts. Using equipment set up at Lincoln Center, Koziol feeds the signal through a recording mixer, the TEAC Model 5, that feeds into a dbx Model 157 Tape Noise Reduction System that encodes the music signal into the dbx format. The enclosed signal is then fed into the telephone lines to the broadcast studio.

At the studio, a custom-built amplifier designed by Koziol is used to boost the level of the phone line signal up to the station's standard common level. The boosted dbx encoded signal is then fed into another dbx 157 for decoding before being fed into the main console for broadcast. Air checks are made simultaneously throughout the broadcast.

For New York City Opera performances, which are broadcast live and taped by WNCN for syndication to 25 radio stations, air checks are made before the signal is fed into the system for decoding.

The WNCN equipment is used not only to reduce phone level noise, but also to make the tape copies. According to Koziol, "The encode/decode process also substantially reduces the noise on the tapes, enabling WNCN to make tape copies for syndication that are virtual master tapes of the live performance."

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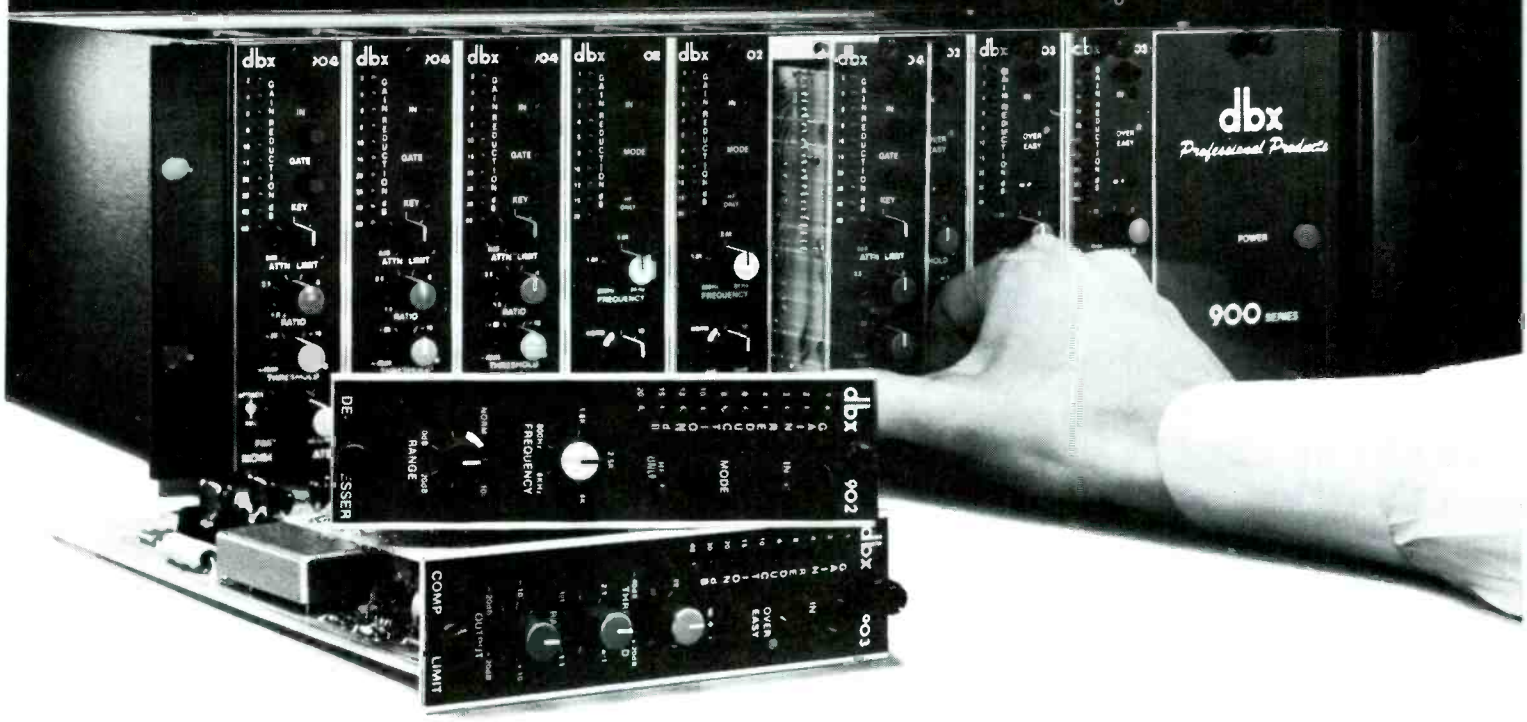

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Circle (31) on Reply Card

Audio noise reduction

depends on the nature of the program material and the type of noise reduction system used.

Broadcast cartridges

Broadcast carts are often the most noisy program source in an audio system. Noise can frequently be heard when a cart is started after a short pause in a program or if a cart is loosely cued. This is not too surprising when it's considered that the noise performance of many cartridge systems is not very impressive to begin with and that material recorded onto a cart may already be two or three generations from the original. High output tape formulations have helped to reduce cartridge noise to some degree, but much more improvement can be achieved if complementary type noise reduction is used around the cart machines.

Studio production

In the production studio, noise reduction can be used to reduce tape noise, print-through, crosstalk, dc noise and modulation noise, as well as low level hum and amplifier noise. Virtually all of the production processes can be improved through the proper application of a noise reduction system. Archival recordings suffer from print-through when stored for long periods of time; in some cases they become unusable. If, when made, these recordings are encoded with noise reduction, the effects of the print-through are greatly reduced. This can be of great importance for special music performances or programs that are saved and run at certain times of the year, such as Christmas programs. Multi-generation copying and editing can bring noise up to an unacceptable level also. Using noise reduction from the mastering on through will help to prevent severe noise degradation of the finished product.

Program syndication

Most production and syndication companies use noise reduction during the production of their programs. The benefits of this process could be passed on to the subscriber, and ultimately the audience, if the final decoding process were left to the broadcaster (depending, of course, on both parties using the same type of noise reduction system). This could certainly be offered to the subscriber as an option because no extra cost is incurred by the producer if noise reduction is already being used.

Videotape recorders

The audio tracks of videotape are starting to receive more attention as television sound becomes increasingly important. The quality of the audio tracks of quad and helical scan VTRs is inferior to professional audio recorders because of a combination of narrow track width, a thin oxide coating and oxide suitable for video but not audio. Noise reduction applied here can bring acceptable quality sound to this medium that has until recently been ignored. Major improvements in VTR audio, including stereo, are available with the type C 1-inch format, but the tracks are still narrow and the signal-to-noise ratio still leaves something to be desired. Built-in noise reduction modules for the audio on tracks of some models of 1-inch VTRs are now available. The built-in approach to audio noise reduction is obviously an indication of things to come, and there are free-standing systems available for the other videotape formats to make

them compatible with the 1-inch format for production and editing. Television production houses and syndicators can deliver their products with encoded sound tracks as an option. With ¾- and 1-inch formats, one audio track can be encoded and the other left conventional.

Audio links

Audio noise reduction has been in use for some time by broadcasters on land lines, microwave links and RPUs. Limited phone service can present such problems as dial pulses, crosstalk and low level hum —all of which can be greatly reduced by the proper application of a noise reduction system. Transmission path loss noise and noise caused by multi-hop relays can be cleaned up by placing an encoder at the transmitter and a complementary decoder at the receiver. Some satellite systems are using audio noise reduction to make the signal quality suitable for broadcast.

Selecting a system

There are several manufacturers of complementary type noise reduction systems and many different designs. It is not the purpose here to recommend one system over another, but to explain the concept of using noise reduction. However, there are a few things to keep in mind when shopping. For one thing, be wary of consumer hi fi devices; they are not designed to interface with broadcast equipment, usually have little RFI protection and, in most cases, don't perform as well as professional systems. Also, because noise reduction systems are not compatible with one another, standardization is a factor. A single system should be used throughout the facility, and the system should be one that is in wide use, particularly if encoded tapes will be supplied to others.

The decision to apply audio noise reduction to a particular problem in a broadcast facility involves a commitment. Once a system has been chosen, it should be used extensively throughout the facility. Also, it should be realized that using the encode or decode process by itself will result in gross frequency response errors. Therefore, enough equipment must be purchased initially so all encoded material can be properly decoded—in production, in the field or on the air. A system of identifying material that has been encoded must also be implemented and closely followed. However, because some noise reduction systems can be remotely controlled, an automatic signalling system could be developed for encoded material that would reduce the number of decoding units necessary and alleviate the need for having to rerecord an entire tape or cart library. A system like this would also simplify the application of noise reduction to radio automation systems.

Why an analog system?

It might be asked, why go to the trouble and expense of improving analog systems when digital audio is on the threshold? Theoretically, digital audio can produce pure-sounding recordings with *unmeasurable* noise and distortion. However, available digital systems still have limited practical use for broadcasters and are expensive. Furthermore, software compatibility is a major problem because nothing recorded in a digital format will work with an analog system and vice versa; thus, an immediate format changeover would be necessary. As a result, until the digital systems are standardized and the equipment becomes more affordable, analog systems will be in use and will continue to be improved. □

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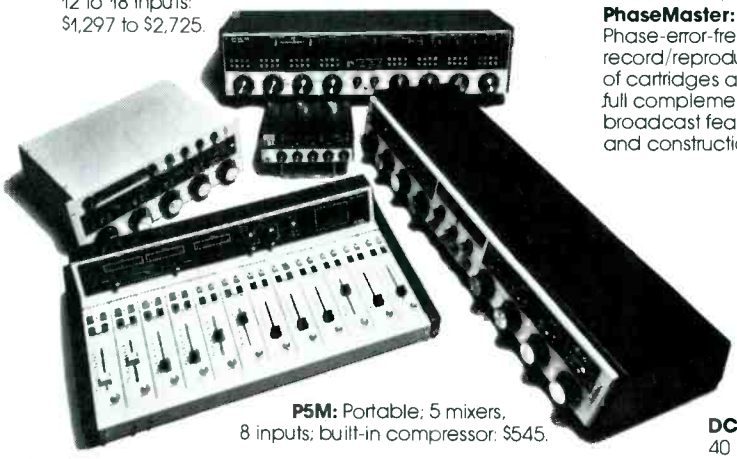
SC-5, DC-5, DC-8: 5 & 8 mixer, 12 to 18 inputs: $1,297 to $2,725.



P5M: Portable; 5 mixers, 8 inputs; built-in compressor: $545.

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THE PHASE-ERROR-FREE CART/CASSETTE PRODUCTION CENTER

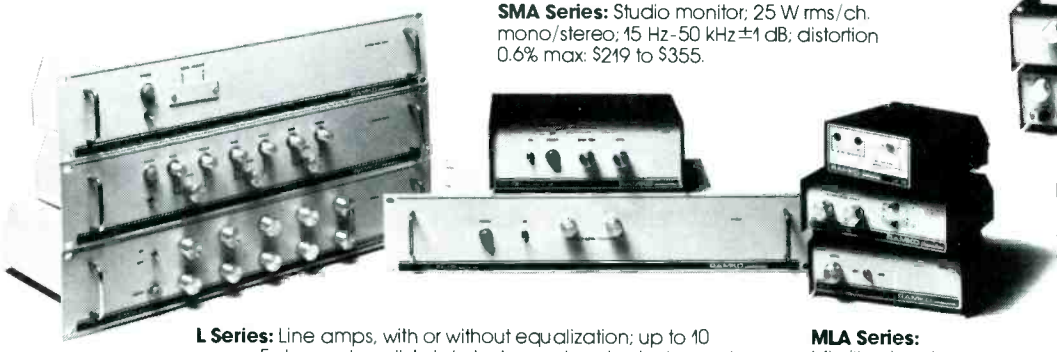
PhaseMaster: Phase-error-free record/reproduce/duplicate of cartridges and cassettes: full complement of broadcast features and construction.

DC-38: 5, 8 or 10 mixers, up to 40 inputs: $2,871 to $5,181.

MA Series: Studio monitors; 12 W mono, 20 W stereo; 20 Hz-70 kHz±2 dB; distortion 0.05% max: $121 and $153.

MIC/LINE/STUDIO AMPLIFIERS

SMA Series: Studio monitor; 25 W rms/ch. mono/stereo; 15 Hz-50 kHz±1 dB; distortion 0.6% max: $219 to $355.



DML Series: Dual mic in to amplify, mix, limit and control gain; built in compressor; AC and DC: $243 to $319.

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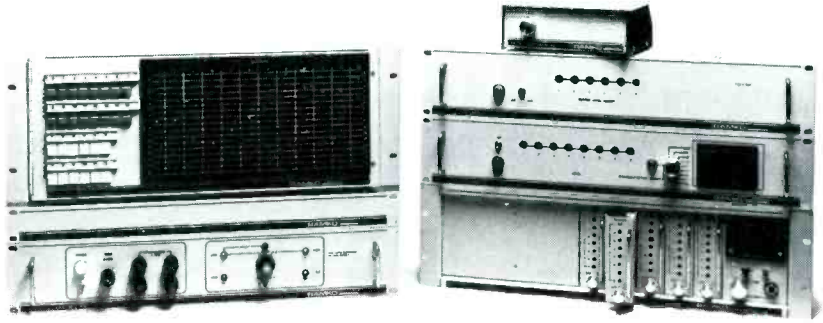

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But in all fairness, we have to warn you—once you've tried Ramko, chances are you're hooked for life.

No more phase shift error

The Ramko PhaseMaster provides phase-error-free recording/reproduction/duplication of your carts and cassettes, with performance specifications that meet or exceed whatever cart drives you're using now.

Instead of adding failure-prone electro-mechanical components or re-inventing the cartridge, we simply encode the stereo before it sees the heads or tape, then use this recorded information to eliminate any phase shift error introduced by the heads or cart when you play the signal back.

Features of the Ramko PhaseMaster include two A and B cart decks and a cassette deck. Simple cassette-to-cart(s) and cart-to-cassette duplication. Automatic switching of record/playback, encoding/decoding and mono/stereo. Left, right and phase analysis meters. Front panel input selection. Three cue tones.

And so much more that you'll just have to contact us for details and a demonstration. Ask for the Ramko PhaseMaster.

Just another turntable preamp?

Look at what one user wrote:

"Three days ago I replaced the (brand name) preamps in our studio with your ESP-38 preamps.

"The result was astounding. The next day we had six unsolicited calls from local stereo stores. All commented on our improved disk reproduction and wanted to know what we had done."

Try it. You're going to like it a lot.

Consoles for AM stereo, or an FM station upgrade

Ramko consoles come with features you won't even find in more expensive competitive units.

Total dc control of all mixing and switching functions means no more noisy pots and switches, no stereo tracking error, and much more resistance to RFI.

We've developed solid-state balanced inputs for better sound. Added gain select on each input. Included switch-programmable cue and monitor mute selection. Provided mono, stereo and phase meters.

Get your hands on a winner now.

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A fully adaptive digital noise reducer

By Leslie W. Germany, Philips/Pye TVT Ltd., Cambridge, England

The DNR system (Model LDM 3001) described in this technical paper is manufactured under an exclusive agreement with the British Broadcasting Corporation (BBC) by Philips/Pye TVT Ltd. Detailed specification sheets are available from Philips Broadcast Equipment Corp., Mahwah, NJ.

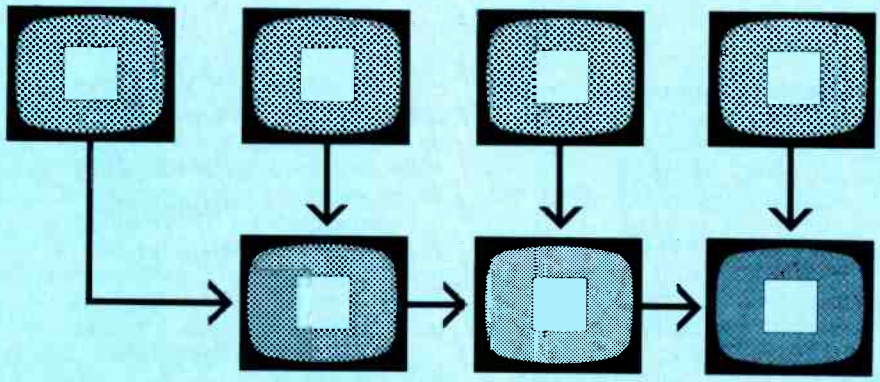

Figure 1. Noise reduction by averaging four successive pictures.

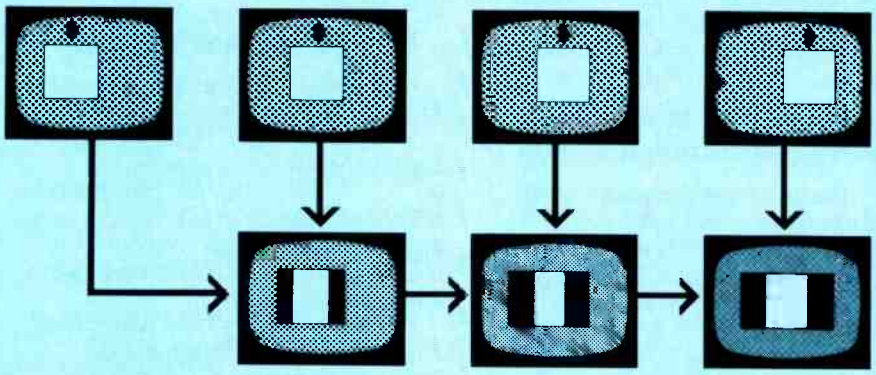

Figure 2. Picture averaging with movement.

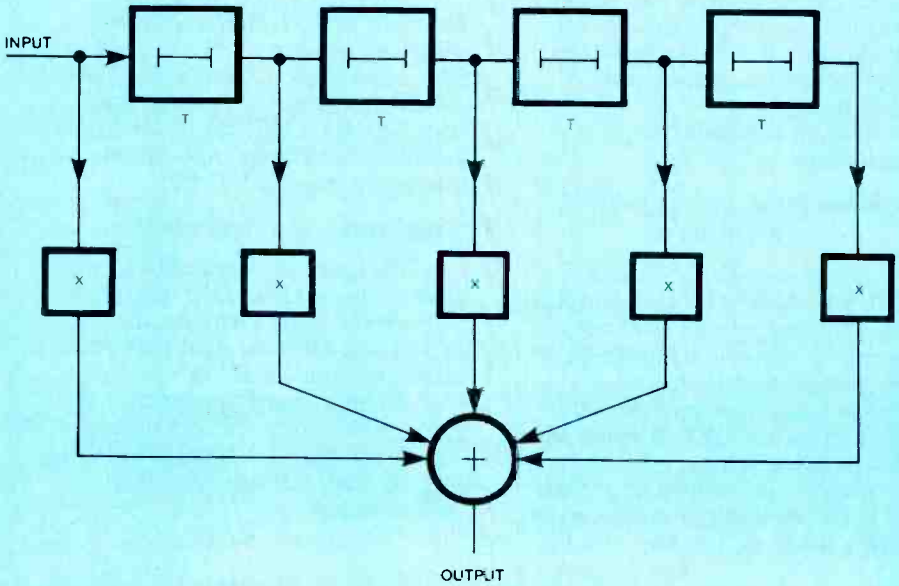

Figure 3. The transversal or non-recursive filter technique.

Many of the pictures transmitted by TV networks are excellent in quality in almost all respects except for the presence of noise, which ranges from the just perceptible to nearly unacceptable.

At low levels the noise can be readily accepted, but at high levels it becomes obtrusive, detracting from picture quality. There is always some noise contributed by the picture source, whether it is in the form of film grain, thermally generated electron noise from the camera head amplifiers, or, in the limit, photon noise. Following this, single or multiple generation recording adds its quota of noise, and the signal may also be subjected to a less than perfect transmission chain.

Signal averaging is a well known technique used to extract repetitive waveforms from noisy backgrounds. By averaging the signals point by point from successive television pictures, the wanted information is reinforced relative to the noise components that may be considered random and substantially uncorrelated from picture to picture. The effect of noise reduction by the averaging of four successive pictures is shown in Figure 1.

If there is movement in the picture as in a normal television transmission, picture averaging would introduce lag that would show up as picture smearing simulated in Figure 2. Because this effect is most pronounced at the edge of moving objects, the picture averaging process must be suppressed on moving edges.

Picture averaging from successive pictures may be accomplished by using a temporal low pass filter of which there are two fundamentally different types. A transversal type low pass filter is shown in Figure 3, in which the video signal is passed into a number of picture delays so that successive picture signals can be added. However, this is an uneconomical method because the noise power reduction factor is simply the number of picture signals available. One picture delay would provide 3dB of noise reduction, but nine picture delays would provide only 10dB.

The recursive system

The other method, shown in Figure 4, is to use a recursive

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Digital noise reducer

low-pass filter in which the output signal is recirculated to the input. This technique is the heart of the DNR system described here. The filter need contain only one picture delay because the amount of noise reduction is controlled by the division between the input signal and the recirculated signal of the previous pictures.

In a practical filter (Figure 4B), this division is controlled by two multipliers denoted K and 1-K. If the value of K equals 1 then 1-K equals zero and the input signal is fed directly to the output with no recirculated signal, and consequently no noise reduction takes place. If K is much less than 1, most of the output consists of the previous pictures and the input contributes very little; a high degree of noise averaging occurs. By simply varying the value of K the characteristics of the filter can be changed, and experiments have shown that a K value of 0.25 is a good choice.

The impulse response of the filter is a decaying exponential sampled at the picture frequency, and moving pictures appear as if they were displayed on a CRT with a long persistent phosphor. The amount of blurring on the picture depends upon the rate of movement and the value of K.

In moving areas of the picture the filtering must be switched off by changing the value of K to 1, so that moving detail is preserved at the expense of noise appearing on the moving edge. This is acceptable to the viewer because moving detail tends to distract the eye from noticing noise but in large plain areas, where the noise is most noticeable, the noise reduction can remain effective.

Control of the value of K is obtained from a movement detector that compares the delayed and undelayed signals. If a large difference is detected, movement is assumed and a K of 1 is selected; thus, the picture store instantly refreshes itself for that element with new information from the input signal. However, if a small difference is detected, a lack of movement is assumed and a small coefficient is selected.

A rearrangement of the circuit elements of the recursive filter shown in Figure 5 simplifies the construction in that only one multiplier is required and the movement detector output is provided directly from the subtractor. (This is the circuit elected for use in the system

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described here.)

Analysis of the frequency spectrum of a video signal (Figure 6) shows that, with a stationary picture, spectrum lines occur at intervals of the picture frequency, grouped around harmonics of the horizontal frequency which in itself is related to the picture frequency. When movement occurs, sidebands to these spectrum lines have a tendency to fill in the gaps shown in Figure 7.

The temporal low pass recursive filter is, in effect, a comb filter with its teeth separated by frequency bands equal to the picture frequency, as can be seen in Figure 8. The bandwidth of each tooth becomes progressively narrower as the value of K is reduced. The noise reduction of the input signal therefore increases in inverse proportion to the bandwidth of each tooth. For a value of K equal to 0.25, the maximum noise reduction at half the picture frequency is 16.9dB, which corresponds to an unweighted noise reduction value of 8.5dB. When movement is detected, the value of K is increased and the teeth of the comb widen to accept the movement sidebands and the noise power reduction is reduced. The unweighted noise power reduction for different values of K is shown in Figure 9.

The value of K may be modified by feeding the output of the movement detector controlling the multiplier through the nonlinear transfer characteristic shown in Figure 10. If the picture-to-picture difference is small, then the difference signal is assumed to be caused by noise, and the value of K is set to 0.25. If the difference signal is greater than the threshold shown at Vt, it is assumed to be caused by picture movement and the value of K is set to unity and no noise reduction takes place.

The drawback of this rudimentary detector is that decisions about movement are made on a point-to-point basis with no correlation between decisions at adjacent picture elements. On the other hand, when objects move, they do so coherently and do not break into fragments. Clearly there is a need

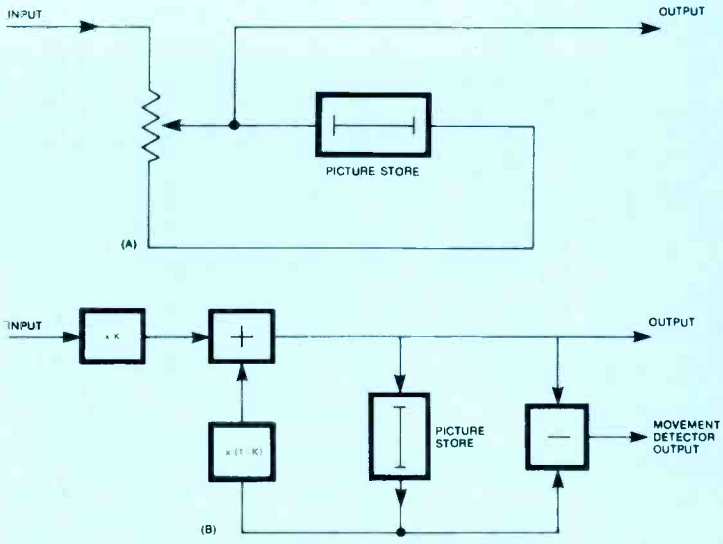

Figure 4. The recursive filter: (A) basic scheme; (B) detailed block diagram.

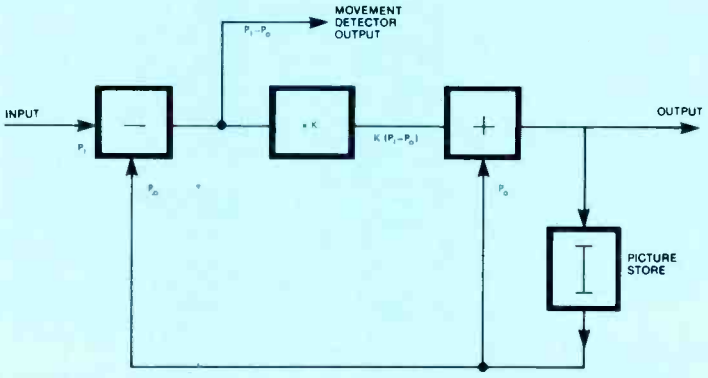

Figure 5. The recursive filter developed by BBC requires only one multiplier and is used in the system described in this paper.

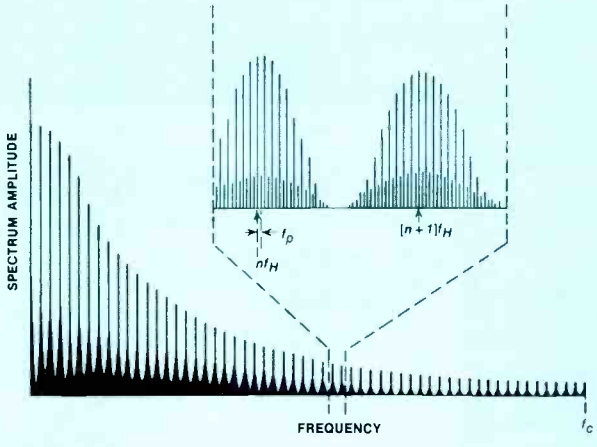

Figure 6. Spectrum of video signal with stationary picture.

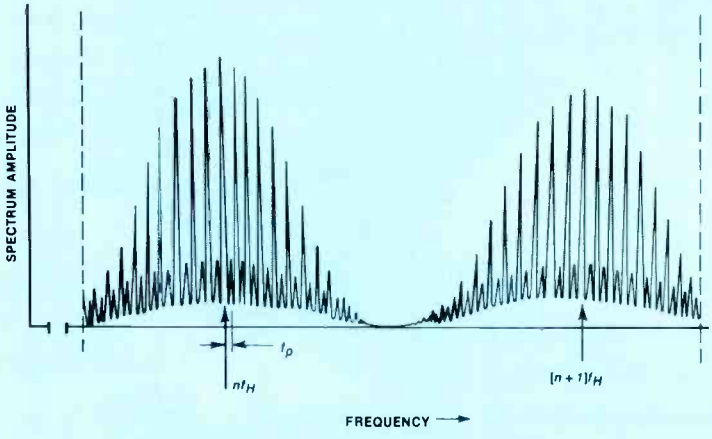

Figure 7. Structure containing noise.

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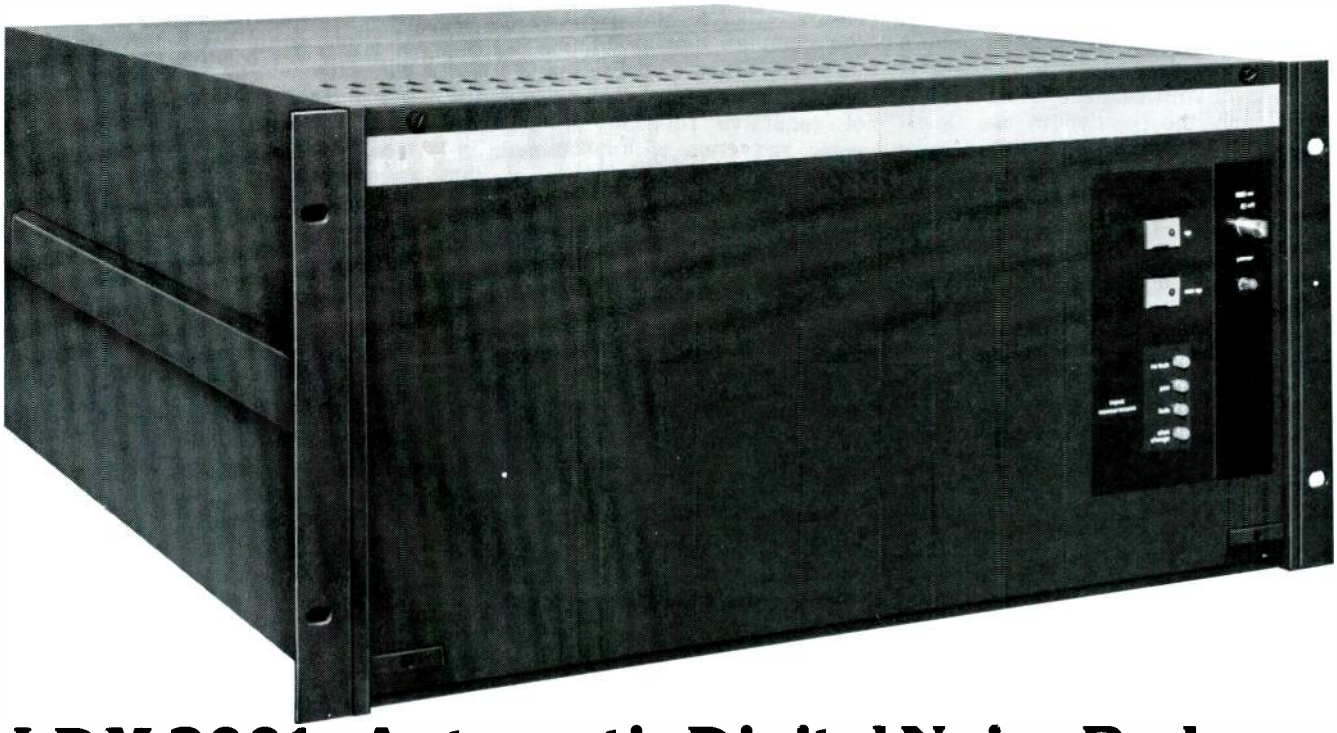

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to smooth the movement decision signals to prevent erratic behavior. This is done in an auxiliary side chain to produce a signal that varies the multiplier K in a controlled manner.

Were it not for the presence of the incoming noise, the movement detector would be able to make movement decisions with total certainty. In the presence of noise, however, the decision fails where the moving detail is at a sufficiently low level with respect to the noise.

Clearly the position of the threshold Vt depends upon the noise level. It is possible to set the threshold manually for each picture source, but this becomes difficult when there is considerable shot-to-shot variation in noise level. Consequently, an adaptive circuit has been included in the movement detector that measures the amount of incoming noise and automatically adjusts the threshold.

Adaptive circuitry

A unique feature claimed for the DNR system described here is its ability to survey and measure all characteristics and parameters of the complex moving television picture and to judiciously apply to any point in the picture varying amounts of recursive filtering to optimize noise reduction without human intervention. Other features of the adaptive circuit are its ability to detect shot changes and rapidly adapt to new noise levels and to detect panning of the camera and so reduce noise reduction as is appropriate from movement of the entire picture.

Further details of the noise reduction technique used in the Philips system are shown in Figure 11. The smooth detection of movement takes time to accomplish, and this accounts for the compensating delays in the main path and return path from the picture store. The diagram also shows a predictor, in series with the store, that functions to adjust the phase of the subcarrier in the stored composite signal to make it equal to that of the incoming subcarrier. If it were not included, the presence of the subcarrier that has a frequency not an integral multiple of picture frequency would cause a large picture-to-

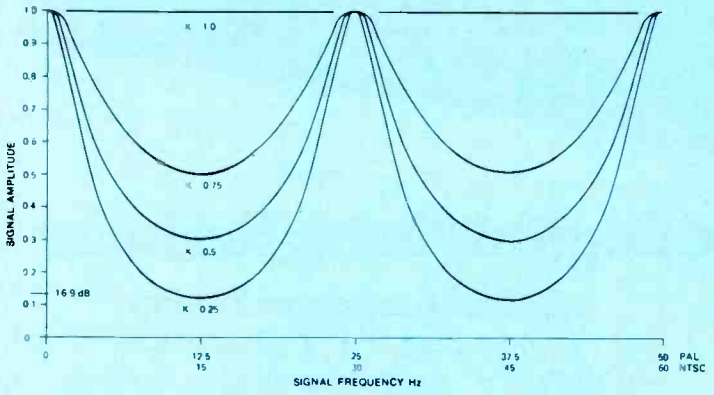

Figure 8. Amplitude characteristic of first-order recursive filter for various values of K.

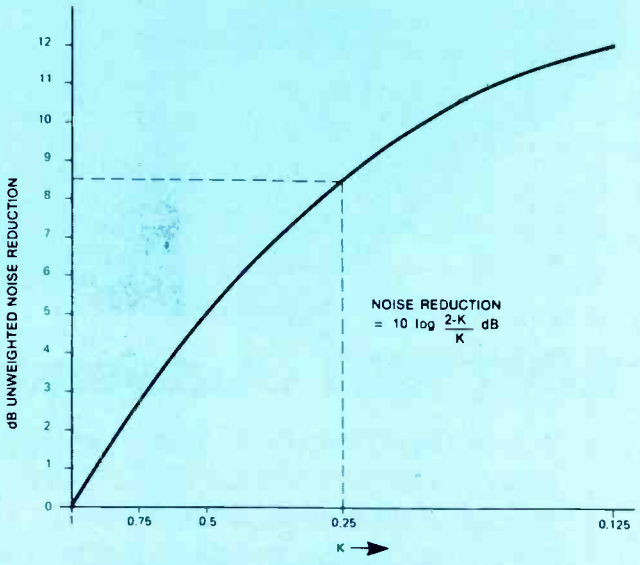

Figure 9. Noise power reduction versus K value.

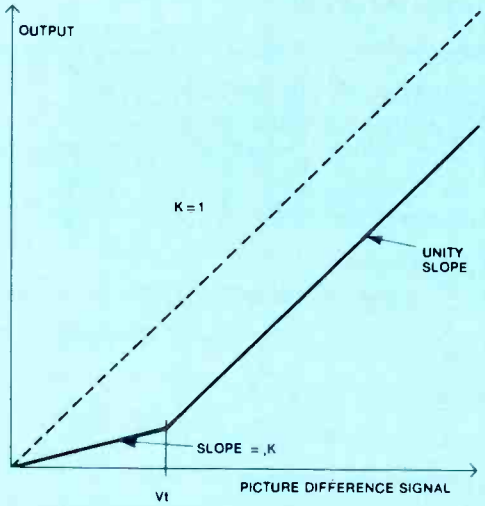

Figure 10. Multiplier transfer characteristic.

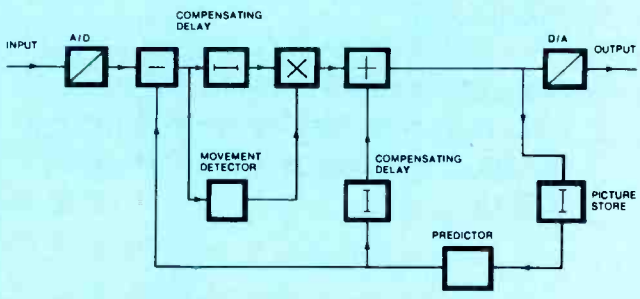

Figure 11. Complete digital noise reducer.

"Our Auditronics on-air and production consoles pay off three ways",

says Chuck Cooper, General Manager of WKOR in Starkville, Mississippi. "When it came time to rebuild this station, we wanted to go first-class all the way to the tower. Of course, that meant starting with first-class consoles for both on-air and production. But when you own a 1 kW station in a small market, you've got a modest budget to work within, and you can't afford to make a mistake."

"So we took our CE, PD and Op. Mgr. to NAB to look at everybody's hardware with an open mind to make sure we got the best value for our money. We believe we got it in our two Auditronics 110 consoles. First, our on-the-air people love the Auditronics boards, and being able to show this type of equipment helps us to attract the level of talent we want."

"Second, in a small market like ours, the stations do most of the commercial production, and the quality we get out of this Auditronics production board has helped us capture 80% of the production work in The Golden Triangle. Third, the Auditronics boards give us an audibly superior on-air quality that sells very well to our advertisers, and that's the real bottom line."

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picture difference in saturated colored areas that would then not be reduced in noise.

The predictor operates by a process that separates the signal into luminance and chrominance components and adjusts the phase of the chrominance before adding it back to the luminance. This is achieved by a combination of signals from adjacent lines.

The equipment is entirely digital and operates at a clock frequency of 851 times the horizontal frequency. This frequency is close to three times PAL subcarrier frequency and four times NTSC subcarrier frequency. The choice of a horizontal frequency-locked clock provides orthogonal sampling which eases the logic arithmetic.

The Philips LDM 3001 uses a 16k dynamic RAM based on NMOS technology. Apart from the picture store, the equipment is implemented almost entirely in Schottky TTL and low power Schottky TTL integrated circuits.

One design target for the equipment was to allow fault diagnosis to be carried out using a conventional 25MHz oscilloscope. With this aim in mind, several aids have been included. A digital sawtooth may be used to replace the analog-to-digital, (A/D) converter output, and simple resistor digital-to-analog (D/A) converters are included at suitable test points. The main path D/A converter may be switched to the store output to check its validity or to a wandering 8 lead test probe to examine the validity of the 8 bit data at any point.

To aid the location of faults in the main picture store, a flashing cursor may be superimposed on each store location. The cursor appears on the output picture monitor and a control circuit indicates the position of the cursor within the store, enabling faulty locations to be identified. Indicator lamps are fitted to the front of the equipment to show that the data clock is locked to the incoming signal and also that the noise measuring circuit is functioning.

The equipment occupies 8.75 inches of vertical rack space and contains 16 printed circuit cards measuring 7.9x12 inches. As far as possible, each card is designed to carry a definite circuit, namely, storage, movement detection, noise measurement, A/D, D/A, predictor and multiplier.

The combination of space and power requirements means that a switched mode power supply and a forced air cooling system are required. The switched mode power supply has an efficiency of about 70% compared with 40% for the equivalent analog unit and has the added advantage of small size.

The equipment is fully automatic in operation and there are no front panel operating controls apart from an on/off switch and a by-pass switch.

The digital noise reducer described here has been designed for flexibility. Where unattended operation is necessary or desired, the broadcaster can count on its adaptivity to deliver an optiminally noise-reduced picture with no trace of motion lag. For special applications such as critical post-production assembly, the digital noise reducer may be adjusted by an operator to achieve various noise reduction and picture integration levels.

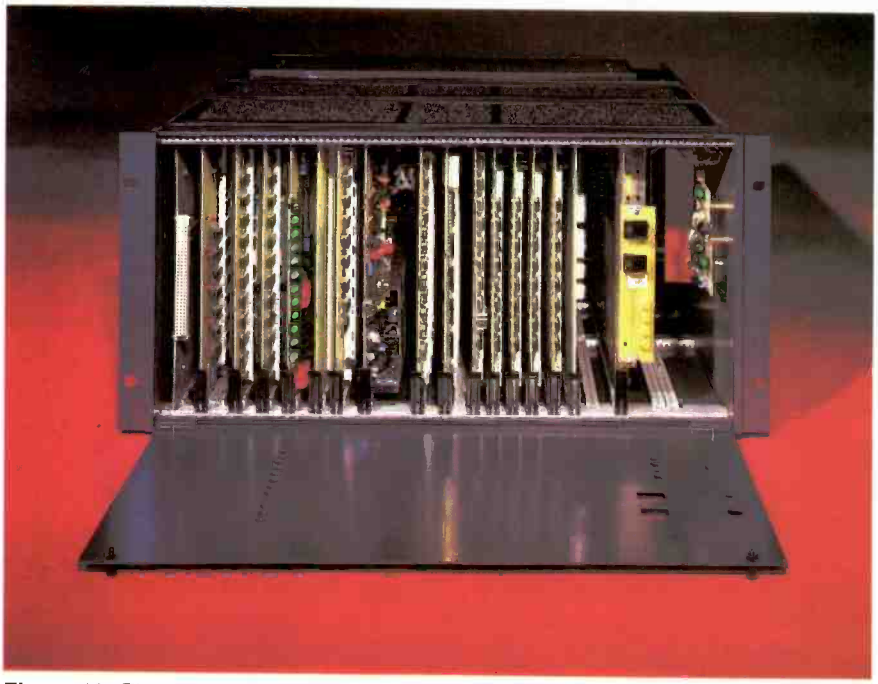

Figure 12. The production model of the digital noise reducer described in this paper shows a functional panel configuration, classy internal construction.

Other data

Digital noise reduction technology is growing in importance in broadcasting, and only one system has been covered here in detail. If you're interested in detailed information on other available systems, circle 300 on the reader service card and material will be sent. □

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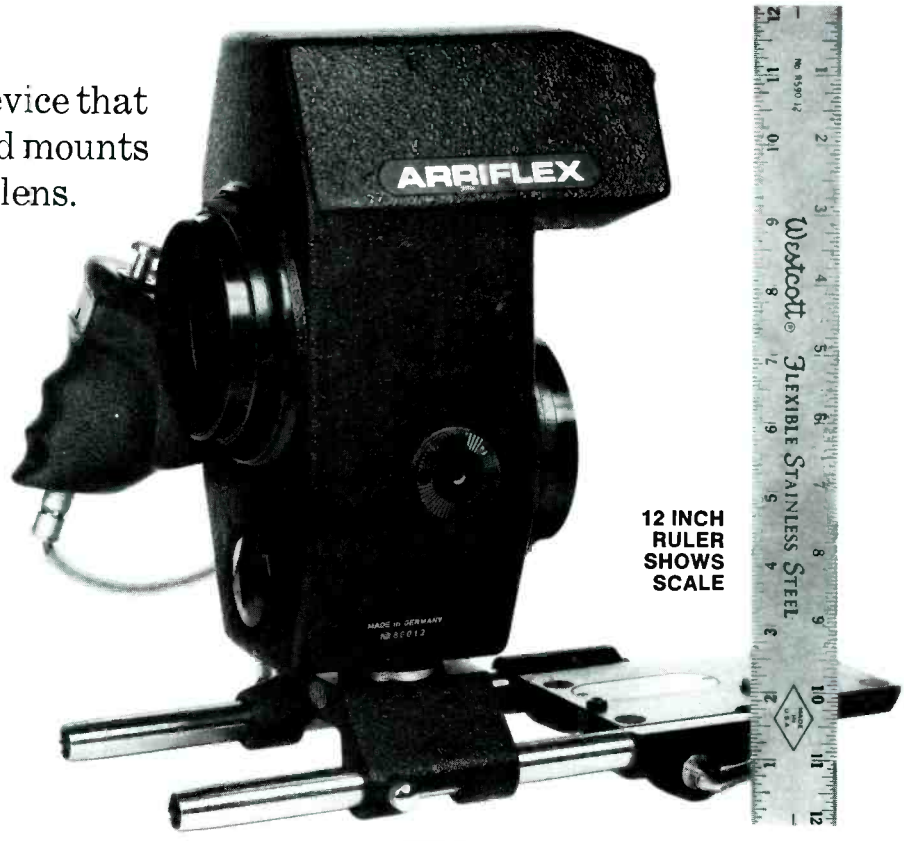

12 INCH RULER SHOWS SCALE

The news shot that grabs the viewer is a closeup. Of course. Like any other moving platform, though, the helicopter isn't steady enough for the camera to zoom in tight. Needless to say: at the long end of the lens, vibration is magnified.

You pay good money for that helicopter. You should get high-quality images.

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Without stabilization, you can't go longer than about the 50mm focal length on your ENG camera. With the Image Stabilizer, depending on air turbulence, you can get smooth shots at 150mm or longer.

No special training needed. It's just another (astounding) accessory.

The Image Stabilizer comes with its own Support Plate and bracket. You mount your camera on the Plate and position the Stabilizer in front of your lens. Switch on the Stabilizer. Switch on the camera. Shoot. Any competent cameraman can use it. It works with any camera and with any prime lens longer than about 35mm. (With zoom lenses, the widest focal length varies slightly.)

The new Arriflex Image Stabilizer

an important ENG/EFP accessory.

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The entering light rays are reflected off a front-surface mirror mounted on two gimbals powered by a battery-driven gyroscope. The mirror is effectively floating in space, as though on two trapezes – one oriented N-S, the other E-W. The image from this mirror is reflected onto another (fixed) mirror and thence into the camera's lens.

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A gyro's directional stability makes it resist off-axis movement – such as panning the camera. If you insist, it tumbles in that direction. British Aerospace, the designers, have turned this tendency to advantage. A precession brake causes the gyro to *lean with* the panning motion, steadily. This is military aerospace technology, ingeniously adapted.

The British Aerospace Steadyscope uses the same stabilization method. Above: surveillance from a NATO army helicopter.

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One of their products is the Steadyscope. It uses the same gyro-stabilization as our Image Stabilizer, whose moving parts are also made by British Aerospace.

How well does it work?

In the November 16, 1978 issue of the British magazine NEW SCIENTIST, there's an article by Guy Parker on stabilized binoculars. Referring to the Steadyscope, Mr. Parker writes:

Anchored in space

"On pressing the uncage button there is an immediate transformation which is both psychological and optical. The impact is of course greater if one is being shaken in a helicopter, but even on land the image appears in an almost uncanny way to anchor itself in space, even if the instrument is deliberately jiggled about."

Detail resolution

"An optical phenomenon now becomes apparent," writes Mr. Parker. "After the initial pleasure at the disappearance of jitter, the eye seems to demand needle-sharp resolution, now that the visibility of detail is determined mainly by the quality of the optical design. *There is no future for a stabilizer which does not give the highest resolution under all conditions of use.*"

IMAGE STABILIZER SPECS:

Length (Image Stabilizer alone): 6 5/8 ins. Width: 4 11/16 ins. Height: 9 1/4 ins. Weight (Image Stabilizer alone): 5 lbs. Weight (on Support Plate with 9 1/2 inch rods and with cable-release handle): 7 lbs. 4 oz. Maximum panning speed: approx. 4 degrees/second. Maximum accelerative force: 6g. Equalizes vibration frequencies 1 Hz and higher. Camera lens focal lengths usable with ENG/FFP format: 35mm and longer.

Rear view of Image Stabilizer shows Support Plate with threaded camera mount. Custom brackets are available for various cameras. Stabilizer can be removed from camera in less than two minutes.

No light loss, no image degradation.

There are no lenses or prisms in the Stabilizer. Light rays pass through optical flats front and rear, and reflect off two front-surface mirrors. If you meter the light at the exit port, it measures the same as the light entering.

Doesn't perform miracles. *Does* work in a car, though, or any other moving base.

The Stabilizer is for making shaky shots smoother, *not* for simulating a rock-steady tripod. Its low mass is vital in the unwieldy g forces inside a helicopter. But that's useful in a car, too, or on horseback... You can get out of the car and continue shooting with a body-brace. And the Stabilizer is quiet enough to shoot sync sound out of doors.

Elegant proof of low mass space-hardware sophistication: a gyroscope powered by one flashlight battery.

To improve a gyroscope's effectiveness, you can increase either its mass or its RPM. For military purposes, British Aerospace had to make it small, light and efficient.

High speed with low mass requires exact dynamic balance, of course. Eccentricity and bearing friction would impair accuracy and soak up power. One measure of the phenomenal precision of this device: The gyroscope – with its double gimbal and mirror – will run about four hours on a 1.5 volt D cell!

Low mass saves money.

A low mass device is likely to be compact. With this one, you can rent a 5 place helicopter at $300 an hour, and get steady shots *from inside.* No need to hang out of the open door. And no need, either, for a 7 place helicopter at $400 an hour, or more. The Image Stabilizer, incidentally, rents for about a tenth of that.

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IMAGING EQUIPMENT SINCE 1917

Circle (42) on Reply Card

First Class License and the FCC

By Robert A. Jones, consulting engineer and president of the Society of Broadcast Engineers

The First Class License issue is no doubt the hottest broadcast issue in many years. The Communications Act requires that stations be operated by "licensed" operators. The act does not instruct or limit the FCC on how it will license these operators.

Docket #20817 has been much misunderstood, much rumored about and probably more hotly debated than any other docket I've seen issued.

But look at the docket. First, the FCC proposes to delete the issuance of and renewal of First Class Licenses. Second, it proposes to downgrade each renewal to a Second Class License. Third, it plans to allow the technical duties at any broadcast station to be performed by a person with any class of license. And fourth, it proposes shifting the technical responsibility for determining competency of employees to the station owners.

This move by the FCC is not an isolated matter but is really part of an ongoing study in the matter of commercial radio operator licenses in both broadcast and nonbroadcast. In July 1979 the FCC reduced the requirement of duty operators to permit any class of commercial operator to operate any AM and FM station, except for critical arrays. Then in November 1979, the FCC permitted AM stations with critical arrays as well as TV stations to use any class of operator, as long as one First Class operator was employed full time. This sole First Class operator had to review logs, conduct technical inspections, install, maintain and adjust all transmitter equipment as well as train and supervise lesser grade operators.

This latest inquiry was in part initiated by the 500 parties who filed comments in connection with the two earlier proceedings. The FCC notes that 341 parties addressed the question of retaining the Radiotelephone First Class Operator License. In general, the majority of those in favor were those who held such grade of license; those who do not have such licenses argue against them. Also of no surprise to me was the fact that large market stations tend to favor continuing licensing, while small market stations tend to favor elimination.

One reason is that small market technicians tend to be scarce. Large market stations operate in a different environment. They usually enjoy the position of having more applicants than they have jobs to fill. Often mere possession of a license is not sufficient to acquire a job. Some practical experience is also necessary. Where does one obtain such experience? By working at small market stations.

In some markets a First Class License acts as a screening device to reduce the number of job applicants.

The FCC has boiled the subject down to two key questions. Does the examination of operators contribute to the operation of broadcast stations within FCC technical standards?

If you concur, the second question is: are there other forces that can effectively assure that the broadcast stations will operate within technical standards, without the need for First Class examinations?

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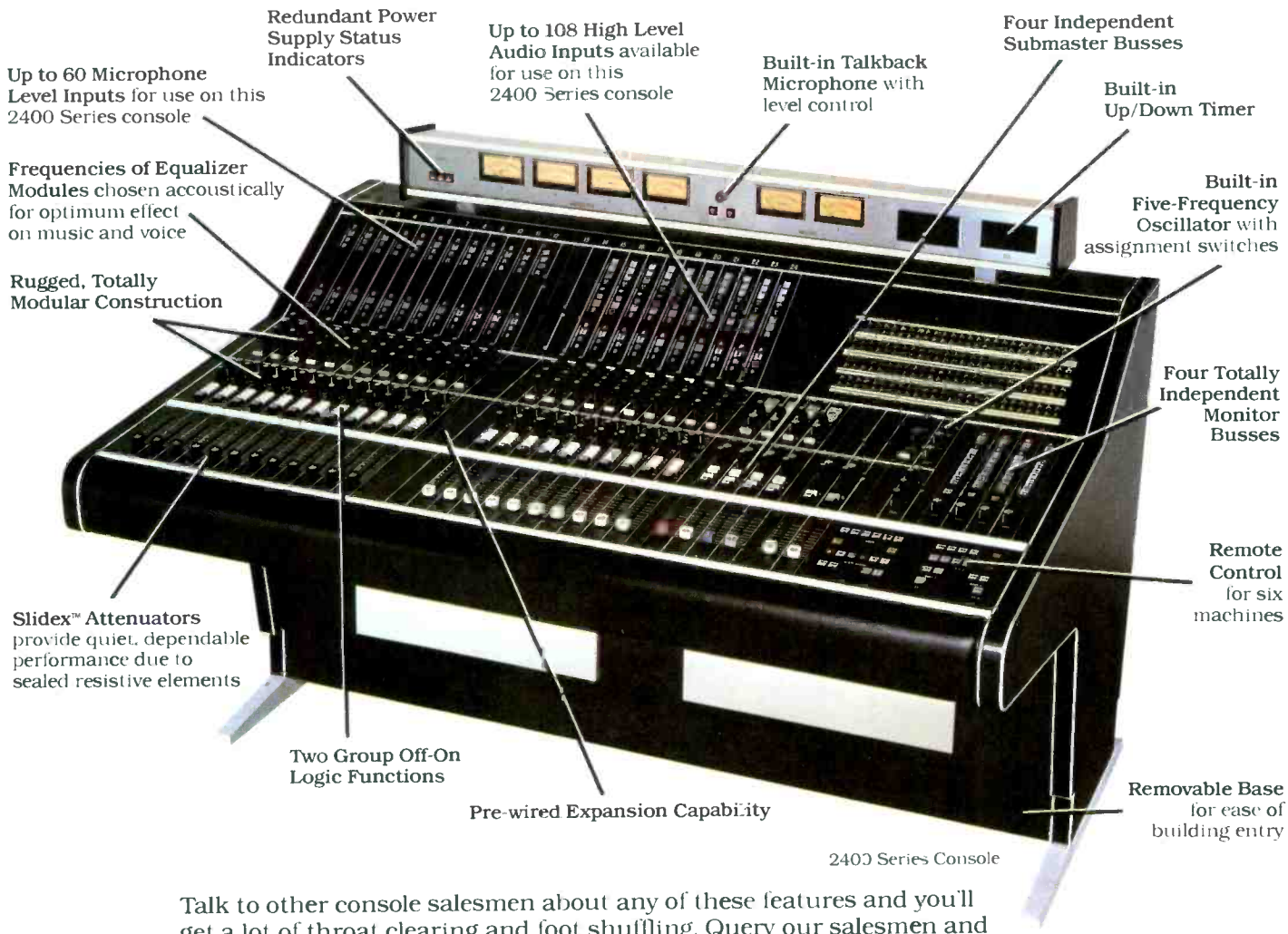

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And get the complete picture on VTR.

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Circle (44) on Reply Card

License

By the time this is read, much will have been said. Much will have been filed and much contemplated.

The Society of Broadcast Engineers' executive committee and board of directors decided at their October 9 semi-annual meeting in Chicago that SBE's official position is that the FCC is making an error by downgrading the First Class License.

SBE is a nonprofit society incorporated in the District of Columbia. The purpose of the society is the dissemination and increase of operational and scientific knowledge in broadcast engineering as well as the promotion and advance of science and its allied arts, both in theoretical and practical applications. One of the society's goals is the establishment of standards of professional education, training and competence for engineers. The society is also interested in professional recognition of these standards. Another goal is creation of a working alliance, and a meeting of minds in all aspects of broadcasting, including the FCC.

The society thinks the First Class License should be retained. Its deletion would be downgrading to those who worked to achieve this recognition. Its deletion would be one more step by the FCC in diminishing the professional status of broadcast engineers and technicians.

The society thinks the FCC is correct when it says this grade of license does serve as a useful screening device in employment at medium and major market stations.

The FCC says it has not been able to find a practical way of testing applicants on practical experience. SBE thinks it has one. On the back of each First Class Operator's License is a place for the service record. In the mid-'50s this requirement was deleted from all operator renewals. The society urges the FCC to reinstate this requirement. An individual's record will show the FCC inspector, as well as a prospective employer, an applicant's job experience. Those licensed operators not employed will find it difficult to automatically renew their licenses. This would serve to diminish the work load of the FCC staff. In a five year period it would reduce the number of First Class Licenses to those actively engaged. The service record would help establish experience in the field.

In the real world it is the chief engineer at a given station who worries about rule compliance, and who usually is the one to keep, maintain and read Volume III. From my experience, this is the person in every station that the other personnel turn to with questions on FCC rules.

I do not buy the fact that the administrative costs do not justify construction of the First Class License examinations. If cost is the only reason to discontinue exams and renewals, the FCC can solve this by charging a modest fee.

The FCC gives as another possible reason for discontinuing First Class exams the fact that some people are unable to take exams. The society does not know of any person who failed to obtain a license because of an inability to take examinations, or because of a lack of ability to read and write in English. The SBE thinks that although some individuals have such problems, the number is insignificant to warrant special treatment. Besides, any person who freezes up at taking written exams could always petition for a waiver. I do not know of any person who ever did so.

The SBE is opposed to the FCC using registration as a substitute for giving examinations. The SBE thinks

the FCC First Class License serves as an entry level test to the broadcasting field. It does test one's minimal knowledge of engineering principles and familiarity with the FCC rules.

If the FCC removes licensed operators from any responsibility, and places all burden directly on the owners of the station, it removes a strong influence on the present class of operators to keep the station in good technical compliance. The FCC has the authority to issue citations and to impose fines on operators. In fact it can even revoke one's license. Because a First Class License takes considerable effort to acquire, those who have it want to keep it.

Any grade of license that can be acquired by mere registration will be of little value and hence will carry little or no responsibility on the part of the holder.

The society is greatly concerned about the future of the broadcasting industry in the absence of FCC First Class Licenses. Instead of downgrading them we think they should be upgraded. AM stereo is around the corner, as is possibly 9kHz channel spacing, reduced mileage of FM stations and the advent of low power TV stations. These positive moves by the FCC will increase by hundreds the number of FCC broadcast outlets, will increase the need for experienced operators and will increase the probability of electrical interference between licenses.

One only needs to visit another country where private radio exists (other than Canada) to see what chaos could result. If the FCC has trouble inspecting and policing the number of broadcast stations it now has licensed, how can it police double or triple this number? We think proper licensing will create a grade of capable and responsible operators.

One final area troubles me. This deals with the safety of station personnel. In most stations the chief or First Class License person is the only one who recognizes the lethal problems associated with running a transmitter and an antenna. Through study and preparation for the examination, that person has at least heard of the danger of electricity. Elimination of the First Class License will cause non-technical persons to attempt to service, maintain and install equipment that can be hazardous. I would not want to be responsible for any nonoperator's death.

The SBE thinks the First Class License has served a useful function as an entry level test, has protected the health and life of station personnel and has resulted in a higher level of technical compliance with the commission's engineering rules.

But what if the FCC downgrades the operator's license? The SBE thinks a substitute must be found—one that can help employers, FCC inspectors and fellow operators recognize a person's equivalent achievement of an FCC First Class License. Obviously any such certificate or license issued by the SBE will not carry the mandatory requirement of an FCC license.

We think the SBE Certification Committee is capable of preparing tests and examinations that will test the same knowledge and experience level now tested by the FCC. Just where and how these exams would be administered must be resolved later.

As I have said, we trust the FCC will reconsider its options and will continue and even upgrade its Radiotelephone First Class License program. But if it doesn't, the SBE will review its responsibilities to its industry and will take what official action its president and board of directors deem most in the public interest. □

station-to-station

Use of a calculator to maintain inventory

By Carl Bentz
staff engineer, KCPT/TV19
Kansas City, MO

The Texas Instruments TI-59 calculator with magnetic cards and PC-100A printer can be used to maintain a broadcaster's inventory records. The program and calculator can handle batches of 90 part numbers at a time (three magnetic card sides of data). Using a format CCPPPPP.NNN allows 99 device codes (CC). Having five digits (PPPPP) allows 99,999 individual part numbers within a device code. And 999 (0.NNN) pieces of a part number can be counted.

Two examples illustrate. Suppose that silicon transistors are assigned a device code of 22; TTL logic devices from TI are 35. An entry in the inventory record for 234 pieces

Sample of program, part 1. Loading inventory into memory.

```
      15.
2201304.011
      16.
2201306.011
      17.
2201307.012
      18.
2202219.009
      19.
2202222.011
      20.
2203439.002
      21.
2203436.001
      22.
3507400.005
      23.
 3507402.
      24.
3507404.111
      25.
 3507413.02
      26.
3507420.001
      27.
 3507430.
      28.
 3507432.
      29.
3507440.011
      30.
```

Sample of program, part 2. Updating the file.

```
U/DAT
                  19.
            2202222.011
            2202222.111

U/DAT
                  89.
            9987654.001
            9987654.002

U/DAT
                  21.
            2203436.001
             2203436.

U/DAT
                  33.
             3507489.
            3507489.999
```

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Circle (48) on Reply Card

of transistor 2N2219 would appear as 2202219.234. An entry of 3574193.025 indicates a stock of TTL device 74193 numbering 25. Because some manufacturers' part numbers are huge they need to be shortened before the TI system can work. The device works as the shortening mechanism.

The program is written in several sections, each dealing with a specific capability. One loads the file of part numbers (and inventory count) initially. The second section allows updating of the inventory count as more parts are purchased or used. The third section enables the recordkeeper to search the file for a specific part number and the stock level or, perhaps, determine whether that part is actually in the inventory.

Before any use of the program (before entry from the keyboard or from magnetic cards) the calculator must be repartitioned by keying in **10 2nd Op 17** to set data register requirements. Once the program has been entered from the key-

Inventory program for a TI-59
Part 1—Creating the part number file

2nd Lbl 2nd E'	To load the file initially, **press 2nd E'.**
90 X — T	Sets counter limit.
SBR CLR	Resets counter to zero.
2nd Lbl A	
SBR 2nd Tan R/S	**Enter data** as CCPPPPP.NNN; **press R/S.**
STO 2nd IND 99	Stores data in register given in counter.
RCL 99 2nd PRT R/S*	Prints register number; **press R/S.**
RCL 2nd IND 99	
2nd PRT R/S*	Prints data entry; **press R/S.**
1 Sum 99	Increments counter to next register number.
GTO A	
2nd Lbl 2nd Tan	Subroutine checks for maximum number in counter.
RCL 99 2nd X = T 1/X	
INV SBR	
2nd Lbl 1/X	If counter has reached 90 items (0 to 89).
9 + /-2nd PRT R/S	-9 is printed to indicate end of a batch of 90. When all part numbers have been entered or a -9 is reached, follow calculator instructions to record card sides 2, 3 and 4.

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Naturally, the B67 uses Cannon-type connectors, and ASA ballistic VU meters (augmented by IEC peak-reading LED's). And it gives you built-in editing facilities with a monitor speaker. Both mechanical and electrical construction is modular throughout, for rapid service and adjustment. Full remote control is available. And when you say that the record and playback heads are made by Studer, that's all that needs to be said. The B67 is available in 19" rack-mount, console and portable formats.

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Circle (50) on Reply Card

Calculator

board, it may be recorded on a card as Side 1 for future use. The part numbers do not need to be in numerical order.

After the program has been entered and Part 1 has been completed, the inventory file may be recorded as card sides 2, 3 and 4, holding registers 60 to 89, 30 to 59, and 0 to 29, respectively. When using Part 2 for updating and once a part number is update, **press B** and enter the next part number of interest, followed by **R/S**. The display will blank during the search for the proper file. For example, 2½ minutes will be needed to search through a file to find the number of interest if it is 89 register.

Finally, the program can be used without the printer. It has been written to allow display of all printed items, with the exception of an alphanumeric comment. An asterisk has been placed by R/S instructions that could be deleted from the program if a printer is always used. □

Part 2—Loading data from magnetic cards into memory and updating items

2nd Lbl 2nd A'	To enter data from cards, **press 2nd A'.**
2 INV 2nd WRITE	**Insert card side 2** into reader, enters registers 60 to 89.
3 INV 2nd WRITE	**Insert card side 3,** registers 30 to 59.
4 INV 2nd WRITE	**Insert card side 4,** registers 0 to 29.
90 STO 98	Sets counter limit.
2nd Lbl B	To locate an item in the file.
SBR CLR R/S	**Enter** device **CCPPPPP; pres SR/S.**
STO 97	Stores device number being sought.
2nd Lbl $\sqrt{X}$	
RCL 97 X ⇆ T	
RCL 2nd IND 99	
2nd INT EE INV EE	Recalls data from register; converts to CCPPPPP.
wnd X = T D	
1 SUM 99	
SBR 2nd GRAD	Subroutine checks for counter limit.
GTO $\sqrt{X}$	
2nd Lbl D	
2nd Op 00	
41 63 16 13 27	
2nd Op 01	
2nd Op 05 R/S*	Prints "U/DAT" (4163161337 in display); **press R/S.**
RCL 99 2nd PRT R/S*	Prints register number; **press R/S.**
RCL 2nd IND 99	
2nd PRT R/S	Prints data record (CCPPPPP.NNN). **Enter number** of parts **change** (0.NNN), starting with decimal point. For increase in stock, **enter 0.NNN** and **press R/S;** for decrease in stock, **enter 0.NNN + /-** and **press R/S.**
SUM 2nd IND 99	Adds number change into register.
RCL 2nd IND 99	
2nd PRT R/S	Prints updated file.

Part 3—Searching file by file to find part number and/or count of parts
(This section does not use printer)

2nd Lbl E	To search file, **press E.**
SBR CLR	
2nd Lbl X^2	
RCL 99 R/S	Register number in display; **press R/S.**
RCL 2nd IND 99 R/S	Data file displayed; **press R/S.**
1 SUM 99	
GTO X^2	Goes to next register.
2nd Lbl 2nd GRAD	Checking for counter limit.
RCL 98 X ⇆ T	
RCL 99 2nd X = T 1/X	
INV SBR	
2nd Lbl CLR	Clears counter.
0 STO 99	
INV SBR	

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Circle (53) on Reply Card

Station-to-station

Modifying a telecaptioning decoder

By Victor Castens
project engineer
KOAM-TV7, Pittsburg, KS

We looked at various low cost methods of displaying telecaptions provided by our NBC network services. After studying available decoders we decided on a Sears Model #564.54300050 Telecaption Decoder that has a complete tuner and IF/demodulator included. After the RF signals are demodulated, the telecaption data is decoded and added to the program video. A channel 3 or 4 RF carrier is then remodulated.

What we needed was a method of connecting to our studio baseband monitoring system. The circuits of Figures 1 and 2 accomplish this.

Figure 1 shows a video distribution amplifier connecting to the signal board at TP26, the video out-test point near the rear and right center on the signal board.

Figure 2 is an interface circuit connecting either line input or internal video demodulator through S1 to the adapter caption adder circuits.

Step 1 is to modify the adapter by adding coax connectors to the rear panel and connecting power leads to chassis ground and to the "O" output terminal of the 15V regulator IC002.

Step 2 is to lift the end of R117 and R119 at the end toward the front of the signal chassis and add the resistor network R2 as shown between +12 and the junction of R117/R119. R2 is adjusted for a voltage of 3.4Vdc with S1 in line position.

Step 3 is to add R3 and adjust for the same dc level at blanking as the measured blanking level at junction of R117/R119.

Step 4 is to adjust R1 for 1VP-P at the output of the distribution amplifier.

Because many stations have no method of monitoring the captioning information, this technique may be of considerable interest. However, a warning: Sears says that this modification may void the warranty by Sears Service Centers.

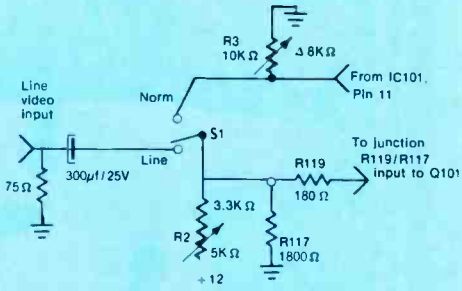

Figure 2 Modifications for line input to decoder.

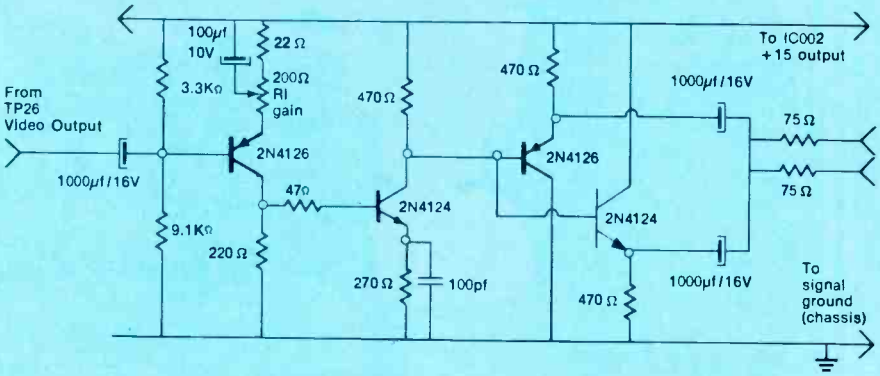

Figure 1 Line driver amplifier.

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Circle (56) on Reply Card

people in the news

Paul F. Amedick was appointed manager, news services for RCA Commercial Communications Systems Division. Amedick is responsible for news and information programs for the four business units of the division: Avionics Systems, Van Nuys, CA; Broadcast Systems, Camden; Cablevision Systems, Van Nuys; and Mobile Communications Systems, Meadow Lands, PA.

Bill Wolfenbarger, former marketing director at Time & Frequency Technology, Inc., has joined MARCOM's Northwest office as radio sales manager.

Dr. Matti S. Siukola, unit manager of advanced development for RCA Broadcast Systems' antenna engineering center in Gibbsboro, NJ, died on September 19. Siukola joined RCA in 1952 and had been a major contributor to the development of radio and television broadcast antennas. For the past seven years he had been a primary influence in the development of circularly polarized television broadcast antennas.

Leo I. Meyerson, founder and chairman of the board, World Radio, Council Bluffs, IA, will be elected a fellow the the Radio Club of America, Inc., in ceremonies scheduled for November 21 in New York City. Meyerson was selected for the honor for his many unusual contributions to the radio electronics industry and his continued leadership, support and international acceptance in that field.

Ted Stratton, assistant chief engineer for KTAR/KBBC-FM Radio since June, 1979, has been named to the position of chief engineer for the Pulitzer owned Phoenix stations.

Comsat announced the retirement of **John A. Johnson** as chairman and chief executive officer of Comsat General Corporation and the appointment of **Richard S. Bodman,** president and chief executive officer, as his successor.

C A Audio Systems, manufacturers of the Cadac Audio range of studio mixing consoles, have appointed **Richard Swettenham** as design and marketing consultant.

Van Ladder has announced the appointment of **Michael Penn** as national sales manager. Penn, who previously served as regional sales manager for Northeastern US, will oversee the company's expanding distribution network and coordinate distributor/dealer sales and service programs for the company's line of aerial ladders, lifts and utility and service truck bodies.

Scientific-Atlanta has announced the appointment of **Guy W. Beakley** as its director of research and development. Dr. Beakley comes to his new position from two years as general manager of the company's satellite communications division.

Delbert D. Smith, Comsat's senior vice president, corporate affairs, was named to the Board of Trustees of the International Institute of Communications at the

Electro-Voice's Greg Silsby talks about the Sentry 100 studio monitor

Production Studio, WBBR-FM, South Bend, Indiana.

In all the years I spent in broadcast and related studio production work, my greatest frustration was the fact that no manufacturer of loudspeaker systems seemed to know or care enough about the real needs of broadcasters to design a sensible monitor speaker system that was also sensibly priced.

Moving to the other side of the console presented a unique opportunity to change that and E-V was more than willing to listen. When I first described to Electro-Voice engineers what I knew the Sentry 100 had to be, I felt like the proverbial "kid in a candy store." I told them that size was critical. Because working space in the broadcast environment is often limited, the Sentry 100 had to fit in a standard 19" rack, and it had to fit *from the front, not the back.* However, the mounting hardware had to be a separate item so that broadcasters who don't want to rack mount it won't have to pay for the mounting.

The Sentry 100 also had to be very efficient as well as very accurate. It had to be designed so it could be driven to sound pressure levels a rock 'n roll D.J. could be happy with by the low output available from a console's internal monitor amplifier.

In the next breath I told them the Sentry 100 had to have a tweeter that wouldn't go up in smoke the first time someone accidentally shifted into fast forward with the tape heads engaged and the monitor amp on. This meant high-frequency power handling capability on the order of five times that of conventional high frequency drivers.

Not only did it have to have a 3-dB-down point of 45 Hz, but the Sentry 100's response had to extend to 18,000 Hz with no more than a 3-dB variation.

And, since it's just not practical in the real world for the engineer to be directly on-axis of the tweeter, the Sentry 100 must have a uniform polar response. The engineer has to be able to hear exactly the same sound 30° off-axis as he does directly in front of the system.

Since I still had the floor, I decided to go all out and cover the nuisance items and other minor requirements that, when added together, amounted to a major improvement in functional monitor design. I wanted the Sentry 100 equipped with a high-frequency control that offered boost as well as cut, and it had to be mounted on the front of the loudspeaker where it not only could be seen but was accessible with the grille on or off.

I also didn't feel broadcasters should have to pay for form at the expense of function, so the walnut hi-fi cabinet was out. The Sentry 100 had to be attractive, but another furniture-styled cabinet with a fancy polyester or die-cut foam grille wasn't the answer to the broadcast industry's real needs.

And for a close I told E-V's engineers that a studio had to be able to purchase the Sentry 100 for essentially the same money as the current best-selling monitor system.

That was well over a year ago. Since that time I've spent many months listening critically to a parade of darn good prototypes, shaking my head and watching some of the world's best speaker engineers disappear back into the lab to tweak and tune. And, I spent a lot of time on airplanes heading for places like Los Angeles, Grand Rapids, Charlotte and New York City with black boxes under my arm testing our designs on the ears of broadcast engineers.

The year was both frustrating yet enjoyable, not just for me but for Ray Newman and the other E-V engineers who were working on this project. At this year's NAB show it all turned out to be worth it. The Sentry 100's official rollout was universally accepted, and the pair of Sentry 100's at the Electro-Voice booth was complemented by another 20 Sentry 100's used by other manufacturers exhibiting their own products at the show.

What it all boiled down to when I first started the project was that I knew that the Sentry 100's most important characteristic had to be *sonic integrity.* I knew that if I wasn't happy, you wouldn't be happy. I'm happy.

Greg Silsby

Market Development Manager,
Professional Markets

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People in the news

Institute's annual conference in Ottawa. Dr. Smith will serve for three years with trustees from several other countries.

Image Resource has increased its marketing staff with the addition of **Morgan Walker** as national sales manager. Walker comes to Image Resource from Century Data Systems.

Peter C. Lowten has been named product manager, VTR Products, for the Broadcast Division of the Sony Video Products Company.

Frank Rankel has been named sales engineer for the southeast region of Sony Broadcast. Prior to joining Sony, Rankel was with WTVT Channel 13 in Tampa, FL, for 15 years as chief engineer.

Amtel Systems has announced the appointment of **Jerry W. Knight** as vice president and general manager, southern regional sales, and **DeWitt C. Smith III** as vice president, marketing and northern regional sales.

EEV Canada Ltd. announced the appointment of **David Clissold** as deputy general manager. Clissold joined the company in 1963 in the contracts department.

Monte L. Walpole, manager of engineering for KSDK, St. Louis, since 1973, died September 19. Walpole joined the station on January 13, 1952, and was made an engineering supervisor in 1962.

Mike Gendron has been named district sales manager for ADDA Corporation and will be headquartered in Dallas, TX. He was formerly national OEM sales manager, computer products, for Ampex.

Wayne Hetrich of National Public Radio has been honored with a Special Armstrong Award for "significant research toward the implementation of major developments in state-of-the-art broadcast electronics technology." Hetrich, senior engineer for research and development at NPR, received the Award for Technical Achievement in Broadcasting in Los Angeles on October 6.

Matt Biberfeld, program director at WNCN, has been named general manager of the classical music station owned by GAF Corporation. He joined GAF Broadcasting shortly after the company took over the station in June of 1976.

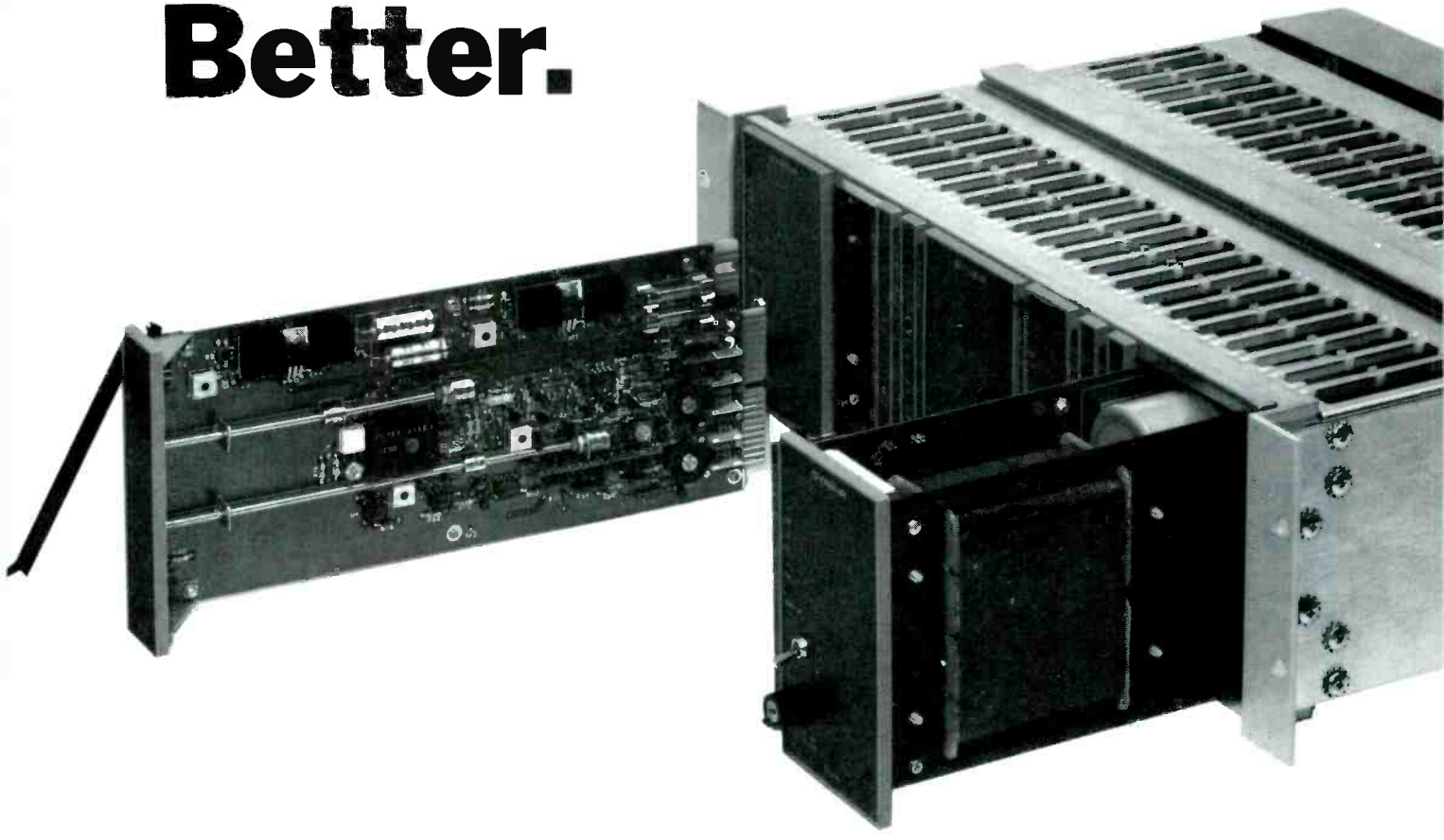
Microtime has announced the appointment of **Alan Kartes** as central regional sales manager. Kartes replaces William Baird, who was promoted to Southeast regional manager last fall.

The appointment of three new district sales managers for Sony Video Products Company's Eastern region have been announced. The three are **Richard Carlsen, David Hillman** and **Anthony Schicchi.**

Gary D. Rosch, former staff attorney for the FCC specializing in international telecommunications, has joined Antiope Videotex Systems as staff counsel.

Hope S. Green has been named manager of the Vermont Education Television Network. □

None Better.



Today's modern television plant with multiple re-entry requirements and long cable runs needs the performance and inherent stability of Dynair's new Series 5300 television distribution equipment.

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NRBA Highlights: Part I, The '80s—a collision of conflict

By Karl Eller
president
Charter Media Group, Phoenix, AZ

The following is the text of a presentation given at the National Radio Broadcasters Association's Seventh Annual Conference and Exposition held October 5-8 at the Bonaventure Hotel, Los Angeles.

Here we are, just past the threshold of the '80s and a fusion of computer and electronic technologies is impacting and changing nearly every aspect of our lives. Throughout this decade, we'll be confronted with a collision of conflicts. Conflicts of supply versus demand, need versus availability and instant obsolescence versus constant innovation.

Charter owns K101-FM, San Francisco, among other properties.

The drama of man-into-space will give way to the practicality of a new technology closer to home, in the home and all around the home. While most of us may continue to be ignorant of what goes on under the hood, inside the speaker or behind the screen, we will have to be keen observers of the cross-impacts—the collision of conflicts—that will result from these new technologies. Satellite technology will become the primary delivery vehicle of network programming and satellite delivery will become cost competitive within the next five years.

On a day-to-day basis we will have to deal with complex interactions in the ways people live, work and buy; the ways marketers will produce and sell; and the ways we in media will build and define audiences. And technology will change the human potential and more importantly, the range of human choices.

The computer—that information revolution in a cabinet—is fanning the spread of this technology. Since the dawn of automation, information flow has operated machines—but today, it is managing the whole process. It gives new meanings to marketing relationships and promises even more control with such two-way communications as Warner's Qube Television system.

In our business planning, processed information is the new tool for defining and comparing alternative courses of action. It has eliminated intuition and quick assumptions from the process and given business planners a new professionalism. Information in readily available form has contributed most to raising productivity over the past decade, and may offer the best potential for needed improvements in the '80s. It will be more true than ever that management can hardly make a move without a printout.

The darker side

But there seems to be a darker side—another collision of conflicts—destined to trouble us in the '80s. First, has technology outrun our resources?

Politicians, economists, feature writers and even the distinguished chairman of the Federal Reserve Board, tell us that our standard of living will be lower in the '80s.

In spite of soaring technology and increasing education, nowhere in

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We call it human engineering. You'll call it terrific. The 4000 Series Switcher from Ampex is powerful enough to get almost any effect, yet so simple to use that your production is right the first time everytime.

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Most good ideas are basically simple. In essence that was our approach to the design of the 4000 Series Switcher.

For instance, take upstream keying and multi-level video processing. Signal flow is both obvious and logical for the operator. Processing takes place left to right and top to bottom.

And with one M/E and the 4000's dual bus keyer, you control five levels of video. This means tremendous power when you need it. One 4000 Series M/E is the equivalent of a conventional switcher's two or three M/Es.

This logical technology will not only give you unlimited creative freedom, but also this simple assurance: the 4000 Series Switcher will never be the weak link in your production chain.

Simplicity is as Close as Your Fingertips.
What could be more logical than to control all vital functions from one, easy to use keypad. Nothing, of course, unless climbing all over a switcher is simplicity.

The 4000 Series keypad control is both logical and extremely fast! Setting-up or changing set-ups can be done quickly and with confidence. You'll have fingertip control of 100 different patterns, 99 transition rates, and ten key sources.

The 4000 Series Switcher. It's From Ampex!
That means Ampex stands behind it. We built the 4000 to be rugged. And because it's built by Ampex, you can count on service when you need it.

The 4000 Series from Ampex. Its creative results and simple operation make it the logical choice for all productions.

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Conflicts

the world do we seem able to govern ourselves successfully.

The Russians can't produce enough consumer goods after 60 years of Communist rule; the Chinese are going through enormous social and political convulsions; Brazil's inflation is rampant again; Sweden, that paragon of government control, is in a box and sees no way out of it. Canada faces dissection. It seems that no matter where you turn—Cambodia, Pakistan, Iran or the United States—there is a breakdown in the effectiveness of governments.

Today, we're seeing a collision of conflicts all around us. To me the collision is never more striking than when I see all those TV antennae poking out of distressing hovels in Peru or in the Phillipines or, for that matter, in Harlem, Detroit or Cleveland.

I must say, I don't see much change in the '80s. The decade of the '80s—even more so than that of the '70s—promises, or threatens, as the case may be, to be a decade of collisions.

The very word, collision, suggests the continuation of wars, rebellions, demonstrations, economic upheavals and uncertainties in planning. But it does not necessarily follow that results of all those collisions will be negative. Indeed, from adversity comes innovation, and from innovation comes progress. Let there be no mistake—I am a cockeyed optimist about the future of our industry and our country.

Our business of communications and advertising stands today on the threshold of excitement. In 1854 when we were building the transcontinental telegraph, Thoreau wrote, "We are in a great haste to construct a magnetic communications link from Maine to Texas. My fear is that Maine and Texas may have nothing of importance to communicate."

Time has proved Thoreau wrong. That fear of nothing important to communicate may be a good hinge on which to turn to some specifics of our own business during this time of collisions and contradictions.

Deregulation

Last fall, the Federal Communications Commission initiated its inquiry into the proposed deregulation of radio. The inquiry encompasses four broad areas of current FCC regulation: nonentertainment programming, ascertainment procedures,

The end of the endless loop.

Eumig's new FL-1000 makes cassettes the broadcast medium.

The Eumig FL-1000, an extraordinary new cassette tape deck, has started a revolution in the world of broadcasting. We believe—and radio engineers agree—that it will soon make the cassette the standard tape format in the broadcast industry.

The FL-1000 is the world's first computer-interfaceable cassette recorder. Up to sixteen FL-1000 decks can be controlled by any 8-bit computer. Some of the decks can be used for commercials; others for news and weather; still others for music and station ID's. And the location of *every* item on *every* cassette can be stored at the beginning of each tape and then in the computer, so *any* sequence can then be played back—automatically, with no human intervention, all day and all night long.

Watching a bank of FL-1000's working together is an awesome experience. One deck is rewinding while another is playing, and still another is moving in fast-forward to locate the next selection. Meanwhile, other decks are copying from a network feed and recording an air check.

The technology of the FL-1000 is so advanced that half a dozen units can do the work of more than 100 individual cartridge players—plus several reel-to-reel recorders. And they do it better, at far less cost, with sound quality comparable to that of the finest open-reel equipment. And the Eumig FL-1000's have none of the mechanical problems that plague endless-loop broadcast cartridges.

To see the end of the endless loop, call Eumig about the new FL-1000. Once you see and hear this amazing new recorder in action you'll agree that this is the long-awaited deck that will make cassettes the standard medium in the broadcast industry.

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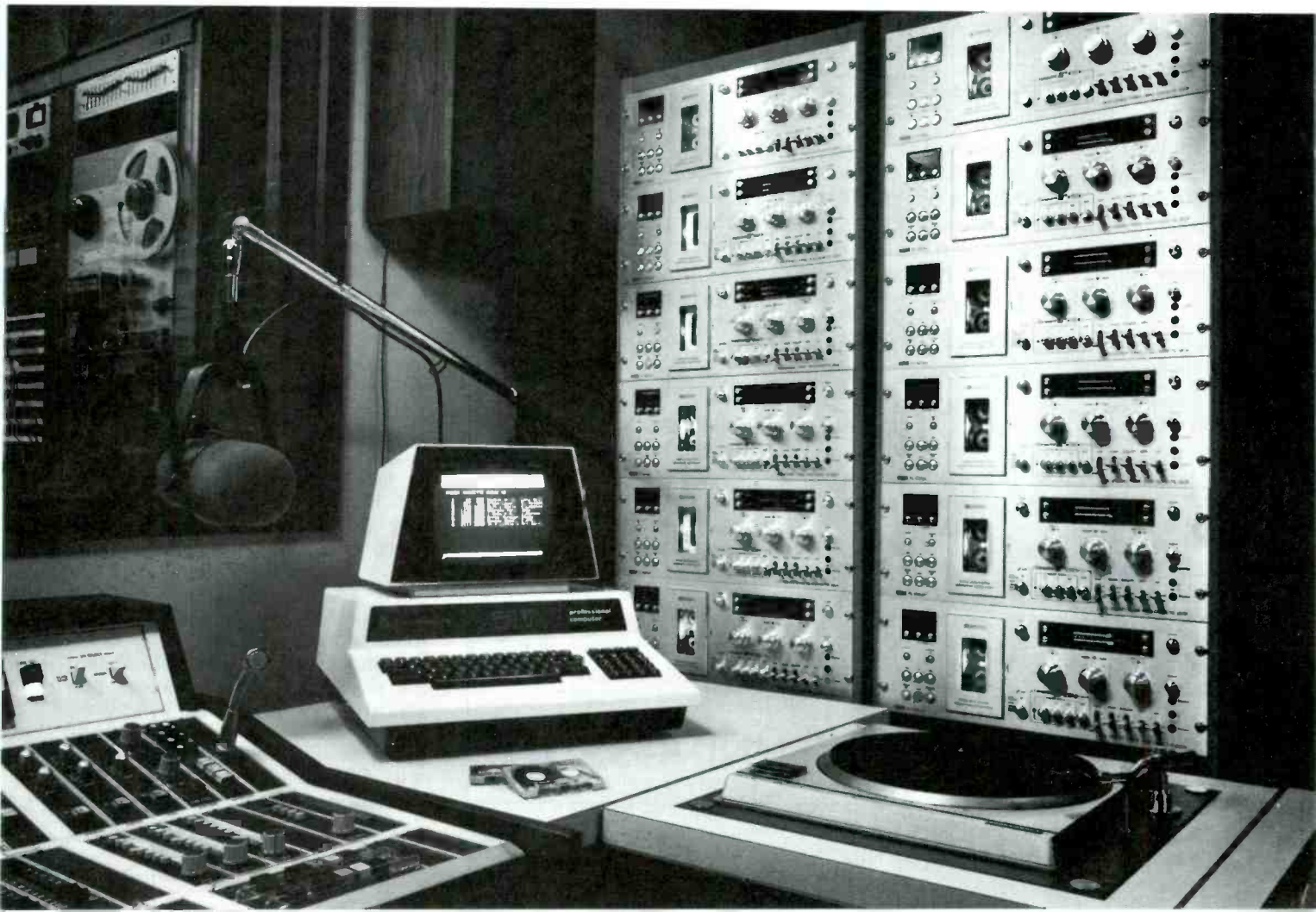


commercial practices and log keeping.

The commission considered a number of options in each one of these categories and indicated those options which appear to be favored by a majority of the commissioners.

While the FCC document is long, complex and accompanied by tables and exhibits, the basic underlying philosophy is the commission's feeling that market pressures will force broadcasters to operate in a responsible and responsive manner so that government regulation will be unnecessary.

Specifically, the preferred options in each category are:

One—the FCC will not consider the amount of nonentertainment programming which a station carries. The apparent willingness on the part of the commission to remove minimum requirements is based on figures which show that a large majority of radio stations already broadcast in excess of the minimal standards. Another factor cited by the commission is the emergence of specialized all news stations which would presumably supply the market's need for news.

Two—the FCC will not enforce detailed ascertainment procedures, leaving it to the marketplace to generate the momentum for broadcasters to be responsive to community needs.

The commission proposes to completely eliminate the ascertainment process, thus removing the need for surveys of the general public and of the leadership.

Three—the commission proposes to eliminate all limitations on the amount of commercial matter, again leaving it to the market to determine acceptable levels. The commission's action is based on figures which it claims show that a great number of stations operate at commercial levels well below the current criteria. The FCC has also stated that many FM stations find that listeners respond positively to a reduction of commercial matter, thus indicating that market forces will put pressure on broadcasters to stay within acceptable limits.

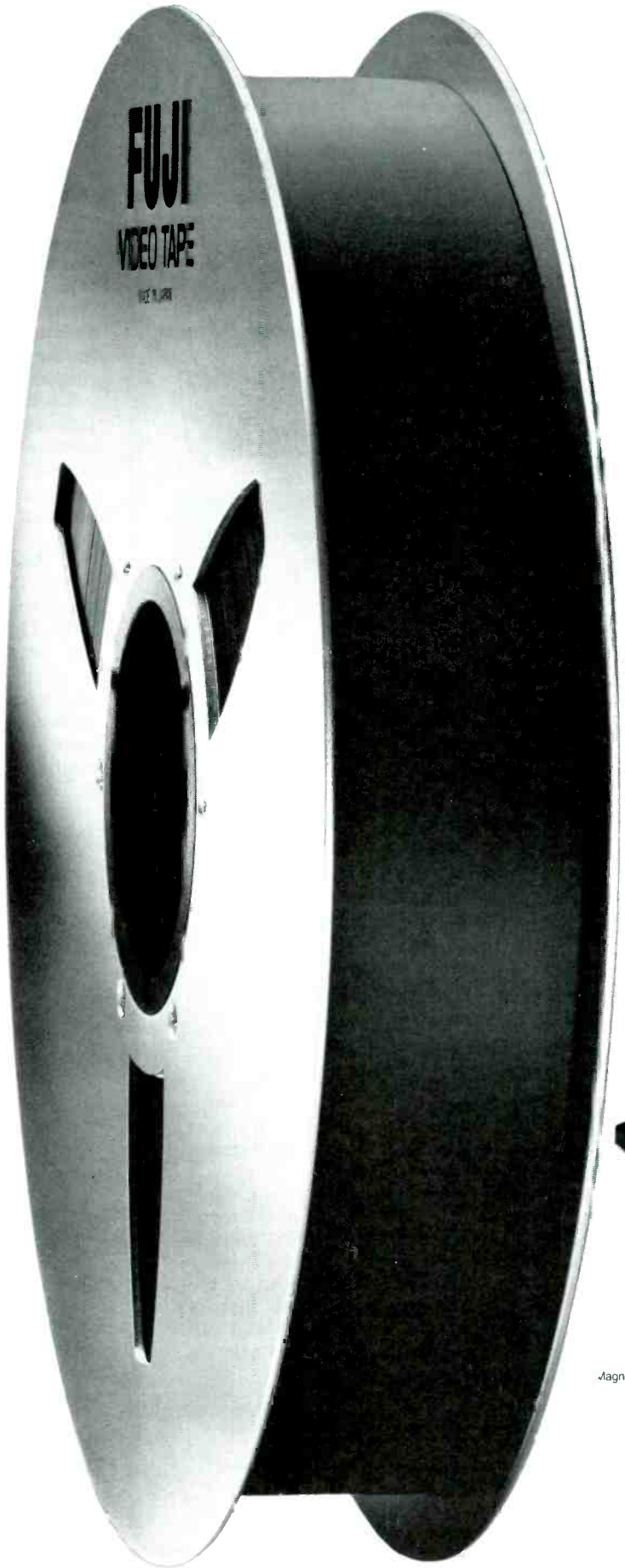
Four—The commission proposes to eliminate requirements for log keeping, but to require stations which keep records of programming commercial schedules to make them available for public inspection.

I see the effects of these proposed actions as positive.

The elimination of minimal standards will permit FM stations which specialize in mood music and background music operations to avoid the "five-minute syndrome" as well as the necessity of "burying" public affairs programming within the graveyard hours. On an overall basis, if the commission's figures are correct, there will be little effect since many stations broadcast in excess of the standards.

As to ascertainment—many citizens' groups and most broadcasters agree that the present procedures are a waste of time and money. With the removal of the mechanical procedures, stations will be free to design their own means of keeping in touch with the community.This will be particularly true of stations with specialized format operations. Thus, a classical music station may not be required to contact the local agricultural agent, or a station programmed for subteens will not have to interview the local social security officer. I don't think that we should assume, however, that we are free to ignore community groups and their leaders, since any potential challenge to our licenses will have to be rebutted with documentary proof that the com-

The measure of success.



In 2," 1" and ¾."
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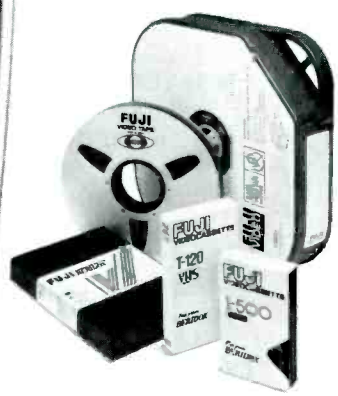

FUJI

munity problems have been sought out and served.

The proposal to eliminate limits on the commercial load will have little effect on many stations, since most stations do not sell out their time even under present rules. While adoption of the proposal may permit stations to increase the commercial load in certain peak hours, there is a collision of conflicts with a public acceptability, which each of us will have to evaluate in the light of our own audience.

While the log keeping proposal sounds appealing, it really gives little to the broadcaster. While we would no longer have to keep a log in the prescribed form, we will still have to keep a record of commercial matter broadcast in order to supply affidavits of performance to the advertiser.

The dates for filing comments and reply comments have now expired. Last week the commission held two panel discussions at which representatives of broadcasters and citizens groups participated, and even there we saw a collision of conflicts—particularly regarding minimum programming standards. We understand that the staff is now studying the record of these discussions and that it will be some time before any action takes place.

From a broadcaster's point of view, I believe the FCC proposals should be supported for the simple reason that they will lessen the workload and expense of operating a station. On the other side, we should be aware that citizen's groups may mount an effective campaign against the proposals, arguing that the FCC has abandoned to the marketplace their statutory responsibility to protect the public.

Radio is still a sensible business for an individual to get into, especially in smaller markets where, if you have a good facility and community-related programming, you can make a go of it.

Protecting radio's interests

Still, there are questions which remain unanswered as we enter the '80s. The prospects of hundreds of new stations across the country as a result of the FCC's push for a 9kHz spacing on the AM dial, if enacted, will add more than 200 new stations to the 8000 or so currently operating.

There are some other aspects of regulation which we should all be cognizant of. Not the least among them is the Performer's Royalty Bill. If ever enacted, this piece of legislation will mandate that all radio stations pay a royalty fee for every record played. It's dead for this session, but you can bet your transmitter that it will be re-introduced again next year. We need to impress upon our senators and representatives the severe inequities of this proposal.

At its most recent session, the Copyright Tribunal, which controls the distribution of cable royalty fees, did not include any allocation whatsoever for commercial radio. Radio broadcasters need to get moving on recommending some effective method for protecting radio's interest.

The deadline for offering your comments on proposed changes to the Federal EEO Proposed Model Program is October 24. Here is really a collision of conflicts to which you should respond regarding the reporting of applicant flow, hiring, recruitment, race, sex, job title and applicant disposition.

I believe that we'll see more new classes of FM stations and more low power TV and additional VHF

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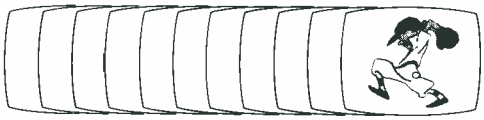

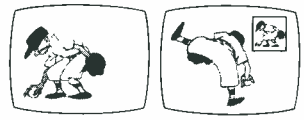

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Conflicts

stations. If the 1981 Region 2 WARC meeting goes badly for the US, many American border and coastal radio stations will experience serious interference from foreign station signals.

All around us, a varying collision of conflicts is occurring which is forcing a restructuring of our industry from a technological standpoint and distorting the competitive marketplace.

One of the conflicts which we face is the collision between the good which can rise out of the technological advances and the constraints which may be put upon those advances by the legions of bureaucrats in Washington. I have the feeling that never before have so few—the bureaucrats—denied so much to so many.

As technology improves our ability to communicate with people, those people's right to know, and their freedom to choose, is under attack. It's nothing new—it's old as tyranny. But what good will the introduction of all these exciting technical additions to our communications tools be if our use of them is prohibited?

I'm sure that many of you are close followers of developments in cable, pay-cable, satellite, radio satellite networks, super stations, video recorders, videodiscs, home communication centers and more. It's inevitable that technology and audience demand will create new entertainment and information habits that will pre-empt some segments of present-day mass audiences. The debate as to how deep this erosion will be still is very much unresolved.

The arrival of these media is well-timed to retrofit with changing work and leisure patterns. We can expect more serial careers, more serial marriages, more working couples, more two-job workers, more earlier and later retirements and more seven-day operations of efficient plans.

It's widely expected that our present day mass TV and radio audiences will be drastically reduced or fragmented. Others, equally intelligent, do not expect a significant reduction. Again, a collision of conflicts.

I can't predict what will happen, but experience shows that technological progress or change which is desired by the consumer always comes faster than anyone predicts. Experience also shows that the arrival just adds another exciting dimension to what we already have.

Opportunity knocks

But with whatever speed with which the new communications services arrive, we can be confident that we—and especially those of us in radio—will have more opportunities than discouragements if we but seize upon those opportunities.

To me, the real question is not about the fact of the arrival of the changing technology; rather, it's how advertisers and marketers will find their place in it and how we, as broadcasters, will move to accommodate those marketers and advertisers and take full advantage of the opportunities which will lie before us.

1979 was radio's biggest year, with revenues going over the three billion dollar mark for the first time. Network revenues were up 32%. I believe that radio networks will continue to grow on a solid base in the '80s, fueled by the search by marketers and advertisers for alternative and effective media. I think the established networks will step up their introductions of "mini" networks directed to specific demographic segments such as The

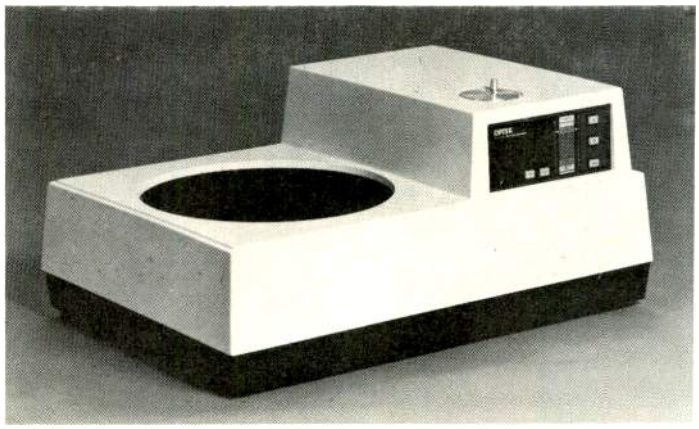
the
OPTEK 8000 Bulk Tape Degausser...
kiss the noise goodbye!

Signal and noise are gone. Wiped Clean. Even today's high density tape is no match for the new OPTEK 8000...the most powerful bulk tape recovery system available today. Fully automatic, hands-off operation provides fast—reliable signal erasure.

High performance "E" core coils virtually strip recorded material; with minimum heat, in less than 32 seconds. The 8000 does all the work...you load the tape, reels up to 16" diameter—¼" to 2" widths, set the coils and push the start button. That's it.

Design features include: high quality Bodine drive motor, total solid-state control logic (C-MOS), resonant coil technology, sturdy cast aluminum chassis and hi-tech style fiberglass cabinet.

If you're in the market for a quality conscious, cost efficient degaussing system that delivers recording tape that doesn't talk back...there's not another machine available today that can match the 8000's performance.



For complete technical information and the name of your nearest OPTEK distributor call or write: Mr. Eloy G. Chairez
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Conflicts

Source, Mutual's *Sports* and the *CBS Information Network*. Advertisers and marketers will need custom-made network programs, and there will be increasing pressures on the industry 'to meet those needs'.

Recession re-teaches resourcefulness, and big advertisers are getting on the radio bandwagon. They are re-learning what you and I have known for years—that radio is a strong, effective, inexpensive medium, and that radio is the most undersold and underbought medium of all. Back are Gillette, Campbell Soups, Upjohn, State Farm Insurance, Tru-Value Hardware and others who are taking a multiple network approach. They're back because of network radio's low CPM, because of an opportunity to protect against ad clutter and because of their ability to build sponsor identification with quality programs and radio's ability to communicate with people.

Industry and personal challenges

The collision between our fantastic technological ability to communicate with people and government's ideological urge to contain, restrain and manage news, information and entertainment is surely a central issue to our business. Our daily preoccupation with deadlines, research information, ascertainments, affirmative action programs, the general order of our public file and the next ARB leave us little time to thoughtfully confront this issue; yet we must. I have developed some challenges for myself which I would like to leave you with because they seem relevant during this time of contradictions.

My first challenge is for us to think deeply about, and to understand clearly, the business we are in. To say this to an audience of experienced radio broadcasters is presumptuous...and yet, I wonder how many of us think deeply about this business...and how many of us really know its essence.

To understand something is to know about it, to perceive its real meaning, to grasp its significance and its importance. Understanding is logical power. To understand advertising and its relationship to broadcasting then, is to perceive the meaning of both, and to grasp their influence.

What do we really do? We seek to persuade. We operate in a competitive marketplace. We thrive only where there are goods and services to be advertised that will offer a better life for our listeners. When we focus on the social significance of what we do, we realize that we are important. We are influential. We offer people a choice whether it's in selection of a brand of soft drink, a choice between varying qualities or prices of merchandise or assistance in sorting out a political contest. We offer advertisers a choice as well... a choice of audiences to which their message is directed.

And that leads me to my second challenge which is a corollary of the first one: That second challenge is to practice our profession responsibly.

If radio broadcasting is an economic value which offers a service to the listener, then we have a lasting responsibility both to the advertiser and to the receiver of the message. Anything less is to demean the business and ourselves.

This implies more than just monitoring advertising messages for ethical standards; it includes everything we broadcast. It includes more than just ascribing to the letter of the law. It obliges us to respect both the message we convey and the person for whom that message is intended.

That means that we must take into account the traditions, social values, moral values and economic

ANOTHER NEW ROUTING SWITCHER CONTROLLER FROM UTAH SCIENTIFIC

CSP-100-E

Switching by source name, true matrix statusing, coax party line control, audio/video breakaway — all this from Utah Scientific in a 1¾" routing switcher control panel.

Utah Scientific's new CSP-100 panel in its **encoded** form permits your operator to address and status sources by their familiar name — VTR 7, CAM 3, etc. The panel connects to the matrix via a single coax party line while LEDs in the **Group** and **Units** button rows provide true audio and video statusing from refresh memory data. Separate audio and video buttons are provided for breakaway switching.

The CSP-100 joins a long line of routing switcher controls from Utah Scientific that all feature single coax control connection, true statusing, and breakaway switching, and that are human-engineered to minimize operator error.

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Circle (74) on Reply Card

situations of those with whom we communicate. Our freedom to communicate involves an obligation to serve rather than a license to exploit. It becomes even more important with deregulation of some sort apparently on the horizon.

Unlike the '70s, when programming innovation seemed to be less important than bottom line performance, today there seems to be a re-evaluation of that theory and a recognition that the product is of utmost importance. If you don't have good programming, your bottom line is in deep trouble.

Allied to that is the understanding that a radio station must be involved in its community and it must be able to reflect its community. A station and its staff must be in tune with what's going on and what's important in that community.

The owner and the station manager must get involved if the station is truly going to serve rather than exploit.

My third challenge is tell the world what kind of business radio broadcasting really is.

I have talked to Washington bureaucrats, distinguished diplomats and businessmen, learned economists, clergymen and students. I have been appalled at their ideas about business in general and about the business of radio broadcasting in particular. When was the last time you discussed your business with a college student? Brace yourself when you do.

A large percentage of the so-called thought leaders of this country do not understand radio broadcasting nor its actual function. You'd be surprised how many people in the advertising industry have no understanding of radio.

And why? Is it their fault? No. It's our fault for not having enough pride in our business to make others understand it and its rightful place in the world of news, entertainment, social attentiveness and radio's role as mover of the goods and services which are the output of American industry and ingenuity.

Broadcasting must perform responsibly. Our real test will come when and if the much talked about deregulation takes place. It's the old *promise versus performance* collision. We in the business have cried for years to let the marketplace regulate. We may have a chance to test that premise. It will be up to us, the leaders of the broadcasting industry, to make it happen.

My fourth challenge is fight for freedom of choice...freedom of choice for your listeners, for your advertisers and for yourselves—as broadcasters under the rights of the First Amendment.

We have to be in the forefront of the fight for the rights and freedoms of advertisers. Advertising, the very life blood of our industry, is becoming more and more restricted in this country. It is the right of an advertiser—but even more so the right of the consumer—to have advertising heard or seen.

Advertising, properly executed, is the most reliable source of product and service information on which the consumer bases his decisions to buy or not to buy. When that information is restricted or cut off, the consumer is the first one who is hurt. The advertiser is the next one who is hurt, then the broadcaster.

Free enterprise

My fifth and final challenge is perhaps the most important to me,

- Over 20,000 ITC cartridge machines purchased since 1969.
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personally. And that is the challenge of doing something constructive to preserve our free enterprise system. For just a moment, I would like to lay a pitch on you. I want to sell you an idea, an idea that directly affects our business. The idea is not broadcasting nor advertising, but rather it is the garden in which the flower of our business blooms—our American free enterprise, or free market, system.

Despite all its flaws, despite some of the problems which are inherent in a free market system—it is still the best system of commerce and business in the world.

My idea, the one which I hope you will buy, is that our system needs some caretakers; someone—lots of someones—who will work to see that it's perserved and that it continues to flourish.

If for no other reason than self preservation—that enlightened self-interest—I urge you, everyone of you, to step forward in defense of free enterprise and the free market system.

It's tempting—always tempting—to turn to the government to solve our problems. But to do that is counter-productive and destructive to a free market.

I urge you to defend our industry when it needs defending; and to criticize it when it needs criticism. I urge you to defend our system when it needs defending, and to criticize it when it needs criticizing. And I urge you to make it known in every sphere of influence where you have contact that our system does work. Help your associates. Your clients and your listeners understand that a free marketplace is the best regulator and works most effectively for the consumer.

Help your colleagues understand that when economic freedoms are withdrawn,—as is happening more and more every day as government inserts itself into our business and personal lives—that when economic freedoms are withdrawn, personal freedoms soon follow. Help them to understand that who ever would exchange his personal freedoms for government—guaranteed economic security will have neither freedom nor security.

If nothing else, our industry, broadcasting, is a marketplace of ideas: political ideas, social ideas, ideas for self-improvement, ideas for eating, for recreation, for profit, for human betterment, personal betterment or self-regeneration. And the list of ideas which populate that marketplace goes on and on.

But when unwarranted restrictions are placed upon that marketplace of ideas, every American loses access to information which helps him or her make better choices, freer choices and better informed judgments. If you have no other reason to stand up for free enterprise, may I suggest that your defense of freedom in the marketplace of ideas is sufficient.

When that marketplace is compromised, restricted, narrowed or diminished, we can clearly identify the shape and name of two greater losses which will soon occur. The lesser of them is democracy and the greater of them is liberty.

I thank you for the opportunity to visit with you today. I ask only one thing—and that is that you will do everything you can to help preserve our free enterprise system as it endures a collision of conflicts in the '80s.

I happen to believe that the free enterprise system is the 8th wonder of the world...but the misunderstanding of it is the 9th wonder. □

videotape editing system

VANGUARD

by datatron, inc.

SMPTE Editing for 3/4" U-Matic 1" Type C 2" Quads

DATATRON INTRODUCES VANGUARD, A TOTALLY NEW GENERATION OF VIDEOTAPE EDITOR DESIGNED TO GET THE MOST OUT OF THE NEW GENERATION OF VERSATILE TYPE—C VTRs.

Vanguard is the most exciting development in SMPTE videotape editing since the introduction of the Type-C format.

The excitement begins the moment you sit down at the dedicated-function, color coded keyboard with its superbly organized interactive CRT display. From this position, you've got full control over five VTRs and a switcher. VTR motion control is effortless and precise; dual Varascan™ controls allow you to utilize the shuttle capabilities of Type-C VTRs to their fullest — — on two VTRs at once.

You can enter edit and split times on-the-fly or manually. You can perform cues, previews, edits, all automatically. You can even perform A/B/C/D sync'd roll edits involving up to four sources.

But that's just the start; Vanguard lets you set your own preroll and postroll times. It provides variable operator reaction time compensation. The edit list memory can store up to 999 edit events — — enough for even your longest editing sessions. And powerful, easy-to-understand edit list management lets you modify the edit list any way you choose.

Auto assembly from up to four sources is standard, as are paper tape edit list input/output, teletype edit list printout, and scrolled CRT edit list output. And if you wish, floppy disk is available.

It's all here, and at a price that's about half of what you'd pay for just one Type-C VTR with TBC.

And, just in case you're not ready to convert to Type-C, it will probably come as no surprise that Vanguard also interfaces to more than 35 other makes and models of decks, including quads, 3/4 inch cassettes, 1" Type-A/B, multi-track audio recorders, and the Rank Cintel scanner.

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new products

Video delay trimmers

Allen Avionics has introduced the VAR Delay Trimmers. The units permit an infinitely small delay adjustment, according to the manufacturer. The units can be used as delay trimmers alone, or in conjunction with any of the other Allen Avionics delay boxes from dc to 5.5MHz.

Circle (175) on Reply Card

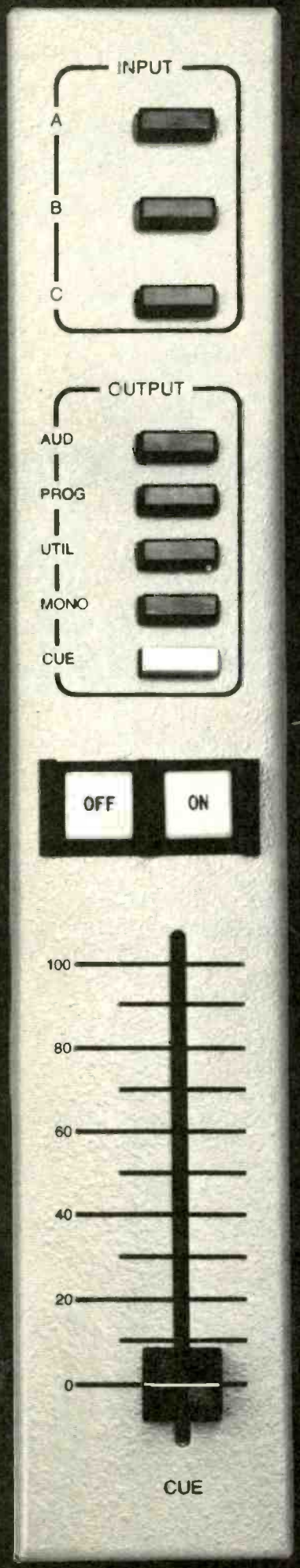
Videocassette recorder

The CR-8200U from **US JVC** is a professional videocassette recorder called The Tapehandler. It has direct-drive head drum and capstan, as well as direct-drive reel motors on the reel servo system. This results in stable tape movement at any speed. Luminance jitter is rated at less than plus/minus 5μs.

Circle (176) on Reply Card

Computer diagnostic service

Quikserv, a new high-speed computer diagnostic capability, has been announced by **Station Business Systems**. The capability will be provided with all new installations, and many existing ones, according to the company. With Quikserv, Station Business Systems computers will actually *talk* to customer computers over telephone lines whenever a problem occurs, and the service computer will repair the prob-



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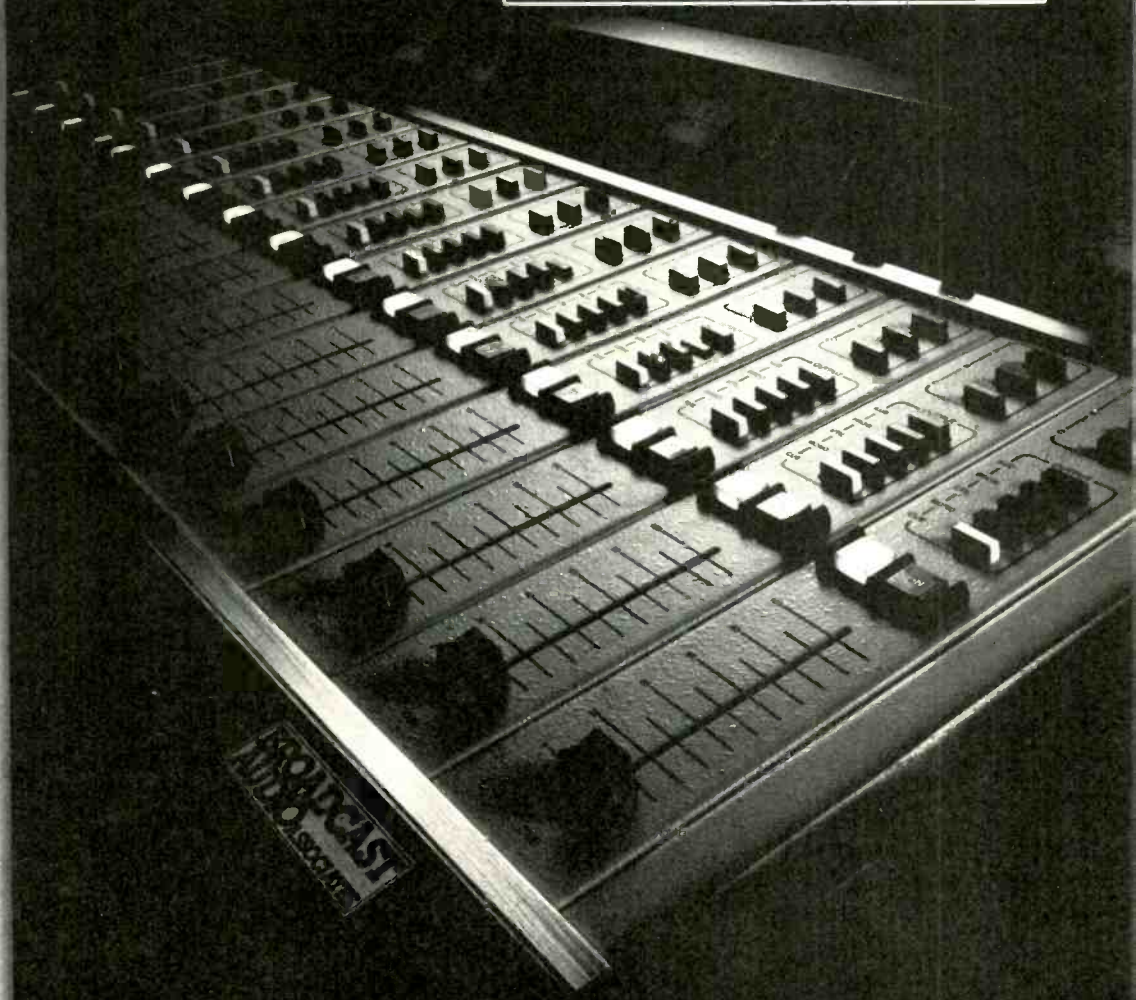


11355 Pyrites Way Rancho Cordova, CA 95670 (916) 635-1048

Circle (82) on Reply Card

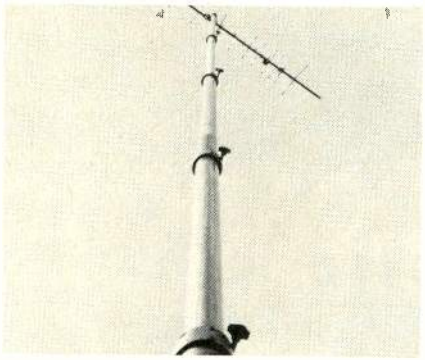
New products

lem in the system at the customer location.

Circle (177) on Reply Card

Telescopic mast

Allen Osborne Associates is distributing a pneumatically erected telescopic mast made by **Hilomast, Ltd.** The masts come in heights ranging from 5.5 to 13 feet retracted to 20 to 70 feet extended, respectively. They are designed for vehicle installation or ground mounting and



can be operated by a standard vehicle foot pump or a small air compressor.

Circle (178) on Reply Card

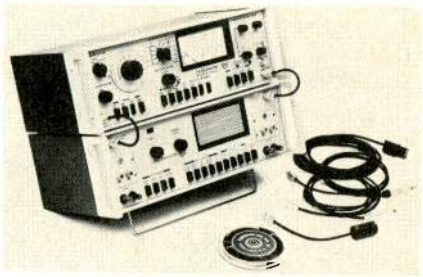
Battery pack

Kapco Communications battery pack weighs only six pounds and is 4"x8". It is fully self-contained and operates over a temperature range of -40F to +150F. It is rated at 5A hours at the 500mA rate of discharge. It charges fast and a standard cigarette-type plug is used for connection.

Circle (179) on Reply Card

Test set

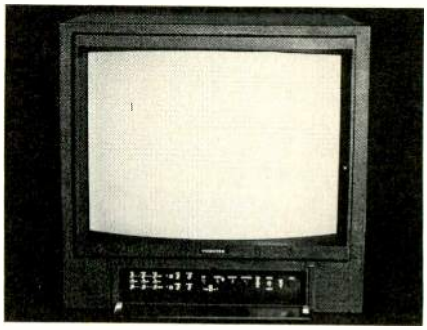
The Ferrograph Audio Test Set RTS 2 from **Neal-Ferrograph** cuts the time needed to test all types of audio equipment by up to 30%, according to the manufacturer. When used in conjunction with the Auxiliary Test Unit ATU 1, from the company, it speeds and simplifies measurements made on the RTS 2. The provision of balanced connections on the ATU 1 allows mixers, studio amplifiers, reverberation systems and equalizers to be tested to international specifications.



Circle (180) on Reply Card

Color monitor

Videotek has introduced the VM-26P 26 inch (diagonal) color monitor. All metal construction and profes-



New products

sional design make this an excellent monitor for studio and newsroom sets. Standard features include A-B inputs, internal-external sync, RGB gun switches, RGB background and drive controls, raster size regulation, dc restoration, keyed back porch clamping, dynamic focusing, velocity beam modulation for improved resolution, and internal preset adjustments for chroma, hue, brightness, and contrast.

Circle (181) on Reply Card

Wireless microphones

Nady Systems has announced a new design for its VHF hand-held wireless microphones. These mics are now being factory-stocked with

Electro-Voice 1776 mic heads. This popular cardoid microphone head is permanently attached to the Nady VHF transmitter and results in a sturdy, one-piece unit.

Circle (182) on Reply Card

Gain reduction amplifier

Modular Audio Products has introduced the model 3320 gain reduction amplifier. The 3320 has only one operating control, *Range Reduction*, calibrated in dB. A 10 segment LED array monitors the instantaneous gain reduction in dB. A preset Input

level or threshold control, a preset Output level control and an In switch with LED indication are the remaining front panel controls.

Circle (183) on Reply Card

Headphones

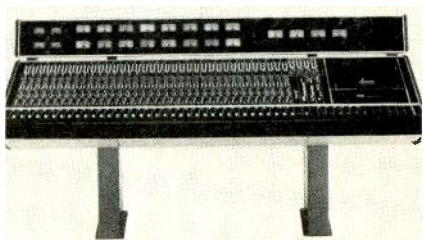
Designed for wearing comfort without sacrificing sound reproduction, **Sony's** MDR series lightweight stereo headphones are based on the design of the MDR-3s. The MDR-2, MDR-5a and MDR-7 have a small diaphragm with the ability to achieve a sound pressure equal to

much larger units. This complex high excursion diaphragm permits the MDR headphones to deliver a remarkable amount of sound with very little power. One advantage of this design is that the MDR headphones can be used with lower output portables and cassette decks, according to the manufacturer.

Circle (184) on Reply Card

Audio mixing console

Auditronics has introduced the model 720 audio console that contains 24 VU meters that indicate all the console program outputs. The mainframe also contains a modular plug-in jack bay with 432 jacks. The unit is a 36-in 16-out console with four effects outputs, two foldback outputs, stereo lift and right outputs, two mono outputs, stereo control room and studio monitor outputs.



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business news

Convergence editors used at convention

The Convergence Corporation announced that ABC Network News in New York used Convergence editing systems in its television coverage of the Democratic National Convention in New York City, August 11-14. ABC also used Convergence editing systems for its coverage of the Republication Convention. Eighteen systems were used in Detroit for pre-convention activity coverage as well as for the main convention coverage.

Sony wireless mic at political conventions

Sony Industries' Professional Audio Division sold 10 wireless microphone systems to ABC-TV for use at the Republican National Convention in Detroit (July 11-14). They were also used at the Democratic National Convention in New York City (August 11-14).

For more information about coverage of the national political conventions, see the story on page 22.

Loudspeaker test technique

Celestion Industries, British loudspeaker manufacturer, announced its development of a new speaker measurement technique that reveals the precise motion of a loudspeaker diaphragm as it is driven by test or music signals.

By scanning a laser beam across the surface of the moving diaphragm, in a process called "interferometry," Celestion's new test detects the velocity and position of all points on the diaphragm surface. Subsequent digital processing yields a plot showing precise vibrational modes of the loudspeaker under test. Resolution capability of the system ranges from the minute vibration of a tweeter in its upper range to the lengthy excursions of a woofer or subwoofer.

Sample plots show an 8-inch woofer at 60Hz, clearly revealing the effect of the neoprene surround, and a 1-inch hard dome tweeter at 14.2kHz, making breakup clearly visible.

New Arriflex headquarters

Arriflex has announced the opening of its new corporate headquarters in Rockland County, NY. The new building is designed to accommodate its increased sales and maintenance services. In addition to the Arriflex 16 and 35mm camera lines, the expanding range of products now includes Sachtler film and video camera support equipment and ARRI HMI lighting equipment.

Record incoming order month for ADDA

Record incoming orders of more than $1,000,000 for the month of August were reported by ADDA Corporation. The $1,000,000 month, which represents the largest in the company's history, included substantial numbers of both VW-1 and VW-2 time base correctors/frame synchronizers, as well as ESP digital still store systems.

Grand opening

Audiotronics Video Display Division employees and invited guests gathered at the entrance of Audiotronics new 100,000-square-foot building in Spring Lake Park, MN, for official ribbon-cutting and flag-raising ceremonies. Officiating at the event was Don E. Warner, president and chairman of Audiotronics who visited from the company's North Hollywood, CA, corporate headquarters.

Datatron reports annual sales and earnings figures

Datatron reported its net income for the fiscal year ended June 30, 1980, as the largest in six years. Sales for fiscal 1980 were $6,312,439 against $5,058,810 for fiscal 1979. Net income was $574,046 compared to $231,108 at June 30, 1979.

Amtel Systems formed

J. Peter McDonnel, president, has

announced the formation of a new company, Amtel Systems, Inc. Amtel will manufacture, distribute and act as manufacturers representative for several product lines through an established national distributor base.

Amtel corporate headquarters, located at 11001 Donietta Drive, Huntsville, AL, will be the center for all administration, finance, inventory, shipping and handling, and southern regional sales for the company. Simultaneously, northern regional sales, service, marketing and advertising will be accomplished through a second office established at 101 Pine Mill Circle, Doylestown, PA.

In addition to manufacturing the Visa-20, a vertical interval sync alignment generator, Amtel will act as exclusive representative for Dynaquip Electron Devices Ltd., an established manufacturer of microprocessor based products, throughout the domestic United States and Central and South America.

Name change

Ronald D. Kindwall has announced that Van Ladder, Inc. has changed its name to Kindwall Corporation. The change is effective immediately. According to Kindwall, the Spencer, IA, company was originally formed to produce and sell an all-electric aerial ladder for use on service vans. "Since then, we've created and added other products which are not adequately described by the name Van Ladder," Kindwall stated. "The corporate name was changed to Kindwall Corporation in order to remove this confusion."

Wireless mic used

The Sony wireless mic system was used for the Jerry Lewis Muscular Dystrophy Telethon. Nick Morris, general manager of Sony's Professional Audio Division, remarked that the telethon project was very important to Sony. "It represents the most extensive use of the Sony wireless system to date. The unit's sound quality and reliable performance last year led to its greatly expanded use at this year's Telethon."

The Sony wireless mic system, which consists of microphones, tuners, antennas and diversity units, was selected for use on the telethon by sound engineer Pete SanFilipo of Western Media Entertainment.

The wireless system setup employed the following Sony equipment: six WRT-57 UHF microphones, two receiving systems composed of a pair of WRR-57 UHF tuners and a

Business news

WRR-55 VHF/UHF diversity unit housed in a PB-53 portable base, and four WRR-27 portable UHF tuners. Each of the diversity receiving systems used two AN-57 ground plane antennas while the WRR-27 units were used with their supplied antennas. The wireless systems operated in a completely trouble-free manner during the entire broadcast.

Burns Audiotronics changes company name

Burns Audiotronics, Inc. has announced that its corporate name has been changed to Beyer Dynamic, Inc. In making the announcement, Norm Wieland, the company's national sales manager, said, "Burns has been the exclusive distributor of Beyer Products in the US for some time. The change in name makes good marketing sense and is consistant with Beyer's worldwide sales policies." The address of the company remains 5-05 Burns Avenue, Hicksville, NY 11801.

Architect chosen

New York architect Richard B. Dempsey has been commissioned by Metromedia, Inc. to design the new offices of their Television Home Office Division in Secaucus, NJ. He has also been commissioned by Westinghouse Broadcasting Corporation to design the lobby/entrance area of their corporate headquarters in New York City. Both projects are underway and will be completed by the end of this year.

CBS Video Enterprises establishes new offices

Effective October 6, CBS Video Enterprises established new offices at 1700 Broadway, 35th Floor, New York, NY 10019. Phone numbers for Cy Leslie, president, CVE and his staff will remain the same.

Microdyne/AFC complete merger

The stockholders of Antennas For Communications (AFC) approved the acquisition of AFC by Microdyne Corporation in an exchange of .875 shares of Microdyne for each share of AFC. The effective date of the merger was April 16, 1980. AFC will continue its operations as a wholly owned subsidiary of Microdyne.

Howard H. Hubbard and Steven Galagan, officers of AFC were elected to the board of directors of Microdyne.

Thomson-CSF

Thomson-CSF has moved their agency and their marketing offices to the West Coast from the New York territory. The new agency is Jansen & Associates, 16812 Red Hill, Irvine, CA 92814.

meetings, events, & seminars

November 9-14—The Society of Motion Picture & Television Engineers' 122nd Technical Conference and Equipment Exhibit will be held at the Hilton Hotel in New York City.

November 14-16—Loyola University's 11th National Radio Conference will be held at the Hyatt Regency Hotel in Chicago. For information write: 820 N. Michigan Ave., Chicago, IL 60611, (312) 565-1000. □

professional services

advertisers index

Professional Services (Cont.)

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HELP WANTED

NEW YORK BASED DISTRIBUTOR with some new and exciting lines of camera tubes and components for broadcast and CATV markets wants knowledgeable reps who can devote the time required to promote us. Up to 10% commissions on sales. All serious replies answered immediately. State areas you cover, background, etc. Write Dept. 520, Broadcast Engineering, P.O. Box 12901, Overland Park, KS 66212. 11-80-1t

ASST CHIEF for January 1981 hire. Good maintenance experience required, preferably with RCA cameras and videotape machines. Must have management potential. Competitive salary with benefits. Send resume to: WEVU-TV, P.O. Box 6277, Fort Myers, FL 33901. Equal Opportunity Employer. 11-80-3t

VIDEO OPERATOR: experienced on TK-44 cameras, able to set up, operate and assist with maintenance. Experience in TV broadcast; or video production studio preferred. Contact Chief Engineer WYAH-TV CBN in Portsmouth, Virginia ...an Equal Opportunity Employer. 11-80-1t

TELEVISION TECHNICAL DIRECTOR: Immediate opening—minimum 3 years experience in Production Video Switching/Time Code Editing. TR/AE600 equipment. Salary commensurate with experience. Top $439/week. Send resume today to: KCMO TV, 4500 Johnson Drive, Fairway, Kansas 66205, (913) 677-7252. Attn.: Jack E. McKain, Director of Engineering. EOE. 11-80-1t

TECHNICAL MAINTENANCE STAFF

Recent business growth has created the need for additional staff in our Engineering Department. As a Southern California based, high technology company, we can provide challenging work, excellent work environment, a competitive salary and fine benefits package.

Current openings available:

TAPE FILM MAINTENANCE ENGINEER

Repair and maintenance of 3M Electron Beam Recorders and state of the art digital video equipment. Min. BA in Electronics, working knowledge of physics and vacuum electron optics.

V T MAINTENANCE ENGINEER

Maintenance of VPR-2, AVR-1, Helical U-Matic, VCR's and Time Base Correctors. Working knowledge of video and audio techniques. Min. 2-3 yrs. working experience.

HELICAL VCR MAINTENANCE

Reapir and adjustment of Sony, JVC, Panasonic VCR's. Recent working experience with repair and calibration of Helical VCR's. Min. 1 yr.

TELECINE MAINTENANCE

Minimum 1-2 years maintenance experience on rank flying Spot Scanner.

Qualified applicants please send resume with salary requirements to:
IMAGE TRANSFORM
Personnel Department
P.O. Box 7760
Burbank, CA 91505
Equal Opportunity Employer M F.

HELP WANTED (CONT.)

SATELLITE EARTH STATIONS TELEVISION TECHNICIANS

Wold Communications, a common carrier specializing in satellite transmission for television and radio broadcasters is accepting applications from qualified professionals to fill positions in New York City, Los Angeles, and the Washington, D.C. area. Earth Station and TV Technicians for Wold's transportable and fixed earth stations and operating centers are needed. Travel is required for some positions. Successful applicants will have experience in communications, maintaining baseband and R.F. equipment, and will hold FCC First Class License. Experience with earth station technology desirable. Salary commensurate with qualifications. Send resume and salary requirements to W. Mark McKibben, Director of Engineering:

WOLD COMMUNICATIONS
8150 Leesburg Pike
Vienna, VA 22180
(703) 442-8550
Equal Opportunity Employer

NETWORK PRODUCTION: Evangelical Christian Ministry seeks qualified applicants for the following positions: **Videotape Operators**—Minimum 3 years experience TR 70C, TR 600 and VPR 2, studio recording, editing and dupeing. 2nd and 3rd shift openings. **Videotape Editors**—Minimum 2 years experience CMX 340X, CPR 2. 2nd shift openings. **Television Directors**—10 years experience in TV Production with minimum 5 years as director or A.D. **Unit Managers**—Minimum 5 years experience in TV production in varied responsible positions. If you are qualified and have a desire to serve, please apply: CBN Personnel, CBN Center, Virginia Beach, VA 23463. CBN is an Equal Opportunity Employer.
11-80-1t

SHARE THE ADVANTAGES OF BEING WITH THE LEADER IN THE BROADCASTING INDUSTRY

Harris has excellent opportunities for professional sales personnel in TV and Radio Sales as:

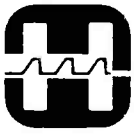
SALES SPECIALISTS
PRODUCT MARKETING MANAGERS
DISTRICT SALES MANAGERS

In the constantly expanding broadcast equipment industry, the Broadcast Products Division of Harris holds a dominant position. You can benefit not only from our impressive division growth but also from the fact that Harris is a leader in state-of-the-art technology and plans to stay in the lead.

Due to our continued impressive growth, several new positions are presently open for District Sales Managers which have outstanding compensation potential. Also openings presently exist at our Quincy, Illinois headquarters for Sales Trainees and Product Marketing Managers.

Those individuals in the Broadcast Industry who have a sales or marketing background and technical experience with Broadcast Transmitters, Program Automation, Antennas, and Studio Equipment are challenged to come join the leader. HARRIS!

Please send resume in confidence to Gary Schell, Professional Recruiter, Harris Corporation, Broadcast Products Division, P.O. Box 4290, Quincy, Illinois 62301 or call 217-222-8200.



HARRIS
COMMUNICATION AND INFORMATION PROCESSING

An Equal Opportunity Employer—Male and Female

HELP WANTED (CONT.)

Electronic Technician

OMS, Inc., a subsidiary of RCA, has an immediate opening for an Electronic Technician. Must be able to repair, maintain, and install TV Broadcast equipment; recommend design options; and prepare engineering change proposals for military customer. Must also be able to install cables and wiring and integrate electrical equipment. Must know wiring diagrams, wire lists, and work from engineering drawings. These position assignments are located at Patuxent River Naval Air Station, MD on the Chesapeake Bay

Please send your resume and salary requirements to:

Mr. W. Strayer
RCA Service Company
5260 Port Royal Road
Springfield, VA 22151

Or call Mr. Strayer at **(703) 321-8900**, weekdays.

RCA/OMS, INC.

A Tradition On The Move!

Equal Opportunity Employer

VIDEO TAPE EDITOR. Minimum three years experience, operation and maintenance. Send resume to the Personnel Director Broadcasting, P.O. Box 100, Nashville, Tennessee 37202. An Equal Opportunity Employer. 11-80-2t

TV MAINTENANCE TECHNICIAN: Assists in installation, maintenance and repair of equipment used in video/audio productions and distribution. Two years skilled and technical experience in the operation, installation, maintenance, repair and modification of video broadcast and sub-broadcast TV equipment, preferably in a TV studio or other production facility. FCC license and TV broadcast experience preferred. Salary: $1611-1939 mo. Send resume by 11/28/80 to Personnel & Employee Relations, California State University, Northridge, 18111 Nordhoff St., Northridge, CA 91330. An Equal Opportunity, Affirmative Action, Title IX Section 504 Employer. 11-80-1t

GROWING, PROGRESSIVE TV in beautiful desert southwest seeks Assistant Chief Engineer. Salary commensurate with experience. Send resume to: Chief Engineer, KYEL-TV, Box 592, Yuma, Az. 85364 or call Frank Etherington 602-782-5113. We are an Equal Opportunity Employer. 11-80-1t

EXPERIENCED MAINTENANCE ENGINEERS: AM, FM, TV and translator. First Class FCC required. Send resume to: A. L. Ladage, XYZ Television Inc., P.O. Box 789, Grand Junction, Co. 81502. (303) 242-5000. 11-80-2t

SYSTEMS/PROJECT ENGINEER—We are a high technology electronics manufacturing systems and service company providing quality audio and video equipment for the broadcast industry. We are currently seeking candidates with 3-10 yrs. exp. in fixed and/or mobile electronic broadcast systems who will participate in equipment development from concept through installation and final testing. A desirable requisite is at least 2 yrs. electronical education or a BS degree. Qualified applicants, please send resume and salary requirements to: Corporate Recruiter, P.O. Box 7760, Burbank, CA 91505. 10-80-2t

HELP WANTED (CONT.)

ENGINEERING POSITIONS

We specialize in the placement of TV and Radio Engineers with Broadcast Stations, Manufacturers, Industrial TV, Production Facilities and Dealers; all levels, positions and locations nationwide. Professional, confidential - no fee. Best Industry reputation - over 1000 client contacts. To discuss your employment possibilities phone Alan Kornish at (717)287-9635 or send your resume' now. Employer inquiries invited.

KEY systems

NEW BRIDGE CENTER, KINGSTON, PA. 18704

CHIEF ENGINEER: with automation experience and good maintenance habits who keeps orderly records. Call WCCF/WQLM, Punta Gorda, Florida. EEO Employer. 813-639-1188. 10-80-2t

THE REX HUMBARD MINISTRY has immediate openings for experienced video operator/engineer and videotape maintenance engineer with experience on late model RCA. Please send resume with salary history to T. Holleron, 2690 State Road, Cuyahoga Falls, Ohio 44223. 10-80-2t

TELEVISION ENGINEER: Staff engineer for new PBS station operating on Channel 6. Installation, bench repair and some master control operation. First class FCC license required. Contact Personnel Office for application. Call John Bradley 816-429-4127 for information regarding qualifications. Centra Missouri State University is an Equal Opportunity, Affirmative Action Employer. 10-80-2t

Field Service Engineers

The Grass Valley Group, Inc. a leading manufacturer of television broadcast equipment, is looking for people who want challenging professional positions PLUS the added attraction of working in a small town nestled in the Sierra foothills.

These challenging positions combine chances for U.S. travel plus marketing and engineering career opportunities. Individuals with experience designing and/or maintaining television broadcast systems are required to provide after-sales support for our wide variety of complex systems.

Interested and qualified candidates are invited to send a resume in confidence to Sylvia Smith, The Grass Valley Group, Inc, P.O. Box 114, Grass Valley, CA 95945. An Equal Opportunity Employer M/F/H.

The Grass Valley Group

A Tektronix Company

HELP WANTED (CONT.)

LOOKING FOR GOOD ASSISTANT chief engineer, familiar with RCA transmitter—TR 600, TK 630 Sony, Phillips engineer. Contact: Jim Robinson/WECA-TV, 904-893-3127. 6-80-tfn

TELEVISION HELP WANTED—TECHNICAL: $40,000+ FIRST YEAR GUARANTEED. Our company has grown so quickly in the past 5 years, we are in desperate need of a very special person who knows broadcast equipment intimmately and has aggressive sales ability. We are diversifying into other areas and need someone to take over the equipment sales division. Responsibilities include sales of new and used broadcast equipment and further development of equipment sales division as business demands. We are a first rate company and believe in paying top dollar for the right person. Call Bill Kitchen, Quality Media Corp., (800) 241-7878. 9-80-TFN

ENGINEERS, TV Systems Engineers, Electronic Technicians, Technical Supervisors, Maintenance. Immediate openings. Experienced. Full time, Full benefits, plus Pension. Excellent Salary plus commissions. Send resume to Technical Operations, Inc., P.O. Box 840, New Hyde Park, N.Y. 11040, or call Personnel Mgr. (516) 352-2238. 9-80-tfn

TELEVISION ENGINEERS: Television Engineers needed for expanding production facility. Must have 5 years experience in Video, Audio, or Videotape maintenance and/or operation. Send resume to Personnel Dept., Oral Roberts Evangelistic Association, P.O. Box 2187, Tulsa, OK 74171. 10-80-2t

MAINTENANCE ENGINEER needed for 5Kw AM, Class A automated FM in midwest small market. Good salary, equipment, working conditions. Send resume, references, and salary requirements to Broadcast Engineering, Dept. 518, P.O. Box 12901, Overland Park, KS 66212. 10-80-2t

TELEVISION BROADCAST MAINTENANCE ENGINEER. Transmitter experience preferred. Salary negotiable. First Class License required. Call or write Chief Engineer, WMBB-TV, P.O. Box 1340, Panama City, FL 32401, (904) 769-2313. E.O.E. 10-60-3t

TELEVISION OPERATING ENGINEER for studio operations. Primary duties—quality control of signals and light duty maintenance. First Class License desired. Call or write Chief Engineer, WMBB-TV, P.O. Box 1340, Panama City, FL 32401, (904) 769-2313. E.O.E. 10-80-3t

WANTED

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

WANTED: Radio Transcriptions 16" E.T.'s, any Eddy Arnold, or other Country 16" or 12" Transcriptions. Will consider others. Interested in Radio Station Libraries to purchase, all speeds of records. Boyd Robeson, 2425 W. Maple, Wichita, Kansas 67213. (316) 942-3673, 722-7765 Eve. 9-80-tfn

******URGENTLY NEEDED****** 12AP4 (1803-P4) picture tubes and parts for R.C.A. TRK-12 antique television. Arnold Chase (203) 521-5280. 9-80-5t

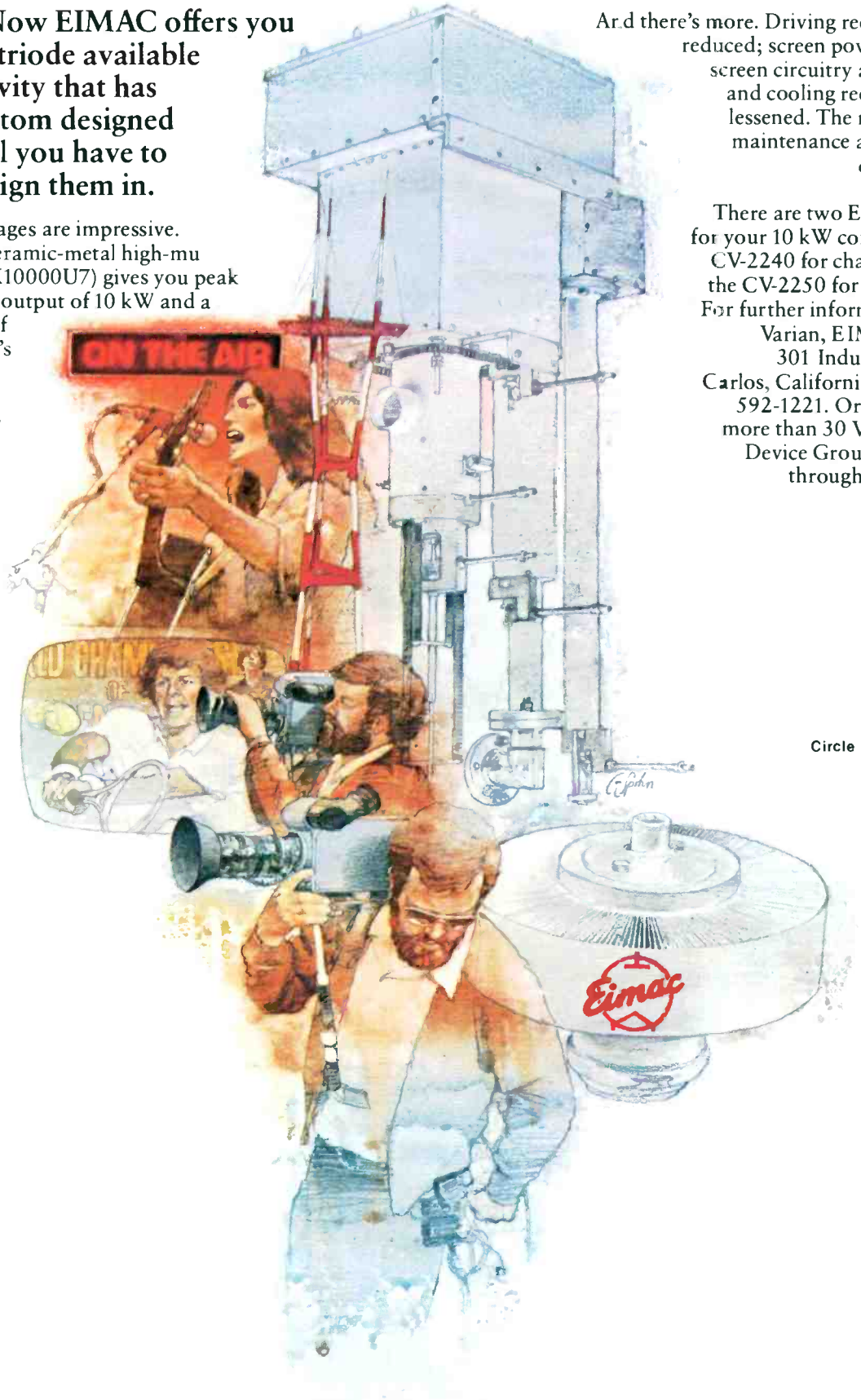
WANTED: Two Sony DXC-1200 cameras in top operating condition. Write J. Vaughn, AUDIOACTIVE INC., R 1, Hwy. 304W, Delaplaine, AR 72425. 10-80-3t

WANTED: Instruction manual (or copy) for Gates 1D transmitter. Call collect (813) 576-2234 10-80-1t

EIMAC's new high-mu triode/cavity combination. It takes the hassle out of 10 kW VHF transmitter design.

Relax. Now EIMAC offers you the best triode available and a cavity that has been custom designed for it. All you have to do is design them in.

The advantages are impressive. EIMAC's ceramic-metal high-mu triode (3CX10000U7) gives you peak sync power output of 10 kW and a stage gain of 14 dB. That's 2 dB more than with comparable tetrodes.



And there's more. Driving requirements are reduced; screen power supply and screen circuitry are eliminated; and cooling requirements are lessened. The result is ease of maintenance and substantial cost reduction.

There are two EIMAC cavities for your 10 kW combination, the CV-2240 for channels 2-6, and the CV-2250 for channels 7-13. For further information contact Varian, EIMAC Division, 301 Industrial Way, San Carlos, California 94070, (415) 592-1221. Or call any of the more than 30 Varian Electron Device Group Sales Offices throughout the world.

varian

Circle (2) on Reply Card

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A dazzling new performer has captured the spotlight in the sophisticated world of contemporary sound.

Reflecting industry demands for comprehensive facilities, and studio reproduction quality in a transportable console, Ward-Beck presents the WBS T1202.

Another classic example of Ward-Beck's flawless dedication to engineering excellence!

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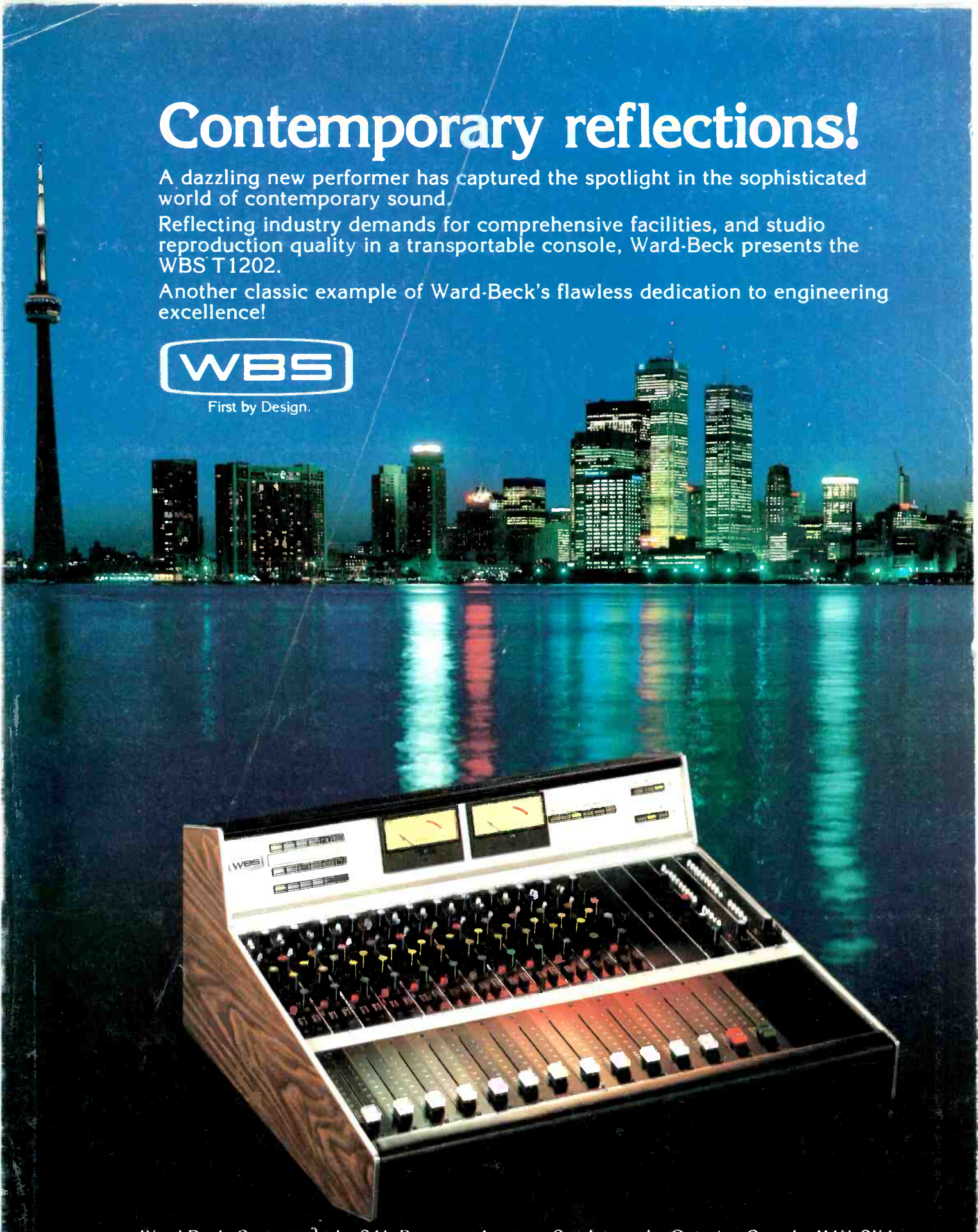
First by Design.



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

Ward-Beck Systems Inc., 6900 East Camelback Road, Suite 1010, Scottsdale, Arizona 85251.