

# BROADCAST<sup>®</sup> engineering

July 1981/\$3



**KCBS Electronic Newsroom**

**Edit Controller Roundup**

**Digital at KQED**

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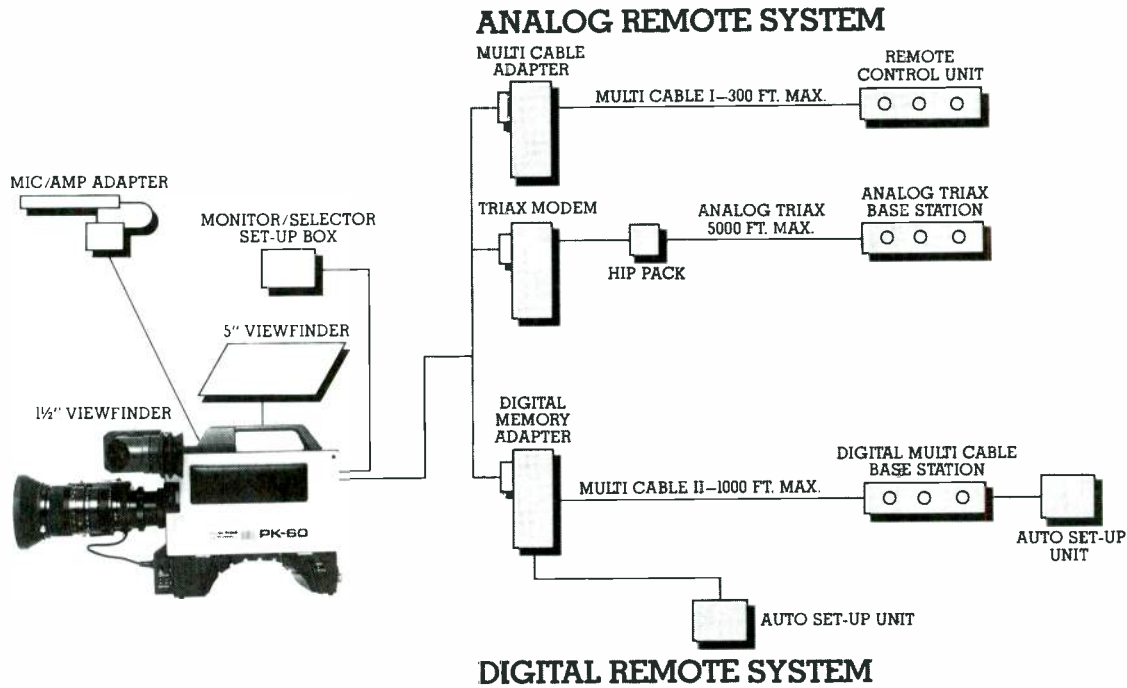
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Circle (2) on Reply Card

# BROADCAST engineering

The journal of broadcast technology

July 1981 □ Volume 23 □ No. 7

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## BROADCAST engineering

July 1981/53



KCBS Electronic Newsroom  
Edit Controller Roundup  
Digital at KQED

THE COVER this month shows members of the KCBS staff using their computerized newsroom system.

- A. Jim Cullen, editor, lines up his stories for an upcoming hour newscast.
- B. Larry Cooper (right), and Clancy Kasell discuss the program log.
- C. Two character sizes are available to suit the needs of the system operator.
- D. A desk assistant can assemble the latest updates and can route them to any terminal or booth with a simple command.
- E. Three members of the KCBS news staff at different stages in preparing their airstrips.

The complete story of this station's system is discussed in "KCBS: The electronic newsroom," on page 20.

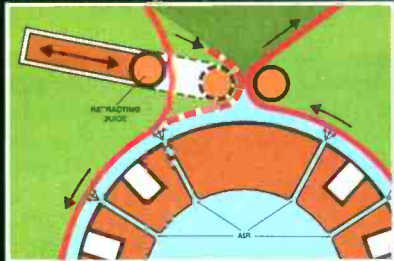
### NEXT MONTH

The August issue will be devoted to audio processing for radio and television. There will be a major, in-depth article on audio processing by Bob Orban of Orban Associates. An Equipment Round-up will provide thorough coverage of audio processors that are available. Also included will be a preview of the NRBA Convention scheduled for Hollywood, Florida.

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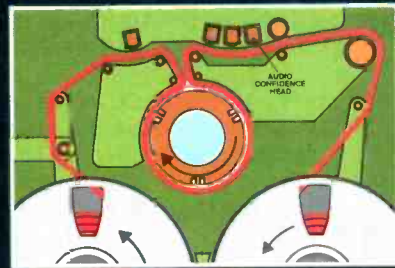
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# FCC update

July 1981



## FCC Chairman Mark S. Fowler

Mark S. Fowler was sworn in as a commissioner and assumed the chairmanship of the FCC Monday, May 18, in a ceremony performed by Judge Roger Robb of the US Court of Appeals for the District of Columbia Circuit.

Fowler was confirmed by the Senate May 14. President Reagan designated him chairman, to be effective as soon as he assumed office as a commissioner, at the time Fowler's nomination was sent to the Senate for confirmation.

Fowler was formerly a senior partner in the Washington, DC, communications law firm of Fowler & Meyers. He was legal counsel for communications to the Reagan for President Committee in 1979 and 1980 and the Reagan-Bush committees during the 1980 campaign, as well as the 1975-76 Reagan campaign committee. He headed the transition team that studied FCC operations after the election and also was co-director of the legal and administrative agencies transition group.

As chairman, he succeeds Commissioner Robert E. Lee, who was designated by the President April 13 to serve as chairman until Fowler took office.

Fowler had 10 years of experience in broadcasting before he began practicing law. While still in high school, at age 17, he worked as a part-time announcer, first at station WABR-AM, now WAJL, Winter Park, FL, and later at WHOO-AM-FM, Orlando. He entered the University of Florida, Gainesville, in 1959 and worked as an announcer at WDVH-AM there.

After graduating in 1963, he became a full-time announcer at WKEE-AM-FM, Huntington, WV. From 1964 to 1965, he worked as an announcer and full-time sales representative at WMEG-AM, now WMEL, Melbourne, FL. Entering the University of Florida College of Law in 1965, he rejoined WDVH as an announcer and later became a sales representative, program director and production manager. He received his law degree in 1969.

In 1970, he became an associate with the communications law firm of

Smith & Pepper in Washington. With David Meyers, he formed Fowler & Meyers in 1975.

Born in Toronto, Ontario, on October 6, 1941, Fowler had dual citizenship through his mother, a US citizen. He grew up in Orlando, FL, and at age 17 elected US citizenship, which then became retroactive to his birth.



Fowler

Fowler, following the swearing-in ceremony, named the following people to serve on his personal staff: Willard R. Nichols, *administrative assistant*; Lauren J. Belvin, *legal assistant*; Jerald N. Fritz, *special assistant*; and Edward J. Minkel, *special assistant for management*.

Nichols has served as chief of the FCC's Cable Television Bureau since May 1979. He joined the FCC in 1974 as an attorney-advisor in the Legislation Division of the Office of General Counsel. Between March and October 1977, he was special assistant to FCC Chairman Richard E. Wiley, and between October 1977 and June 1978, special assistant to FCC Chairman Charles D. Ferris. From June 1978 to January 1979, Nichols was in private practice with Kirkland and Ellis, a Washington, DC, law firm. In January 1979, he returned to the commission and served as legal assistant to the Chief of the Common Carrier Bureau. From September 1969 to July 1971, he served in the US Army.

Belvin has been legal assistant to the chief of the FCC Cable Television

Bureau since 1979. She joined the FCC in 1973, and worked in the Cable Television Bureau as a staff attorney in the Certificates of Compliance Division (1973-75) and as a staff attorney in the Policy Review and Development Division (1975-78). In 1978, Belvin became an attorney-advisor in the Legislation Division of the FCC Office of General Counsel, returning to the Cable Bureau in 1979.

Fritz has been associated with the Washington, DC, law firm of Pierson, Ball & Dowd since 1979. He also is an adjunct professor of communications law at George Mason University Law School. In 1975, Fritz served as legal clerk to FCC Commissioner Robert E. Lee, returning to the FCC in 1976 where he served as an attorney-advisor in the Broadcast Bureau's Renewal and Transfer and Hearing Divisions.

Minkel has served as the Deputy Division Chief of the National Oceanic and Atmospheric Administration, National Weather Service Communications Division since 1980. In 1976, he was the Chicago regional manager of the FCC's Safety and Special Radio Services Bureau (now Private Radio Bureau), being named head of that Bureau's Land Mobile Spectrum Management Division in 1977. A veteran of World War II, Korea and Vietnam, Minkel retired from the US Army Signal Corps in July 1976 with the rank of Colonel. He headed the Department of the Army Spectrum Management Division before his retirement.

## Station Totals

The commission has announced the following totals for broadcast stations:

	March 31 1980	March 31 1981
AM Radio	4558	4609
FM Radio	3168	3315
FM Ed.	1035	1096
UHF Comm. TV	229	239
VHF Comm. TV	517	522
UHF Ed. TV	162	162
VHF Ed. TV	105	106

## Broadcast Complaints

A total of 19,894 complaints from the public was received by the Broadcast Bureau in March 1981, a decrease of 2830 from February 1981. Other comments and inquiries of March totaled 953, a decrease of 1319 from the previous month. □

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**26 countries agree to videotext standards**

Following extensive discussions, the 26 member countries of the CEPT (European Conference on Posts and Telecommunications) have reached agreement on a unified approach to videotext (viewdata) standards.

The following is the text of a statement issued jointly by British Telecom, Direction General des Telecommunications and the Deutsche Bundespost, which represented British, French and German interests at the meeting.

"The Telecommunications Commission of the CEPT meeting in Innsbruck has agreed on a recommendation describing a unified standard for basic alpha-mosaic videotext. The existing European systems, namely the British Prestel system, the French Teletel system and the German Bildschirmtext system, have been merged into a single standard which incorporates the advantages of each of them. The new system has a high degree of compatibility with these existing systems and incorporates features which enhance the behavior of these systems. This result, which is the culmination of technical discussions over a period of three years, especially in CEPT, is a major achievement for European cooperation."

The two internationally recognized viewdata display systems in current usage are termed alpha-mosaic, because displays are constructed using a mosaic of dots, and alpha-geometric because displays are constructed using geometric drawing elements such as diagonal lines, arcs and circles. The two recognized standards pertaining to the alpha-mosaic technique are those employed by UK's Prestel service and France's scheduled Teletel trial.

The variant employed by Prestel and by most of the world's trial systems uses "spacing serial attributes." This means that any change of attribute, for example, color, flashing or height, takes up a character location on the screen that generally appears as a space.

The alternative alpha-mosaic method employed by Teletel uses a "parallel attribute" method whereby each character, when stored in the terminal, carries its own attributes thereby usually avoiding the need for an intervening space on the display. However, the Teletel transmission coding system does not provide the editing flexibility or interactive and dynamic frames that Prestel's serial

method allows.

The newly agreed standard specifies how a future generation of alpha-mosaic viewdata terminals will be capable of combining the best features of both systems. A terminal built to the new standard will have the capability of receiving serial and parallel transmission codes and will not require a space on the screen when attributes change. The new terminals will receive the existing Prestel and Teletel codes in addition to a number of more advanced features that are not possible with current Prestel terminals.

**Developments to open North American videotext marketplace**

With technical capability between the French and Canadian videotext systems already achieved, officials from both systems have signed a new agreement for worldwide development of Antiope (French) and Telidon (Canadian) teletext and videotext systems and products along compatible lines.

The agreement was revealed at Videotex '81, where earlier AT&T had unveiled its own videotext system, which is compatible with both Telidon and Antiope. This announcement was made by Jean Guillermin, general manager of Telediffusion de France (TDF), and Francis Thabard, deputy director of Directorate for Telecommunications (DGT).

The Antiope broadcast teletext system has already been adopted in the United States by three major commercial broadcasters: CBS, NBC and Group W (Westinghouse). The broadcasters are part of a large teletext trial in the Los Angeles and San Francisco areas.

French executives said that this important trend toward clarification of the standards for North America, together with European recommendations, will open the marketplace to fair competition. They said they believe that the Antiope-based systems and products will be instrumental in bridging the North American and European markets for broadcast teletext and interactive videotext services.

French manufacturers said that they were well-prepared to take advantage of this breakthrough on standards because of Antiope's capability of being extended, offering a full range of products from the low-cost and mosaic terminals to the most sophisticated alpha-geometric and picture terminals.

**BROADCAST engineering**

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July 1981 *Broadcast Engineering* 7

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# The low-power freeze and how to deal with it

By Harry C. Martin, partner, Midlen & Reddy, Washington, DC

The FCC imposed its low-power "freeze" April 9, 1981. Until further notice, applications for new TV translator and low-power stations may not be filed. Pending UHF applications already accepted for filing will be considered mutually exclusive, and ineligible for further processing, if, translator-to-translator, they do not meet the mileage separation standards for full-power TV stations. Applications that were on file before the April 9 freeze will not be put on cutoff lists until the freeze ends. The freeze applies to all communities that receive two or more Grade B TV services.

The commission's April 9 order constitutes a *de facto* reversal of the FCC's decision of September 9, 1980, to begin interim processing of low-power TV applications. This is its effect because only a handful of the UHF low-power applications now cut-off satisfy the full-power TV mileage separation requirements (and related

UHF taboos) applicable during the freeze.

Under these interim spacing standards, an application for a low-power station on Channel 60 at Denver is now "frozen" if there also is pending an application for the same channel at any location within 155 miles of the Denver applicant's site. This is true regardless of the fact that the Rocky Mountains may geographically separate the two sites. Under these standards, most of the applications now cut off are mutually exclusive with at least one other application and will not be processed until after the low-power rulemaking is concluded.

## Why a Freeze?

The reason for the freeze is the commission's inability to deal with almost 5000 applications that were filed in response to its September 9 invitation. There are only three FCC staff engineers assigned to the job of

reviewing all the applications. Because the Notice of Proposed Rulemaking in the low-power docket did not set interim translator-to-translator mileage separation criteria, the only way the commission could decide who is mutually exclusive with whom would have been for the three engineers to review manually each of the applications and estimate its interference potential vis-a-vis the others.

Such case-by-case processing worked well when the FCC had only a handful of existing translator stations and pending proposals to take into account at any given time. Applicants generally knew at the outset who to protect, and did so. But with 5000 proposals on file, the system has broken down. No one knows whom to protect, and the commission has yet to offer any guidance. Waivers for protection to existing full-power stations are not available because there are too many cases to consider. As a result, no processing of applications has even been attempted. For the past few months, the FCC's 3-man engineering staff has been spending most of its time just logging in the 5000 applications.

## The FCC's "Solution"

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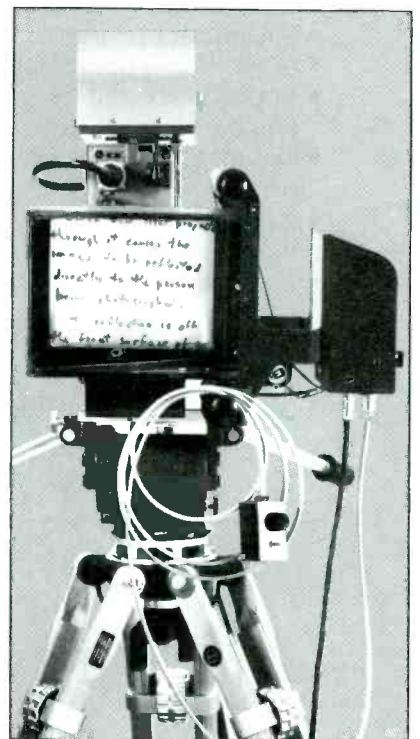
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Picture shows Model 5462/16 TV Audio Console.

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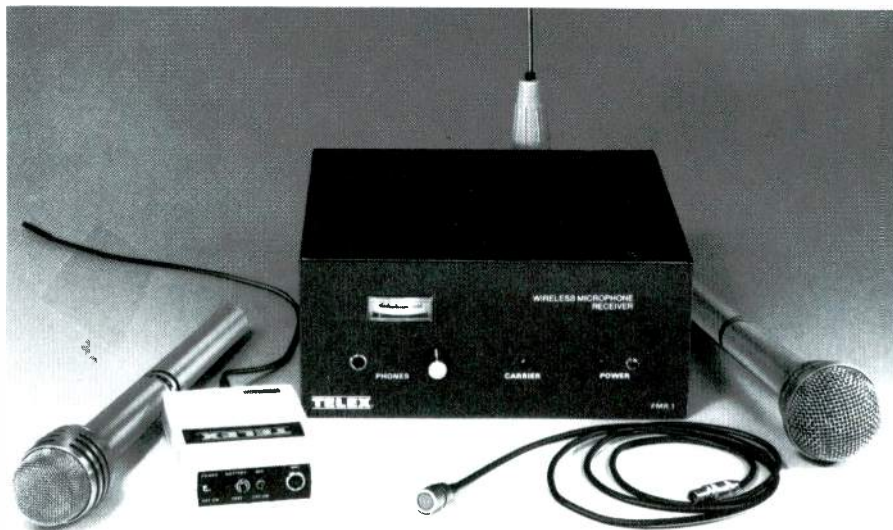
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## Low-power

the low-power problem in a series of steps that will permit a small number of applications to be granted during the next year, but which will cause delays of many years in the processing of most of the others.

The first step will be the issuance of a new notice of rulemaking in which translator-to-translator mileage separation standards will be proposed. According to the staff, this will be published in June or July. It is hoped that before the end of the year, final mileage separation criteria will be adopted. Then, the previously cut-off applications that failed to meet the full-power TV separations, but which comply with the new, less strict separation standards, will be processed.

It must be recognized, however, that most mutually exclusive applications now pending involve proposals for a single location. Consequently, only a few applications not granted under the full-power (for example, 155-mile, etc.) separation requirements will become eligible for grant when shorter spacings are adopted. The remainder of the applications will remain in pending status because no action on those that are mutually exclusive will be taken until after comparative criteria are adopted.

### Post-freeze conditions

The commission may or may not lift its April 9 freeze at the time it adopts translator-to-translator mileage separation criteria. This is only of academic interest, however. All the remaining pre-freeze applications not previously dealt with will be placed on cutoff lists and processed before any new applications will be considered. If you filed before April 9, 1981, the date for facilities not previously cut off, your application probably will be cut off some time in 1982. But if someone then files an application that conflicts with yours, your application will be put on indefinite hold until comparative standards are adopted.

It is unlikely that the commission will be able to deal effectively with mutually exclusive TV translator and low-power applications in the foreseeable future. The comparative criteria and procedures now proposed are controversial. Certainly they will be challenged in court by those who end up with a comparative disadvantage.

Even if comparative criteria and procedures were adopted tomorrow, there is no way the commission could

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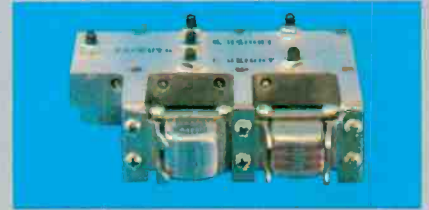
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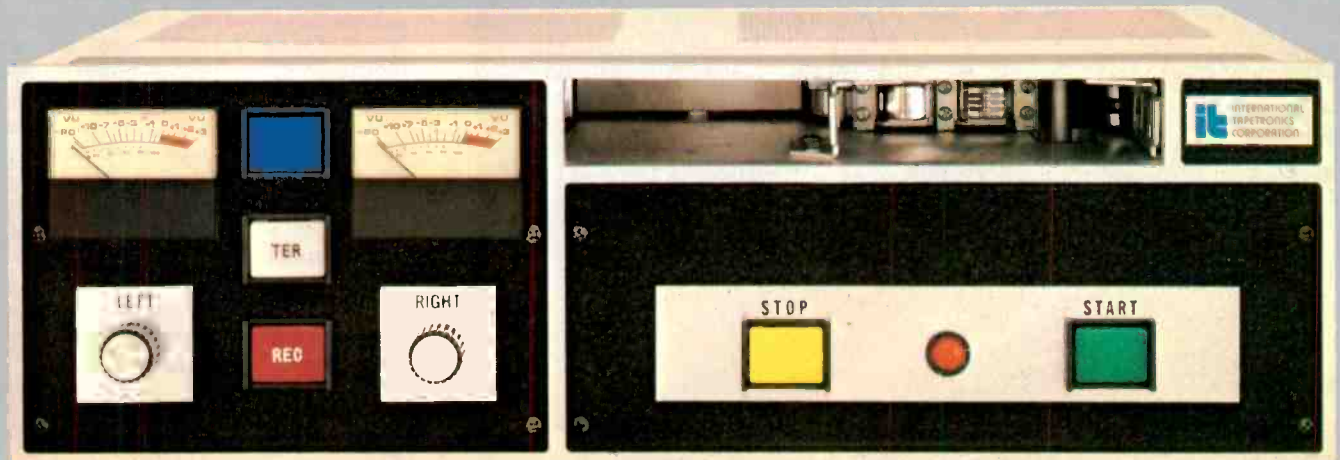
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## Low-power

administer them. There are only four attorneys assigned to process the 5000 applications now pending. These persons cannot possibly even read all 5000 pending applications and related pleadings, much less evaluate them. Thus, meaningful progress in processing mutually exclusive low-power proposals will not occur until the commission establishes workable comparative criteria and provides the manpower needed to process contested applications through hearings.

## LPTV support: A note of caution

By Donald A. Markley, facilities editor, D. L. Markley & Associates, Peoria, IL

Not since the advent of citizen's band radio has anything brought forth such a crop of self-proclaimed experts and "consultants" as has low-power TV. It seems that many chief engineers, maintenance technicians, system installers and assorted fringe "experts" have decided that this is a good time to enter the consulting field. After all, if no one knows just what a service will be, anyone can claim to be an expert.

The old warning of *caveat emptor* has never been more applicable than in the case of the current rash of those who would feed off the low-power TV applications. While there are some who are well-informed and capable engineers, there are many who are not. The low-power TV field will require careful, detailed design for each facility. The problems of impedance match, line loss, antenna pattern, etc., will be the same as for a standard TV station, even though the power level will be lower. In fact, this reduced power level will be the reason for more care to be taken in the construction of some aspects of the facility. These problems demand the input of knowledgeable, experienced engineers.

When shopping for engineering services, examine the background and qualifications of those who would offer such services. Look at formal education and training; evaluate their experience; ask what equipment they have to perform installations if such services are considered; ask if they are registered professional engineers. It is not legal to advertise as a consulting engineer in any state if one is not registered or if registered engineers will not oversee the work and applications. An unregistered engineer performing consulting design services is no different than a lawyer who has not passed his bar examinations. There is need for a minimum level of competence, and one should be suitably cautious.

There are those in the industry who offer technical services who are not registered but do provide highly competent work. These services usually are most involved with installations, field service work and related services—as opposed to heavy design, detailed applications and the more sophisticated requirements of applications for complex systems. These firms provide a needed and valuable service to the industry and do so without the requirement or need for registration. It is not about these firms that we speak, but about those who have now offered *design services* in this new field.

This is not to imply that a new firm is not acceptable simply because of its newness. This would cast unnecessary suspicion on a qualified individual or firm trying to get started in the consulting business, a difficult enough endeavor in itself. We simply wish to advise those who would enter the LPTV field to be careful in their selection of an engineering firm because it appears that there are those who would offer design services that may not be suitably qualified.

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## Low-power

Such a commitment is unlikely given the present internal climate at the FCC, where low-power TV is seen by many as another Citizens' Band nightmare. The last hope—a real long shot—is an amendment to the 1934 Communications Act to permit selection by lottery.

Any application that is opposed in a "petition to deny," regardless of the merit of the arguments raised, also will be put on indefinite hold. This is because of the staff shortages mentioned above. Thus, even if you sur-

vive cutoff, you will be delayed indefinitely if a timely petition is filed against you.

### Dealing with the Freeze

There are two ways to deal with the freeze other than dismiss the application. The first is to wait and take whatever comes, even though it may take years to process the application. Because the commission is planning to permit translators to originate pay TV and commercials, it may prove to be worth the wait if you eventually secure a frequency. Further, even if a station is mutually exclusive with other applicants, it is always possible

to resolve the conflict and obtain a construction permit through a negotiated settlement. For those who plan to file, but have not yet done so, there at least will be a clearer picture of what is left to apply for once mileage separation criteria are developed and the freeze is lifted.

The second alternative is to use a low-power engineering study as the basis for a regular full-power TV allocation to a community. In many areas of the country, a channel found to be suitable for low-power use under the rules also may meet the separation requirements for a standard UHF allocation. Indeed, the translator-to-TV station separations set forth in Section 74.702(c) (2) of the FCC's Rules are the same as those for new UHF channel allocations in "Zone I" (See Section 73.610(b)).

From start to finish an uncontested TV allocation proceeding now takes less than a year to complete. Thereafter, an application for CP may be filed specifying the same—or better—facilities as previously proposed for low-power use. Even if it takes another year, an unopposed application for a regular TV station probably would be granted in advance of most of the low-power proposals caught up in paperwork described previously.

A key advantage of this alternative is that a regular TV station, regardless of its power and antenna height, must be carried by local cable TV systems. Carriage of low-power stations is not similarly required.

Also, low-power service is secondary to regular service. Thus, if a low-power operator's channel were assigned to the same or a nearby community for use by a regular station, the low-power operator would have to vacate the frequency.

An applicant willing to pay the costs involved may wish to pursue both angles simultaneously and wait to see which one is first to bear fruit. Because the commission will not be adopting multiple ownership rules for low-power TV for some time, a low-power and conventional TV proposal may be pursued at the same time for the same community. Even radio licensees will be able to pursue both angles in some instances, because of the expected end, this summer, to the current moratorium on the creation of new aural-UHF combinations.

Regardless of what one's particular interest in these matters may be, anyone who follows the FCC will continue to find the evolution of low-power TV to be a fascinating study of the government in action. Who knows, maybe the new Reagan-appointed commissioners and their staffs will focus on the problems of low-power TV and find workable solutions. □

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### Electro-Voice DO56 Shock-Mounted Omnidirectional Microphone

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For an in-depth description of this and other case histories, get on the Electro-Voice "Mike Facts" mailing list. Write on your letterhead to Mike Facts, c/o Electro-Voice, 600 Cecil Street, Buchanan, MI 49107.

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"So I take the Big Con to Studio B and I explain the difference between ordinary consoles (like ours) and Ramko's DC controlled consoles. I got my eye on the DC38.

"I carefully explain that our current consoles get all this hum and RF pickup, but Ramko's "silent series" consoles eliminate audio wiring from the inputs to the various controlling elements — and the result is reduced external

interference. I tell her to listen to that sucker hum. Connie wonders if it's humming because it doesn't know the words.

"I tell her all the audio switching and mixing is done through DC control so it's less prone to mechanical malfunctions from scratchy pots or noisy switches. And, it provides more inputs per channel than a mechanically switched type console.

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"I go on about how only one pot

is needed to control both left and right channel audio simultaneously, eliminating tracking error. And how I can cue by potting down or by simply pushing a button.

"Then I explain how all the function lights make my job easier by telling me how the console is programmed... about the solid-state VU meters that are faster than a mechanical meter so we can keep a tighter, cleaner sound on K-FAZ.

"You know, I really feel like it all sank in. She went to Uncle Bobby and suggested he order a DC38 for me once she figured out what to do with all the switches and dials from our old console."

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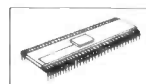
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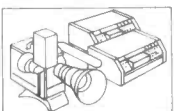
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Shown from left AU-7CC editing recorder, AU-A70 programmable editing controller.

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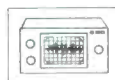
With our AU-A70 editing controller

not only can you generate and read time code pulses, microprocessors let it perform up to 20 time code edits automatically. Add an AU-J10 multiple source adapter and it will accept inputs

from two source decks and one live line plus perform A/B rolls. Microprocessors also let you automatically go to specific tape locations. You can also search both ways at speeds of 1/20X, 1/5X, 1X, 2X, 5X plus pause with picture. Other features include program check, program exchange, insert programming and overflow indication. For editing convenience, separate address time and lap time indicators are included. The AU-A70's error codes pinpoint any procedural

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# KCBS: The electronic newsroom

By Larry D. Cooper, associate director, News and Programming, KCBS, San Francisco

KCBS NewsRadio began using a computer to edit and collect its news in August of 1977. The experiment was begun to determine the broadcast benefits of an electronic system that was designed primarily to do away with typesetters in newspapers. Could a modified system serve the constant deadlines of all-news radio and the changing line-ups of TV newscasts?

United Press International enthusiastically joined KCBS in the experiment. UPI rented KCBS files in its New York computer data base and set up two dedicated circuits using current UPI loops. KCBS leased a circuit from American Satellite for the data transmission and terminals identical to those being used in the UPI Bureaus.

In effect, KCBS became a UPI Bureau. The radio station was limited by outages in the many links and its dependence on UPI files only. But it was proved that there were broadcast applications of the system. In fact, although the experiment was slated initially to last only 120 days, KCBS remained with UPI until December 1980. There were many problems with line outages and equipment breakdowns through no direct fault of UPI. But, whenever the system was available, the KCBS staff quickly left their typewriters for the computer terminals.

The UPI experiment gave KCBS a chance to experiment with a computerized newsroom and to research through on-the-job use the features needed for a broadcast newsroom. Fortunately, KCBS and CBS found David Cunningham, a software engineer, and Greg Endsley, a hardware engineer, to help with the project. The two formed Integrated Technology, in Kansas City, with the

primary ambition of developing a broadcast news computer. Close cooperation among KCBS newsroom management, CBS data management and Integrated Technology quickly brought about the design requirements for the new computer.

The first item on a long list of needs was speed. It was essential that the final system give the information from the data base without hesitation. The current system allows retrieval of any item in the data base within one tenth of a second.

Also, the capability of retrieving information from a number of wire services was necessary, as well as from the local input. The new system allows the input of 15 separate wire services or other similar types of input. KCBS needed the text editing capability similar to the current newspaper systems, in order to quickly prepare news for on-air applications. This capability is supplied with the new KCBS computer, allowing the preparation of a 1-hour newscast in approximately one hour. Using typewriters, as in previous operations, it took at least two hours.

Other items desired and obtained in the current KCBS electronic newsroom were message routing and storage, archives filing of major news items, instant access to material used on a repetitious basis (weather forecasts, sports scores, etc.), without the need for an initial directory, bulletin notification at the terminal, a clock on the screen, back-timing and internal scratch pads. KCBS also demanded and received the capability of updating a news story and having that update appear within the air script or line-up before the writer. Also, the computer is capable of typing the supply of tape cart labels used

daily by the newsroom.

In the KCBS computerized newsroom operation, a strong editor occupies a key, pivotal position. However, the computer is basic enough to allow for other types of newsroom management and formats. KCBS inputs AP Datastream, AP TV, AP Broadcast, UPI Broadcast, UPI Datanews, Reuters, Bay City News Service (San Francisco City Wire), and a call-up port for the KCBS bureaus.

The editor reviews the wire reports periodically, selecting material to be used in the newscasts. The editor can select material as desired, generally by subject or category. The information can be taken out to move it out of the current portion of the wire file, which is equivalent to throwing a typed story into the wastebasket. The same procedure is followed with incoming stories from the KCBS bureaus or in-house reporters.

## Using the system

To prepare a newscast line-up, the editor splits the terminal screen, putting the line-up skeleton on one side and the current file of stories being used on the air on the other side. Electronically, copies of each story are transferred to the line-up skeleton. The completed line-up is stored under the writer's initials, the time in which it is to run and its specially designated "instant access" key.

If any story needs to be updated, the editor makes the change and depresses the "update" key. All stories in newscasts and line-ups are changed to reflect the new information. The writer or anchor-writer then calls up the line-up and can retrieve the stories one at a time, rewrite the item (including any sound) and then either store the completed newscast in one



The old manual filing system for newsroom stories. The new updated system replaces both the manual filing system as seen here and in the lower right hand corner the UPI CRT and printout facility.



The latest newsroom facility consists of eight terminals similar to the one seen here (in the foreground) and a distributed processor in the corner of the room. This is one of two stations in the newsroom, each having three terminals. The assistant editor (back to camera) tapes an interview preparing for a new update. Editor Jim Cullen (right) checks a new story on one of the other terminals.



**Jim Cullen, editor,** selects stories from the current file, building the lineup of stories for an hour-long newscast.



**The desk assistant** assembles the latest updates in the weather report that will be read in the booth on another terminal. When he's finished with this update, he can route it to any terminal or booth with a simple command.



**Wilson Van Alst, KCBS reporter,** checks the news wire service for updates on the MGM fire in Las Vegas. As he selects a particular story line to research, he can hit an abstract key and get an immediate abstract of the story to see if he wants to enter it into his news program or make it available to the editor. The abstract, in this case, is the first few lines of the story or the first paragraph as provided to the wire service.



**Three members** of the KCBS News Staff at various stages in preparing their airstrips, working at one of the two islands. (Note: The wire machines in the background have since been removed.)



**Larry Cooper, anchorman,** (sitting at the console) and Don Mosley, newsman, check the weather on the CRT. Cooper is reading the latest weather report over the air.



**Larry Cooper (right)** and Clancy Kasell discuss the program log between commercials.



**For convenience** the system operator can select one of two character sizes for terminal display.



## KCBS newsroom

of the computer's files or route it to a printer for a hard copy.

The above description explains only the basic operation of the Electronic Newsroom. It required only about three days training for the KCBS staff to learn the system, but mastering it depended on the individual. Some people wanted to know everything the system could do; others wanted only the basics to get a newscast produced. In any case, it worked well for all concerned.

It is safe to claim that the KCBS staff is sold on a computerized newsroom. Morale in the newsroom has improved considerably as the noise level was reduced by the removal of typewriters and Teletypes. With all the wire and current story information at their fingertips, no one can complain about a lack of available information on a late-breaking story. Also, the environment has improved with considerably less dust in the air. Desks are not cluttered with piles of wire copy and carbons.

The computer has allowed greater control by the editor, who can now be constantly aware of what is being

generated by the wires and reporters.

The editor can even check progress on stories and newscasts. Closer culling of the wires by the editor has prompted KCBS to consider the need for fewer wires than are currently being used.

The text editing functions allow for better use of personnel. With writers and anchor-writers spending less time with the mechanics of a newscast, they can concentrate on a better product. However, KCBS discovered that, initially, system-users tend to use it as they would use an electronic copy machine, but this attitude disappears with user confidence.

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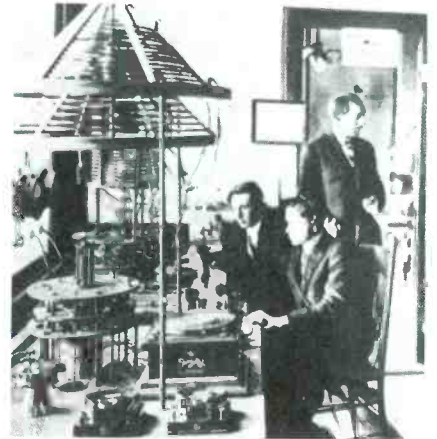
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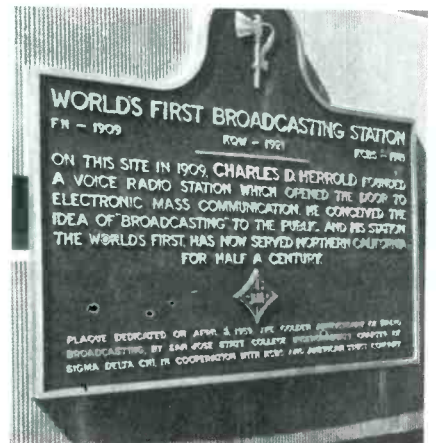
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## Technology Advances



Early station operation at KCBS. Note phonograph for broadcasting music and early instruments for power measurement.



The plaque dedicated to station KCBS, San Jose, in 1959 by the San Jose State chapter of Sigma Delta Chi.

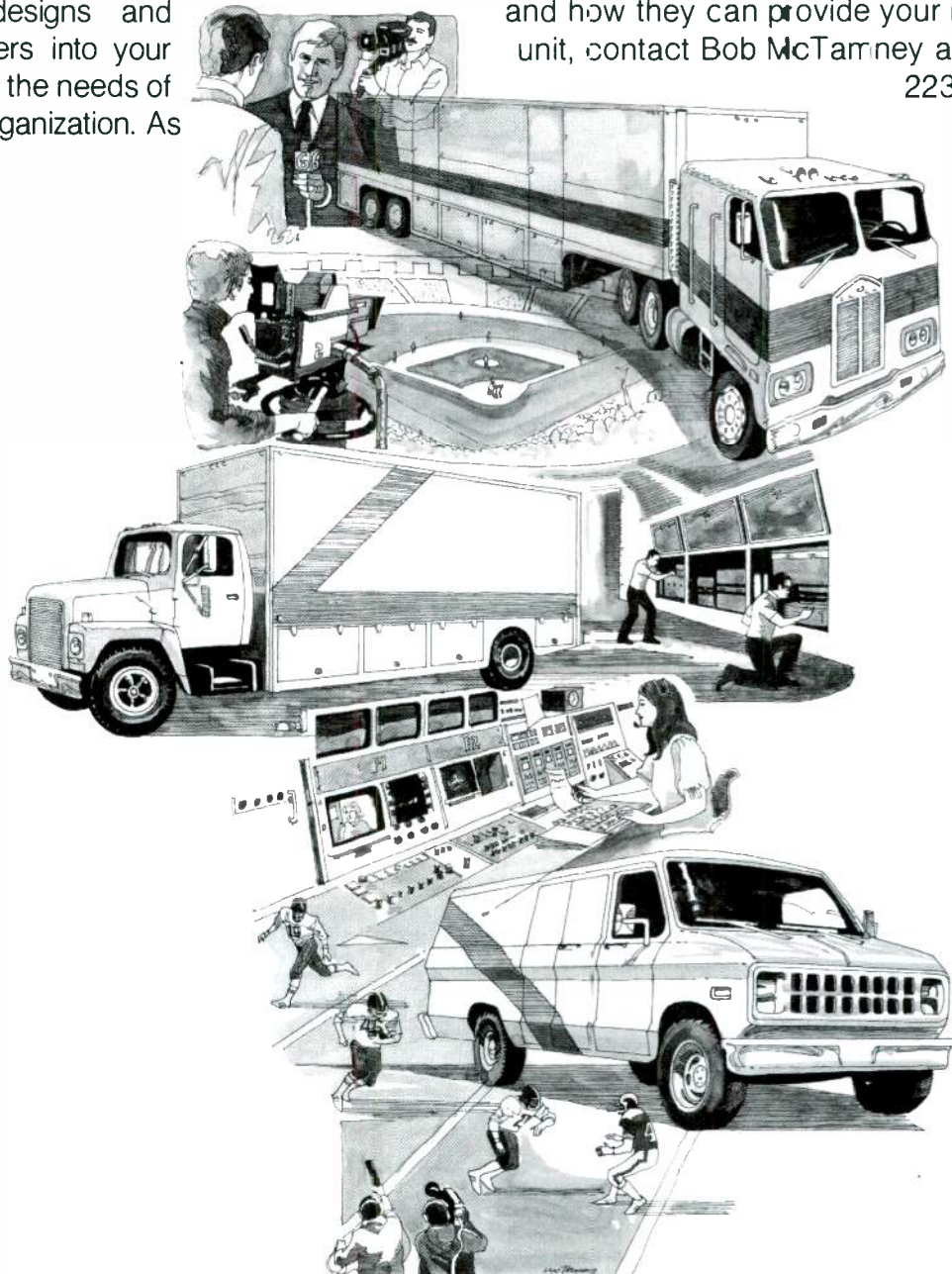
The May 1979 issue of *BE* was a historical salute to broadcasting. On page 98 of that issue, the above two photos were included to commemorate the founding of the world's first radio station, "Doc" Herrold's station, to which KCBS traces its lineage.



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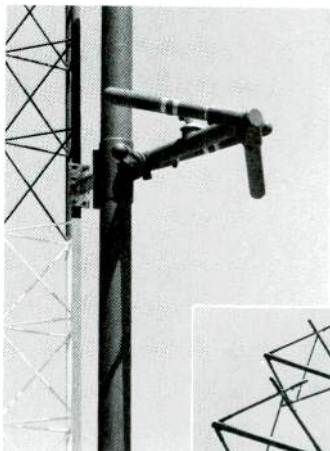
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## Cetec Antennas

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## KCBS newsroom

Ancillary newsroom personnel are now used to a higher degree of efficiency. With the computer taking care of the wires and label printing, these people can be used for more closely targeted items relating to the final news products: elements such as police beat calls, initial phone interview contacts and, in some cases, actual story preparation.

### Morale vs. cost

The improvement in morale and working conditions is considerable, but, for those who are faced with management demanding a hard cost savings with the use of the computer, the results are less tangible.

There is a considerable savings by not using the wire service printers. Paper costs plummet dramatically, as do charges for machine copies. Although it could be argued that fewer personnel are needed as efficiency improves, the KCBS newsroom management prefers to allow personnel now on the job the luxury of taking more time to develop their product—be it a news story, feature or newscast.

The computer costs can be argued on a competitive basis. Just the simple process of getting a bulletin on the air or the latest information on a story quickly, gives the listener the perception that indeed the news does break on KCBS. For example, without the use of computers, bells ring when a

bulletin breaks on the wires. The desk assistant goes to the wire room and looks for the wire that rang. When the story is printed on the wire machine, the desk assistant takes it to the editor. The editor approves the story for air. It is rushed to the booth and read by the newscaster.

With the KCBS system, the bulletin breaks on a wire service high-speed circuit directly into the computer. Every terminal screen flashes the bulletin alert. The newscaster hits the bulletin key, and it is on his screen in one tenth of a second. Using a similar method involving category and slug lines, KCBS scored a 10-minute beat on the competition in the Duran-Leonard fight.

The system is designed to allow its use in TV newsrooms with the addition of several TV-related forms within the software.

Being at the forefront of the computerized broadcast newsrooms has been an exhilarating experience for the staff and management of KCBS. Their experience can be an asset for the industry.

There are several computer systems now available for the broadcast newsroom. When looking over the various systems, keep in mind the KCBS experience and look to the end product—not just the wonderment of using a computer. The individual reporter and writer still produce the newscast, but the computer can be used to enhance that product. □

## KCBS Open House



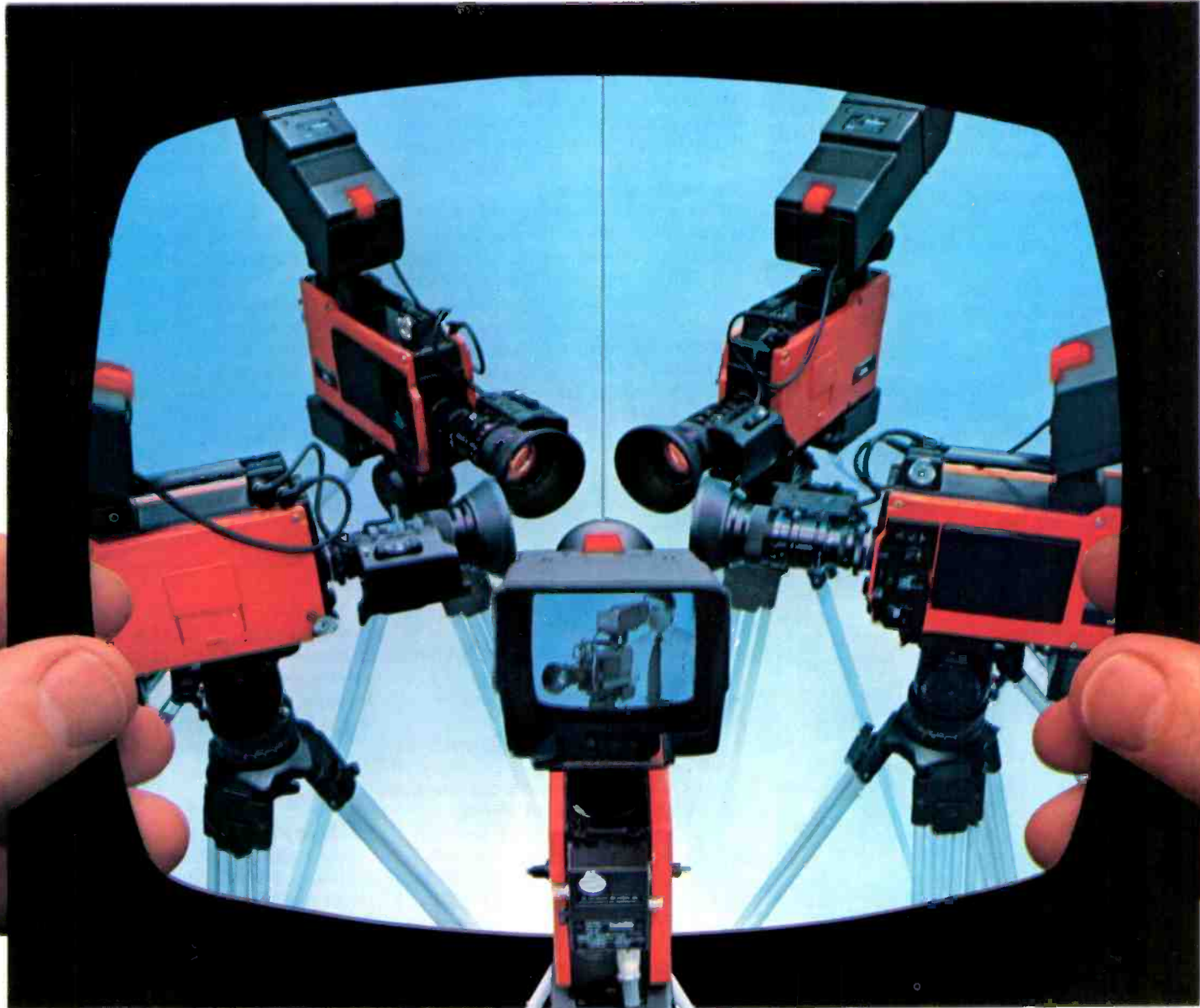
A



B

Following NAB '81 in Las Vegas, KCBS held an open house to celebrate the operation of its electronic newsroom. In photo A, Emerson Stone, (left), vice president of Radio News, CBS News Department, and general manager of KCBS are shown joining in the festivities. In photo B, Dixie Mitchell-Clow, KCBS writer, describes word processing capabilities at the console of the KCBS electronic newsroom terminal.

# Compare



JVC's Professional Video Dealers want you to compare the newest member of the KY family of 3-tube color cameras to any other camera you may be thinking of... and to others you may have eliminated because of their high prices.

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#### COMPARE FEATURES:

A fast, 14:1 Servo zoom lens, Automatic Beam Control (ABC), Automatic White Balance with memory, Automatic Black Stabilizer circuit (ABS), a low 18 watt power consumption for extended battery operation, "Instant On"

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## The new KY-2700



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# Videotape edit controller roundup

By Art Schneider, post-production consultant; Carl Bentz, engineer, KCPT, Kansas City, MO; and Bill Rhodes, editorial director.

In researching new edit controllers, the authors visited manufacturers displaying equipment at NAB '81/Las Vegas in April. The following roundup includes reflections on trends occurring in the industry as seen at NAB '81, as well as descriptive information about the product.

Data from specific manufacturers may be obtained by using the reader service card.

The 1981 NAB equipment exhibits brought out many new innovations in edit controllers that give users more freedom during the editing process. Some of these technical improvements, both in software and hardware, have given the user more

flexibility—especially in areas of edit list management. This, of course, allows the editor more creative flexibility to concentrate more effectively on the aesthetics rather than on the mechanics of editing.

One new feature observed at NAB, which is offered by several manufacturers, is variable speed motion control editing. It permits the user to vary the speed of a 1-inch helical scan VTR forward or reverse at varying speeds and to incorporate this non-linear edit in the final master tape. Another new and interesting concept is that of "touch control" editing offered by Ampex.

This roundup of videotape edit controllers that was seen at the show includes manufacturers' specifications outlining many new features. Because

this is only a brief look at what is available, the manufacturers can be contacted for more detailed information. All features described herein are not necessarily standard with the system.

It will be difficult to find the "ultimate" editing system because it is nearly impossible to please every user. That's why there are so many manufacturers of editing systems—each one trying to design that elusive, perfect editing system. It should be noted, however, that each system described provides the capabilities that may fit into a specific type of operation. Look carefully at the features and options offered by these manufacturers, as well as price, delivery, support and software updates.

## Ampex



ACE (Ampex Computer Editing)

New this year was Ampex's ACE editor (Ampex Computer Editing). This edit controller features a unique "touch screen" (TM) finger control editing system using an infrared grid in front of the edit monitor. The user merely touches a command on the face of the monitor with a finger and the system instantly responds, performing whatever function asked for. Also, one may custom design the edit screen display in any configuration to suit the user and retain this information on a floppy disc so that the system need not be re-configured each time the editing process is begun.

For dyed-in-the-wool button pushers, there is also a dedicated keyboard and joystick control available that may be used in the conventional manner.

- Controls up to 16 VTRs
- Auto assembly with full look ahead
- PAL, SECAM or NTSC formats

- Interfaces with 1-inch, ¾-inch or 2-inch VTRs or ATRs
- Interfaces with multiple mix/effects banks on switcher
- Serial device communication
- Built-in diagnostics
- User bit and time code/control track editing.

Also available from Ampex are the EC-2/RES-1; HEP-1, and TRE-2.

The EC-2, the heart of the EC-2 RES-1 system, allows stand-up editing control of up to eight AVR-2s equipped with the unit. The RES-1 is the sit-down remote console using the EC-2 electronics. The total edit interface system is capable of controlling up to eight VTRs, four as individual machines and four as slave recorders. Any combination of AVR-2s and VPRs can be controlled by the RES-1, including variable speed and jog capability for the VPRs.

The HPE-1 Series C is a microprocessor-based, table-top system for on- or off-line videotape editing with up to four Ampex VPR series recorders. System design flexibility allows the user to specify any of a variety of configurations. Options include single-source programmable fades, soft wipes, A/B rolls, in- and out-edit point loading, simplified split edits, trimming, audio pitch compensation and an animation accessory.

The TRE-2 is a remote helical editing system for use with two Ampex VPR-2s or VPR-2Bs and is designed to exploit the built-in capabilities of both systems. The TRE-2 is packaged in a table-top enclosure for sit-down operation. It

allows the edit point to be trimmed through the use of forward/reverse jog control and all edit decisions to be previewed easily. Operating features include search-to-cue, auto edit and variable shuttle control.

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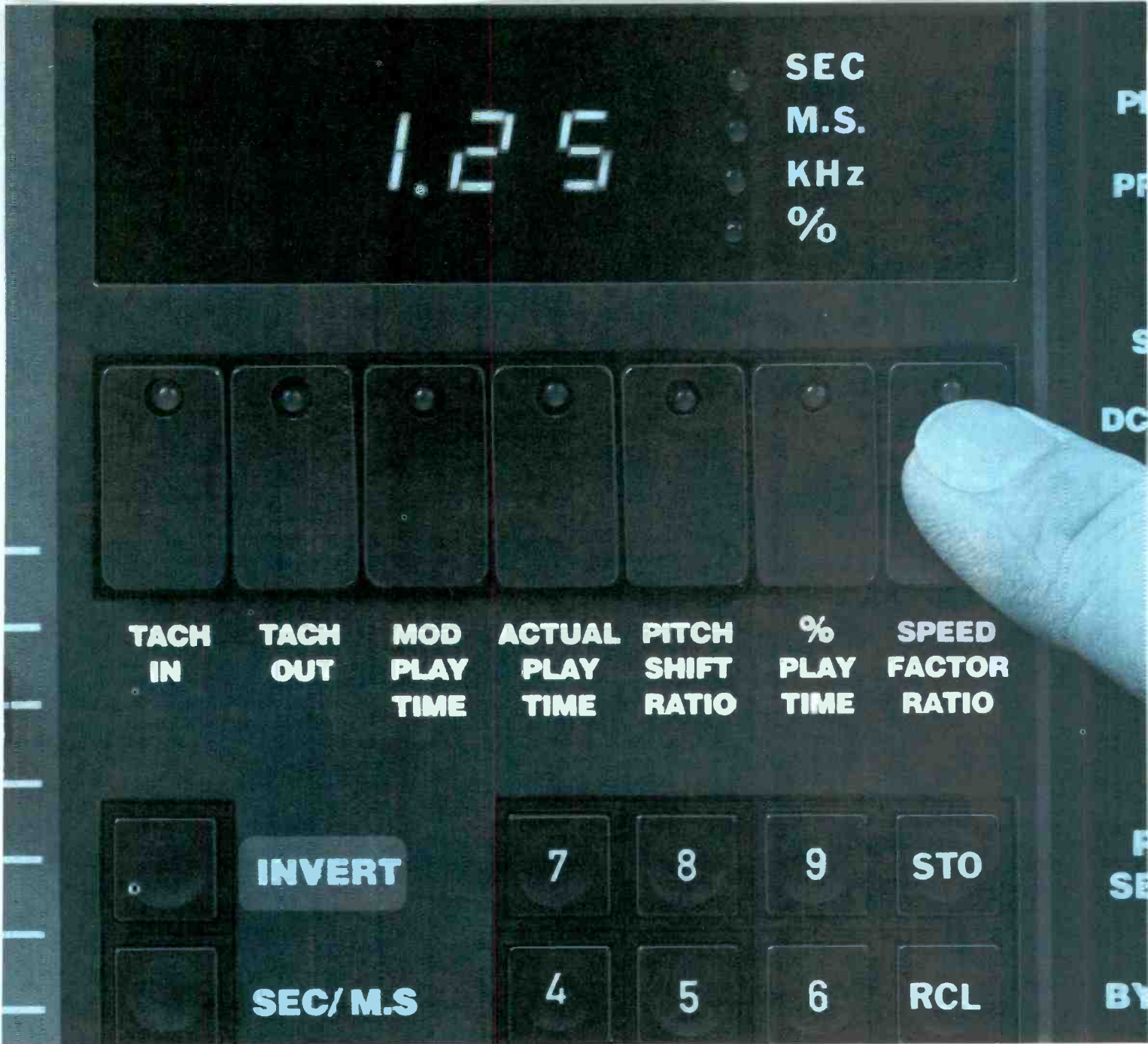
## CMX/Orron

Since 1970, CMX has been building editing systems. The 340X being the latest in the state-of-the-art editing systems, uses I2s (I square) that are programmable for a specific device or VTR. Since 1976, CMX has been using distributed processing that assigns the detailed editing commands to the I2 unit. The central processor talks to the I2 device and essentially tells it what to do.

The new M2 (M-square), which was shown this year at NAB, allows variable motion events to be created and stored in memory and to be learned and replayed as a previewed or recorded event.

- Interfaces up to eight devices at one time
- Full list management
- Color-coded dedicated keyboard
- Operates in NTSC, PAL or SECAM
- CMX offers the "GISMO" which provides both position and speed control for precise visual editing
- Multiple record masters
- GPI (General Purpose Interface) to operate non-time code devices.

The CMX Edge Editing System is uniquely designed for a 3-VTR system, with the user able to select either of



## THERE'S A NEW PRODUCTION TOOL IN TOWN



**Model 1200 Audio Time Compressor automatically reduces or expands the play time of recorded material ... gives you "time-tailored" programming at the push of a button ... preserves original pitch and voice quality.**

- With the remarkable new Lexicon Model 1200, you can now eliminate time-consuming retakes to fit commercials or other material into available time slots. For the first time, you can speed up tapes or slow them down — and get broadcast-quality sound free of distortion.
- You simply connect the 1200 with virtually any variable-speed tape recorder, set the timer for the on-air or play time you require, and you're in business. Material that runs too long can be compressed up to 25%. You can time edit to add tag lines or heighten the energy of the message. In TV applications, the Model 1200 can be teamed with a variable-speed film projector and/or a videotape recorder.
- The Model 1200 — a product of Lexicon's eight years of leadership in digital audio processing — marks a breakthrough in bringing time-processed audio to the level of quality necessary for radio and TV use. Based on sophisticated computer technology and proprietary intelligent digital processing techniques, the 1200 has been thoroughly field-tested in the production of nationally broadcast commercials by 19 of the top 20 advertising agencies. Write for detailed information and application notes.

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There's nothing fancy about the Knox K50.

It's reliable; it's economical; it's basic; the simplest machine we make.

Come to think of it, it does have an independent preview channel... and shadow-edged characters... and a flash function... all as standard features.

Maybe it's fancier than we thought.



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## Edit controllers



### The Edge

two play VTRs and the record VTR. Desk-top by design, the Edge has a 5-inch edit screen display with only 22 key functions. When editing, one may use either SMPTE time code or control track pulses. The SMART keys are used to select the functions opposite each key. These, along with the five mode buttons, the four mark keys and the stop button are all the editor needs to work with. Two rotary joystick knobs allow smooth motion control of the VTRs.

- Variable pre-roll time
- Reaction time compensation
- Wipes, dissolves and fades
- Split edits
- Edit list storage on paper tape or floppy disc.

Circle (251) on Reply Card

### Cezar International Ltd.



### The Editing Centre

Cezar introduced "The Editing Centre" at NAB '81 which is an expanded version of the microprocessor-based EA-3X ("The Executive"), offering all of its standard editing features, plus a unique set of advanced editing capabilities and a variety of options designed to provide flexibility, reliability and operational time and cost savings to every editing application.

"The Editing Centre" will control any combination of two 3/4-inch or 1/2-inch VTRs (as listed for the Controller, plus others), using a set of multipin remote control cables which do not require VTR modifications.

A 7-segment LED display provides all of the numerical data required to monitor the execution of an edit. An optional CRT display is available to present all of the data for an event on the face of a status monitor.

Complete remote control of all available VTR functions can be per-

### The Controller

Cezar introduced its line of edit controllers with new names and expanded features to the press at a special hospitality event and to the conferees on the convention floor. Included this year were the Controller, the Executive, the Editing Centre and the Decision Maker.

The Controller (formerly known as the EA-2X), is a microprocessor-based editing system featuring VTR remote control, cue, rehearse, perform,



Do it with style. Better still, do it with *three* styles.

Knox calls it Multifont, and it's built into each Mod-16 character generator.

It's upper *and* lower case. It's accented letters. And it's resolution down to a *single scan line*.

It's just one of the features standard with every Mod-16.

It's also by Knox. Plain enough?



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# Quality Reliability Performance

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**CAN BE 2x6,**  
**1x12 OR 2 [1x6]**



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**620 RACE ST.**  
**HOLYOKE, MA.**  
**413-536-3551**



Circle (18) on Reply Card

## Edit controllers

formed individually or simultaneously from "The Editing Centre" keyboard. A special feature of "The Editing Centre" permits the operator to cruise at various speeds without operator supervision. Single frame analysis is possible with the action of the shuttle arm, and all edit commands are simple, fast and comprehensive. Price: starts at \$5295, depending on options.

"The Decision Maker" is virtually identical in operation to The Editing Centre, but configured for off-line decision-making operation. As standard, it includes two SMPTE readers, CRT display, CMX 300 cuts only edit decision list, plus one other Decision Lister to be chosen from the following: Cezar Int'l EDL; or CMX 340; Datatron/Vanguard; or newly proposed SMPTE EDL. Price: \$9995.

Circle (252) on Reply Card

## Cinema Products Corporation



### Newsmaker

Cinema Products announced the immediate availability of its new Newsmaker Video Edit Controller designed primarily with the newsroom editor in mind.

The Newsmaker is also ideal for use in educational and industrial in-plant video editing facilities and similar installations. It is a full-featured edit controller, specifically human-engineered to provide a physically comfortable, bright color-coded keyboard with simplified operation for fast, accurate editing.

Moderately priced at \$3700, the Newsmaker provides many sophisticated features such as: variable speed search of each connected VTR from still to 5X normal speed with picture in either direction; in and out point marking with return to any point at the mere push of a button; insert editing of video, audio 1 or audio 2, or any combination thereof; and TAG edit with either or both playback/source and record side VTRs. The unique auto function makes it possible to perform basic simple edits with little training and allows the novice editor plenty of

room for growth in mastering the full capabilities of the system.

Other outstanding features include 16 switch-selectable pre-roll cue times (1-15 seconds); stop frame accuracy of  $\pm 2$  fields; plus a unique trim device that permits the engineer 0-7 frame adjustment for either player or recorder ballistic errors in a matter of seconds.

Designed to interface with most 1/2-inch and 3/4-inch VTRs currently in use, the Newsmaker also features unique expansion capabilities through the addition of the optional "Half-Pac" for multimachine operation from either or both playback and record sides.

For further information: write Cinema Products Corp., 2037 Granville Ave., Los Angeles CA 90025.

## Control Video Corporation

Another new entry into the field of touch screen editing, called the "Lightfinger," is a microprocessor-based, multimachine editing controller. It uses a software-based control system making it expandable, according to the manufacturer.

By using edit screen control, "Lightfinger" gives the editor all the features of a keyboard system without the need for hardware. The system eliminates unnecessary functions from the edit screen and displays them only as they become a part of the editing process.

Circle (253) on Reply Card

## Convergence

Convergence demonstrated several models of microprocessor-based videotape editing systems, both single-source and multisource: ECS-90, ECS-103B, ECS-103C and the ECS-104 List Management editing system.

New for Convergence this year is its new ECS 104 editing system. Edit list management is a standard feature along with the "409" list clean program—both an integral part of the ECS-104. Also more than 800 edits may be stored in its internal memory. Included in the ECS-104 are nine new features that give the user much greater flexibility and performance than ever before. A few of these features are:

- Joyscrol—allows the edit list on the screen to follow as the editor joysticks the VTR in either direction
- Timesearch—provides direct automatic access of the list to any known time location on the record or play VTR
- Cleanit—eliminates overlaps during editing
- Actionmatch—automatically calculates the required edit points to match picture or sound anywhere in the list.



# Editing starts with CMX

**If you think you can't grow from absolute simplicity to total performance look at the world standard for editing.**

Editing starts with the CMX 340X because it performs exactly the same simple functions competitors' limited systems do. Two machine cuts editing, for instance, requires the same number of keystrokes. But for you that's only the beginning. The expandability of the 340X will not restrict its simplicity at any point in your growth.

restrict its expandability at any point in your growth.

Editing starts with CMX because every 340X system installation includes basic training in operation and maintenance. CMX has the world's largest staff of editing system specialists to keep you going. These experts are available to install and train you on new features as they become available.

Editing never ends with CMX because our staff editors provide complete 340X training that never stops. This training is supported by advanced seminars, newsletters, an editors' advisory panel, plus worldwide experience in post-production that only the editors at CMX have.

Editing starts with CMX because it did. CMX built the first simple, practical, computer-assisted editing system over ten years ago. Along with our original customers we

have continued to grow and to lead. While others have come and gone, CMX continues to be the world standard for editing. We have the ten-year track record to support you now and in the future.

Editing never ends with CMX because your initial investment is protected from absolute simplicity to total performance. Before you invest in post-production, look at the difference in total investment between competitors' limited systems and CMX. The 340X has replaced many other systems; and every CMX user has stayed with us when he expanded his system. Editing never stops with CMX when editing starts with CMX.



CMX 340X keys are grouped conveniently, color coded, dedicated and easy to reach. That's one reason it's as easy to operate as most limited capacity editors.

Editing never ends with CMX because the 340X is the most expandable and sophisticated editing system in the world. All the new techniques in post-production developed over its five-year history have been added to the earliest 340X systems. The simplicity of the 340X does not



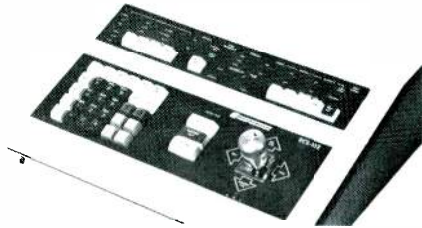
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**CMX**  
**ORROX**

## Edit controllers

The ECS-103 series is available in three models. The ECS-103A is a multisource cuts-only videotape editing system. The ECS-103B is a multisource editing system with switcher effects and A/B rolls. The ECS-103C is a multisource, autoconforming videotape editing system.



ECS-103

The ECS-90 unit is a microprocessor-based editing system that is plug-in compatible to most ¾-inch and ½-inch videocassettes. Accessories include 2-channel time code reader. Options include LL-90 Liplock, audio pitch corrector and BL-90 black generator and fade control.



SM-90

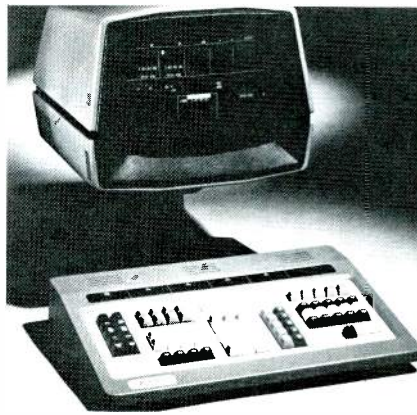
The SM-90 is a professional, low-cost, single VTR controller designed for post-production and on-air broadcast use. This system provides fast, accurate live program rolls, and the capability of prescreen and log scenes. Options for the SM-90 include the LL-90, Liplock, the BL-90 Blade, the TCR-90 Time Code Reader and the LST-20 Lister. (Availability: Fall, 1981).

New accessories now available from Convergence include the CG-100 Command Generator, the DD & DX-100 Dual and Single Disc Drives, the ME-110 Mix Effects System and the CP-110 Control Panel for the ME-110.

Circle (254) on Reply Card

### Datatron

The Vanguard is a high performance, microprocessor-based editing system. It may be used effectively to edit on-line or off-line. The latest in a line of editors from Datatron, the Vanguard offers efficient editing with up to five VTRs and interfaces, as well as interfacing with film chains and

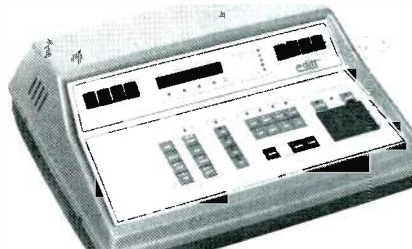


Vanguard

other non-time code devices.

New this year for Vanguard is the optional Smart Scan motion control device that allows the user to "learn" variable speeds on a 1-inch helical scan VTR. The Smart Scan makes full use of a play VTR's ability to produce recordable video at speeds ranging from about 1/30th to two times normal speed in forward, to 1/30th to ½ play speed in reverse as well as freeze frame.

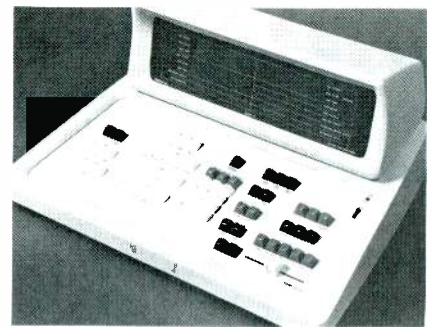
- On the fly auto assembly
- PAL or NTSC format editing
- Edit with time code or control track
- 5-tier scratch pad memory and time code calculator
- Sync roll real time switching and editing
- Full edit list management.



EDITT/PLUS

Datatron also announced at NAB '81 the addition of a new microprocessor-based Off-Line editing system designated the EDITT/PLUS. It features a unique set of advanced editing capabilities with options designed to provide operational time and cost savings for editing applications.

The Off-Line editing system will control ¾-inch or ½-inch VTRs with no modifications. Complete remote control of all VTR functions can be performed individually or simultaneously from the systems keyboard. Also, the system features reel number assignment, full effects notation including wipe pattern numbers and effect durations, and from and to source deck assignment. The SMPTE time code operation provides frame accurate editing. A precise edit decision list can be produced on hardcopy



Tempo 76

printout, punched paper tape or floppy disc.

This editing system with que, review, tag, recall and go-to functions allows time code or control track operation and CRT display of edit data.

The system is directly compatible with the professional Tempo and Vanguard editing systems at a price between \$6000 and \$10,000.

The Tempo 76 series consists of four edit controllers: the 7620, 7630, 7640 and 7650. The units are microprocessor-based expandable systems using control track and/or SMPTE time code editing modes. By adding features to the basic Tempo 76 editor, various editing systems can be assembled. The most elementary configuration is a 2-machine editing system. This can be expanded into a 3-machine system with auto assembly, a 50-event memory and split edits, and text editing; or a 3-machine system with all the above plus remote control of a special effects switcher.

Circle (255) on Reply Card

### Fernseh Inc.

The Mach One software-based dedicated keyboard system allows inexperienced users to quickly learn the system. Look ahead search builds edits as fast as the VTRs can locate the material and will assemble them in a cluster fashion—switching, making optical transitions, switching audio and video all in real time as long as the material is available. Full look ahead and cluster editing work together to speed up the editing process.

- Keyboard is color coded and commands are in simple English
- Multiple record capability
- Up to six VTR and ATR interfaces with most 2-, 1- and ¾-inch VTRs as well as a variety of ATRs
- High speed data display digests data as fast as the editor can type it, eliminating typing delays waiting for the screen to refresh itself
- Alpha-numeric reel numbers
- Built-in list clean as a standard feature
- PAL or NTSC format
- Text or other notes are included in

# "the Controller"

**\$1,995.00**



is a microprocessor based editing system designed to operate with most 3/4-inch and 1/2-inch VCRs without any modifications. Simple, rugged, and reliable, it provides you with outstanding performance and features, in a variety of configurations at an attractive price. A 2-year unconditional guarantee assures your uninterrupted use of the product. Furthermore, you may satisfy your future production growth with our 100% trade-in provision towards the purchase of any of our "Executive" line of advanced editing systems.

Write us on your Company letterhead for a free evaluation at your own facility or call your favorite distributor . . . chances are he's one of ours. (Don't forget to ask for a complimentary copy of our "Editing Process" poster).

**Cezar** International, LTD.

1026 W. Maude Ave., Sunnyvale, CA 94086  
Telephone (408) 733-1436

**"The Originators"**

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## The VPR-20 Edge. Total Performance in the Field.

Post-production in the field becomes an option when you take the VPR-20 on assignment. Its capabilities are so complete that you can return with a finished production.

### Advanced Editing Technology. From Ampex, Of Course.

The intelligent design that went into our VPR-2B videotape recorder was also applied to our smart, rugged 1" portable.

For example, our exclusive dual-cue editing gives you studio-type control. Four edit-related functions give you the edge: From "let's see it" reviews, and precise returns to the next edit point, to total control when replacing undesired material, and even mid-segment edits to new material. All in one, easy to use portable.

The VPR-20 remembers through its exclusive tape timer and servo system, so your "cue-ups" are accurate and fast, and your edits are clean and color-frame accurate.

The VPR-20's performance continues with a video confidence feature that plays the picture back from the tape into the camera viewfinder during recording. You can use any color television receiver for playback. And thanks to our exclusive built-in color stabilizer, you can leave the time base corrector behind and still show full color in the field.

### A Portable Should Be Portable.

The VPR-20 is. Even with non-battery use you'll be free of the burden of cumbersome additional equipment.

Unlike other portable recorders, the VPR-20 has a simple-to-use, plug-in AC power pack. It replaces the battery in our portable and allows you to forget the bulky external power supplies necessary with other portables.

The VPR-20 from Ampex. Total performance in a 1" portable videotape recorder.

Call your Ampex representative today. Tell him you're ready for the VPR-20 edge.

**Get the Ampex Edge.**

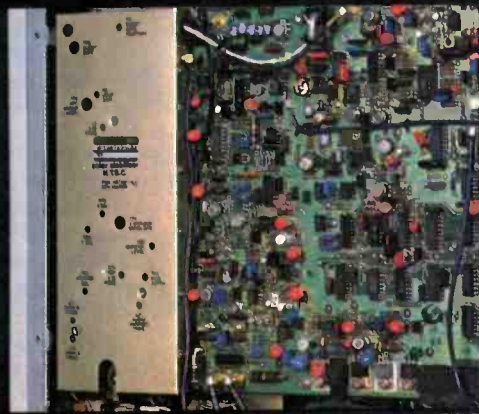
# AMPEX

Ampex Corporation, Audio-Video Systems Division  
401 Broadway, Redwood City, CA 94063  
415/367-2011

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EXCLUSIVE DUAL-CUE EDITING



BUILT-IN COLOR STABILIZER



PLUG-IN AC POWER PACK

## Edit controllers

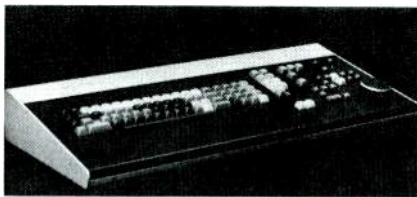
the list and stay with each edit

- Relay closure interface to operate non-time code devices.

The EES-9 controller is equipped on all BCN-50s and BCN-51s and is designed for simple machine editing. The unit will control two machines; one record and one play. In- and out-edit points are selected during playback of the record VTR. The edits can then be previewed and trimmed one frame at a time by a plus or minus trim key on the front panel of the VTR.

Circle (256) on Reply Card

## Harris Video Systems



The Epic

The HVS Epic is a software-based, central processing system that provides on-line or off-line editing with multiple VTRs from quad and 1- to 3/4-inch videocassette units. The basic three VTR system can be expanded to eight VTRs or more by the addition of plug-in interface cards and can be interfaced to almost any computer-compatible video switcher. Standard functions include look ahead, jam code editing, color framing, user bit identification and adjustable cue time. A major feature of the HVS Epic is multi-tasking. This feature enables the editor to perform several functions simultaneously. With multi-tasking, the editor can edit on one VTR, write time control on another and print an edit list on the optional printer.

New this year for Epic is the new film and videotape editing software and hardware allowing film producers to shoot on film, edit on tape and conform the film in the usual manner.

According to Harris, the Epic system is designed to carry out editing decisions instantaneously. Commands and the edit screen display are in plain English. The integral list management allows the user to modify edits within the list, and the results are seen and verified immediately.

Other features of the Epic are:

- Master/slave option—to synchronize of up to eight VTRs
- On-the-fly sync roll
- Auto assembly with look-ahead
- Time sharing capability gives greater flexibility

- Full edit list management
- Editing may be done with SMPTE time code, control track or user bits
- Jam sync time code
- Mixes drop and non-drop frame time codes
- Notes are recorded with each event.

Circle (257) on Reply Card

## ICS (Interactive Systems Company)

ICS offers to the editing industry a variety of editing software designed to offer alternatives to the computer editing systems user.

Super Edit is a software program designed to be used in any CMX system—in essence, upgrading older systems to the latest software available. Super Edit was designed by David Barga independently of CMX, but is offered to CMX users and offers many features not found in current CMX software. Some of these features are:

- Auto track—keeps play and record times in sync
- Auto clean—cleans up the edit list as you go
- Events that have been recorded are marked with an "R"
- Preset allows the user to generate a custom program suited to the user, eliminating needless initialization operations.
- Fast display—allows user to scroll up to 20 events per second
- Auto assembly either sequentially or in checkerboard fashion
- Master slave
- Edit storage on floppy disc or paper tape
- 17 constant registers
- Complete list management and text editing
- For NTSC or PAL editing.

ICS also offers expanded general interface hardware.

Other software editing programs offered by ICS include:

- 409 cleanup program
- Trace program
- Punch card converter program
- Videotape duplicator
- Animation program
- Utility programs

Circle (258) on Reply Card

## JVC Professional Video Div.



RM-88U

The RM-88U editor can control any combination of three 1/2-inch VHS or

3/4-inch VCR units, feeding a master recorder. It features a number of editing functions that are automatic, including independent entry for edit-in and edit-out points for both the player and the recorder in the system. This allows complete automatic start/stop control on edits. There is also a counter display of these edit-in and edit-out points. It also has edit point correction, so a user may shift and correct edit points with frame-by-frame accuracy. The indicators on the RM-88U may be used to display edit lap time. Also, the unit has both preview editing and automatic pre-roll editing for successive assemble edits.

Additional features include: frame-accurate videotape editing and FM-to-FM dubbing capability; simplified editing control sequence, full-function counters for both the player and the recorder in the editing system (counters indicate tape travel in hours, minutes, seconds and frames on a 7-digit florescent display); preview capability for rehearsal edits and selectable assembly or insert editing; and split insert editing capability. Either of two audio channels or the video channel may be replaced in the editing process, independent of any other signal.

Circle (259) on Reply Card

## Jatex Inc.

Jatex exhibited its VSEC-62TMX A/B Roll Edit Controller that is interchangeable with virtually any combination of video players and recorders without modification to the VTRs, with interfaces for 1- and 3/4-inch available. Scene-Dex code gives frame accurate automated editing with every function a SMPTE editor does, including match frame special effects. Separate VTR transport controls allow a complete range of variable speed jog and search functions. Options include SMPTE/EBU interface, up to 999-event memory, single or dual floppy disc operation, CRT status display and edit decision list with event ripple.

The VSEC-42T is microprocessor-controlled and capable of working with any combination of capstan servoed VTRs without modification of the VTR, handles remote control functions for the VTR and uses Scene-Dex time code for addressing edit points.

VSEC-42TD, designed around the 42T, is compatible with it and offers increased capability using remote control on the source and record machines.

Circle (260) on Reply Card

## Panasonic Video Systems

The NV-A960 is an automatic editing controller for insert and assemble edits. Both entry and exit

# Dolby®

## Plug Better Sound Into Your Picture

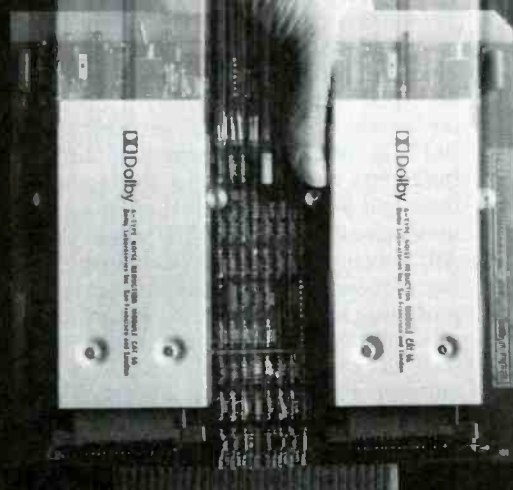
The Dolby® Cat. No. 155 or 255 module allows you to plug the benefits of a Dolby A-type noise reduction directly into your Sony® BVH-1000/1100 or Ampex® VPR-2 1" VTR.\* Operation is fully automatic. And at long last the audio performance of your VTR will rival that of professional audio tape recorders.

Dolby A-type noise reduction has been accepted for years throughout the world for high-quality tape recording and other audio transmission and storage media. It provides 10 dB of noise reduction from 30 Hz upwards, increasing to 15 dB at 9 kHz and above, without the audible side effects (such as noise modulation and overshoot distortion) associated

with more conventional techniques. Dolby noise reduction can also lead to lower distortion, as it permits more conservative recording levels to reduce the risk of tape saturation.

Today wide audio bandwidth and low noise are becoming commonplace in many parts of the television origination/transmission chain. Contact us to find out how Dolby noise reduction can prevent the VTR audio track from being one of the weak links.

\*Outboard Dolby noise reduction units are available for use with virtually any other video or audio recorder. Circle (28) on Reply Card



# Dolby®

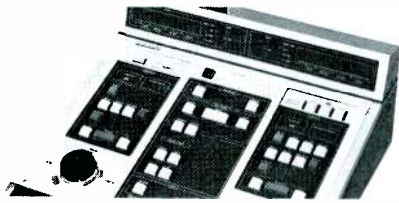
**Dolby Laboratories Inc.**

731 Sansome St.  
San Francisco,  
California 94111  
415-392-C300  
TELEX 34409

346 Clapham Road  
London SW9 9AP  
England  
01-723-1111  
TELEX 919109

## Edit controllers

points are found through the controller's search function that can memorize specific tape points along the entire length of the tape. The unit displays control pulses on LED lap-time/address time indicators in hours/minutes/seconds/frames.



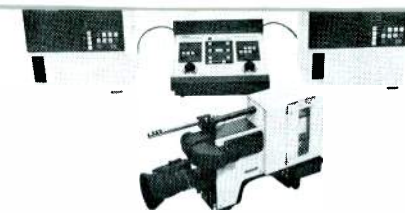
NV-A970

An editing controller, which incorporates ease-of-operation, system versatility and SMPTE time code accuracy, was introduced by Panasonic at NAB '81. The NV-A970 editing controller is equipped with microprocessor-based logic control to allow insert and assembly editing on Panasonic 3/4-inch B2 and G2 models AU-700, NV-9600, NV-9240, NV-9500A and NV-9200A and also permits 1/2-inch VHS assembly editing using Panasonic models NV-8170 and NV-8200.

The NV-A970 ensures editing accuracy through specifically referenced in and out points. The controller reads CTL pulses as well as SMPTE time code information. LED indicators are provided to display lap time and address time in hours/minutes/seconds/frames. With the NV-A970, exact edit points are located using sequential speed dials that permit searching at 1/20x, 1/5x, 1x, 2x and 5x speeds in both forward and reverse as well as pause for a still picture on a monitor when used with AU-700/NV-9240/NV-9600.

The Panasonic editing controller has a length-of-tape memory for entry and exit points of video and audio with edit entry and exit for both source and editing decks individually selectable. A pre-roll function backspaces each recorder so both will be up to speed and locked in sync when the edit point is reached. Pre-roll time is a short 4.5 seconds. Additional features on the NV-A970 permit checking and numerical trimming (+ and -) of entry and exit points on both source and editing decks, plus single field shift (+ and -) buttons when used with the Panasonic AU-700 recorders. The NV-A970 is also capable of on-the-fly cue.

One of the highlights of NAB '81 for Panasonic was the introduction of an innovative video recorder/camera (VRC) combination system and its full-feature studio editing system. The



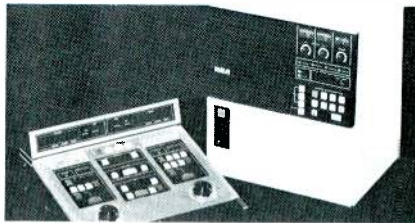
The new editing system consists of two editing VTR machines and one editing controller.

system uses a 1/2-inch videotape cassette and 3-tube color TV camera to produce broadcast-quality program material.

The new Panasonic system editor handles the controlling functions for two 1/2-inch VCR machines for insert and assembly editing, with capability for search in forward and reverse at up to eight times play speed. Other features include individual edit point selectors, preview, review, return and go to functions with LED time/lap indicators for accurate control. Individual machine shuttle controls speed edit point location.

Circle (261) on Reply Card

### RCA Broadcast Systems



HE-1 Edit Controller (left). HR-2 Studio VTR (right).

One of the big items for RCA this year at NAB '81 was the combination video recorder/camera (VRC)—the Hawkeye HR-1—and its companion HE-1 Edit Controller and HR-2 studio VTR ChromaTrack 1/2-inch HVS cassette system.

The HE-1 is ideally suited for use in news or production and is a control track edit controller, providing microprocessor control of two HR-2 VTRs.

Precise edit points are located quickly, using the search control dial. Ten dial-selectable speeds permit moviola-type editing, at speeds from  $\pm 8X$ ,  $2X$ ,  $1X$ ,  $X/4$ ,  $X/16$ , and still, with viewable pictures at all speeds. Fast, simple and precise edits become routine.

Edits can be made using either the playback or record VTR as a decision point reference. Decision points also can be located "on-the-fly." The HE-1 performs split audio-video edits routinely, as well as automated insert and add-on edits. Automatic preview and review functions are also included.

The AE-600 is capable of controlling one record and up to any combination

of eight playback TR-600 quad or TH-200 1-inch VTRs. The system uses SMPTE/EBU time code in either drop frame or non-drop frame modes. Editing capability includes complete lockup, color framing and synchronization of all TR-600As and TH-200s in the system within four seconds, split audio only, audio-video edits and as many as three independent edits on the same tape pass. Other features of the AE-600 when used with the TH-200 recorders include five different preview modes, automatic update mode, master recall mode and a special mode for animation.

The SE-1, a built-in editing device for the TR-600A VTR, counts control track pulses to provide both in- and out-edit point selection. Features include automatic re-cue, variable pre-roll time and programmable relay closure. Edit points may be shifted over a range of  $\pm 99$  frames in single-frame increments.

The RCA AE-800 editor is designed to be used with its TR-800 1-inch VTR only. The unit offers all of the same features as the AE-600, plus it offers six preview modes, built-in printer output, the capability of editing all of the channels of the 1-inch machine, field edit capability and selectable post-roll up to 10 seconds. The unit will also synchronize and edit in variable play.

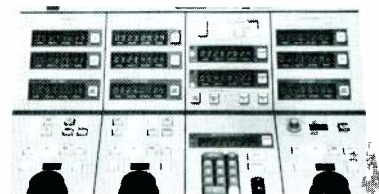
The SSE, a built-in editing device for the TR-800 VTR, will work with control track or SMPTE/EBU time code. Features include 9-point search to cue, out-transfer mode, store-direct mode and unlimited edit point shift. Other features include automatic re-cue, variable pre-roll time and programmable relay closure.

Circle (262) on Reply Card

### Sony

Rounding out its complete line of professional broadcast editing systems, Sony Video Products Company's Broadcast Division unveiled its new BVE-3000 editing system at NAB '81.

The Sony BVE-3000 is a 3-machine editor with a built-in SMPTE time code generator. An optional module is available for VITC read capability. If time code is selected but tape signals are missing, CTL control is automatically selected.



BVE-3000



# Introducing... the Editor-in-Chief.



## Stickler For Details

Fast, accurate decisions and a "mind" for details, that's why Z-6 editing systems are in demand by broadcast newsrooms throughout the country.

With a Z-6 system, you get frame accurate editing, plus all the useful functions of the SMPTE Time Code, *without* all the problems.

What's more, a Z-6 can track SMPTE Drop Frame or Non-Drop Frame, 24-frame film rate, or any other time base. And, it will "translate" codes for you, adding or subtracting real, decimal or mixed numbers for precise scene and program length computation.

## Easy to Work With

Dissolves, wipes, animation, effects, split edits and text editing. The more arduous the editing session, the more you'll appreciate working with a Z-6. Since each key on the Z-6 has a definite, single function, the entire system is easy to use and understand.

Its Auto Edit feature and full look-ahead/behind logic simplify the handling of complicated editing tasks.

With a Z-6, you can pick in or out points on-the-fly; maintain "lip sync" throughout the entire tape during all editing procedures; and do A, B, C external rolls on one pass.

Then, when you're finished editing, you won't have to make a dub—because the Z-6 can automatically edit an exact duplicate tape for you.

## Knows Who's Boss

When you're working with a Z-6 editing system, you are Chairman of the Board. Its microprocessor-based controls were developed by editors for editors. And, its features are designed to take the drudgery out of editing.

For example, the Z-6 automatically loads edit point locations so you can edit pictures instead of numbers. Its ability to randomly locate single frames on any tape in the system saves you time. And, its operator prompting messages are intended to prevent the type of errors which could result in the need for major re-editing.

## Stays in Budget

Best of all, a Z-6 editing system is a financially sound investment. Just purchase the version that meets your *present* requirements.

If you don't need features like multiple source, effects or multi-event memory, you won't be penalized for not buying them.

Since every Z-6 editing system is fully upgradable, all you pay is the *difference* between the price of the model you own and the price of the model you want.

For details on the entire line of Z-6 systems, call or write today:

# Videomedia

Professional Television Systems  
250 North Wolfe Road  
Sunnyvale, CA 94086  
Telephone: 408-733-6500

Circle (29) on Reply Card

## Edit controllers

The BVE-3000 offers selectable reaction trim and automatic pre-roll times. Its color frame "learn" system will automatically check for repeated time code offset between record and play machines. A color frame lamp blinks if conditions are not met.

A numberless editing system allows edit points to be marked and executed using only visual information on monitors. In, out and tape time registers can be blanked to permit edits to be marked, previewed and executed without reference to numerical information. Full audio and video split in and split out-point editing is an additional feature of the BVE-3000.

Sony's exclusive register design enables data to be transferred from any source to any destination by pressing two buttons, eliminating the need for address copying from a keyboard. Additional features include:

- A/B roll capability
- Built-in switcher effects for preset of cut, dissolve or wipe at transition points
- Auxiliary video/audio inputs
- TTY interface to list and punch edits
- A port for controlling an external switcher/effects generator. A complete set of maintenance diagnostics are included with the system software.

Sony's BVE-5000 Precision Computer Editor has been improved this year with new features such as variable speed motion control editing. Improved software also contributes to the BVE-5000's efficiency. This system combines a microprocessor and interactive software to make editing easier and faster. Vertical interval time code adds the capability to precisely locate frames and store edit data in the list with a minimum of effort on the part of the user. Other features:

- Editing by a combination of SMPTE time code and vertical interval time code
- More than 500 edits may be stored and executed
- Look-ahead search and auto assembly
- Safeguard logic alerts user to possible errors
- Up to six VTRs or ATRs interfaced at one time
- Color-coded keyboard
- Edits may be stored on paper tape, floppy disc or be printed out.

The BVE-1000 2-machine editing console is an advanced machine designed to operate on SMPTE time code with any combination of Sony BVH and BVU studio recorders. Emphasis has been placed on human

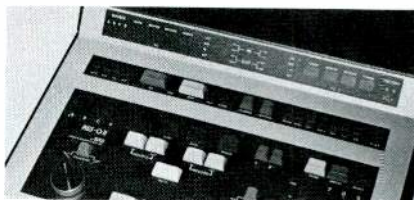
engineering and operator convenience so that all machine functions and registers that define activity are logical and clear.

With the BVE-1000, editing may be performed by reference solely to the video on the picture monitor or by reference to numbers on a complete array of clearly visible display registers. Pre-roll, search and cueing operations may be accomplished even though time code is missing or discontinuous.

The BVE-500A unit is a control-track controller designed for use with Sony Broadcast's BVU-200A series of recorders. The unit features Sony's Bidrex search control, self-returning search dials that replace push-button speed selectors and permit forward and reverse search at tape speeds of 2X, 1X, 1/5X and 1/20 normal speed; a decision prompting system; automatic return to out edit point; extended time counter capable of  $\pm 79$  min/59 sec/29 frames; and the capability for editing video, audio/channel 1 and audio/channel 2 separately or simultaneously.

Circle (263) on Reply Card

### UNEMCO International



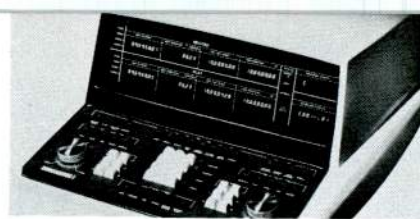
#### RES-QII

The EDITMASTER controller is a microprocessor-based unit requiring no modification of the VTRs. Remote control capability includes bi-directional search, variable pre-roll cue times and time display readout in either EBU/SMPTE time code and user bits or control track. Modular design distributive processing permits growth. Options include color graphics data, CRT/Video monitor and CMX compatible edit decision list with more than 1000-event memory. Programmable audio-follow-video switcher or manually lockable search with separate variable speed controllers for source and record machines, serialized communications with single wire interconnect and control of up to 14 VTRs. A, B, C, D rolls plus record 1 and record 2 in any one event.

Circle (264) on Reply Card

### United Media

The Commander II computer-assisted editing system is capable of multiformat masters, with any combination of 2-inch quad, 1-inch and 3/4-inch VTRs (up to eight). Combining



### Commander I

keyboard, computer, CRT, SMPTE/EBU readers and generator, VTR interfaces and automatic switcher control, the internal memory retains 500 edit decisions, a single floppy disc expands memory to 10,000. When decision list is completed (paper tape and reader are available), the controller may take over, automatically looking up each edit in "Auto Assembly."

- Interfaces up to eight VTRs
- Intermixes any combinations of 3/4-inch and 1-inch VTRs and ATRs
- Memory storage of up to 500 events internally or up to 10,000 events stored on a floppy disc
- Sync step mode allows "on the fly" real time editing
- Controls up to three mix/effects buses on video switcher
- Full look ahead search and cue for real time assemblies
- List management an integral part of software
- Automatic color framing.

The Commander I incorporates computer, keyboard, display, 25 edit decision memory, two SMPTE/EBU readers and two VTR interfaces with paper tape interface for split-end edits and "on-the-fly" in/out marks on Audio 1, Audio 2, or Video; automatic assembly of events stored in memory or on paper tape; automatic and manual color framing. This modular system features separate motion controls for each VTR, including variable speed, yet is compact, self-contained, and portable. Features include:

- Self contained desk-top editor
- Two VTR interfaces
- Built-in time code readers or control track editing
- Split edits
- Auto assembly from internal memory or paper tape input
- Interfaces with most 3/4-inch U-Matic or 1-inch VTRs.

Circle (265) on Reply Card

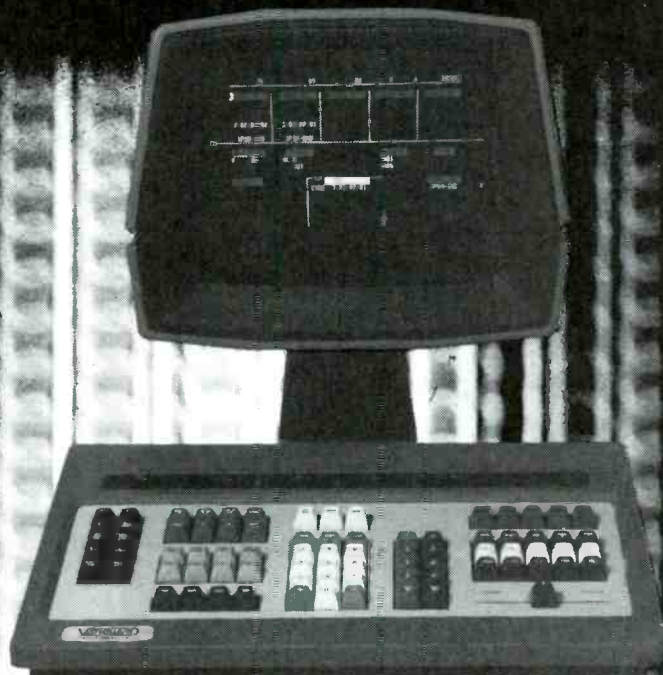
### Videomedia

Videomedia offers a series of "Z" editors ranging from the Mini-Z to the Z6B, Z6C, Z6D and the current Z6E. All feature micro-lok code reading. Some versions also include SMPTE and control track editing as well. Other interesting features of the Z6 family include:

- Mixed time code editing
- Edits may be stored on the edited master tape in a digitally encoded form at the rate of six events per field of video

# The Trend Setter

When It Comes To Professional Editing,  
VANGUARD Creatively Does It All



- Controls 5 VTRs plus switcher and DVE
- Performs A/B rolls and A/B/C/D sync'd rolls
- NTSC/PAL/SMPTE/EBU code or control track operation, insert or assembly
- Interfaces for over 40 types of tape decks and film chains
- Dual VaraScan™ variable speed tape search controls
- 999 event edit list memory
- Uncomplicated, powerful edit list management
- Auto-assembly from up to 4 sources

- Paper tape or floppy disk edit list I/O in industry-standard formats
- Five-tier time code scratchpad memory
- Built-in scratchpad time code calculator performs mixed drop/non-drop frame addition and subtraction
- Edit and split times can be marked on-the-fly or keyboard-entered
- Auto-tag, with override
- Well organized editing status display on eye-soothing green CRT screen; dedicated function, color-coded keyboard
- Selectable preroll, postroll and reaction time

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Vanguard leads the way in giving creative editing professionals innovative new editing system features that add new dimensions to the editing craft. Latest in a long list of Datatron firsts is SmartScan™ learn mode variable motion editing. This feature opens the door to a dazzling array of slow-mo, high-speed and freeze-frame edit effects. SmartScan lets you speed the action up, slow it down, freeze it or change directions, all with a single slide control; every move you make is memorized by the Vanguard system, faithfully repeated in your next edit, and reflected in the edit decision list. Perform freeze-frame edits automatically, with or without



subsequent learned motion; compress or expand edit segments to fill time slots — automatically; select exact, calibrated play speeds for your VTRs over their full speed range. All this and more can be accomplished quickly and easily with Vanguard's SmartScan feature. There simply isn't another editing system you can buy that comes close to Vanguard's capabilities. BE A TREND SETTER; GET A VANGUARD

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(714) 544-9970 TWX 910-595-1589

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# datatron, inc.

MAKING CREATIVE EDITING AFFORDABLE

# NOW, ONE MICROPHONE CAPTURES IT ALL.

The Sennheiser Telemike Electret Microphone System.

Its unique modular design provides all the flexibility and precision of a collection of separates—from omni to super cardioid, spot to shotgun, telescopic boom to tie-clip lavalier.

All, at a fraction of the price of comparable separates.

And all, with the most advanced electret technology available: our unique back-electret.

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All components available separately or as a package.

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# Broadcast Production Consoles

GREAT AUDIO STARTS HERE

### FEATURES:

Stereo Outputs  8 or 12 Channels

Up to 24 Inputs  All Inputs &

Outputs Balanced  QM-

8P, 4 Stereo Channels standard, 0,

2 or 6 optional  QM-12P, 4

Stereo Channels standard, 0, 2,

6, 8 or 10 optional.

**Input Channels:** 3 Knob EQ

with In/Out Switch  Echo,

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Channel On and Remote

Start  High Quality

Conductive Plastic Faders.

**Output Channels:** 4 Balanced  Low

Noise, Low Distortion  May be

Stereo or Mono.

**Monitoring:** 4 Independent Monitors

Flexible Control Room Selection

Talkback to Studio Muting

QUANTUM offers the following options for the QM-8P and QM-12 P:

Phantom Power Supply  104 Point

Patchbay  8 or 12 Channel Input

Expander.



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Telephone (213) 841-0970

Quantum Audio Labs is an independent manufacturer and is not affiliated with any retail store.

Circle (75) on Reply Card

## Edit controllers

- Auto assembly with look-ahead
- Animation from camera or VTR
- Split edits
- Auto edit tag
- Cruise control of VTRs.

All Z6 series controllers are upgradable to higher levels at any time.

The Mini-E Post-Production System was developed for 3/4-inch only users who need A/B roll systems with switcher control but who have budget constraints. Without Z-600 interfaces required, the Mini-E includes a computer-controlled special effects generator and a 99-event memory.

The Mini-M Editing System allows user control of three 3/4-inch machines and performs all functions of the Mini-E except control of a special effects unit. Optional 6X1 audio-follow-video cuts only switcher provides off-line editing for a Mini-E or Z6E by producing the edit decision list from an RS-232 printer port.

The Mini-Z system single-event editing system is frame accurate with Micro-Loc coding, random access to the frame on either VTR, event back-timing, upgradable to any Z system, edit trims, rehearse, perform, and review, as well as full VTR remote control and bi-directional shuttle for each machine.

The Z6B incorporates all of the features of the mini Z and 99-event memory, auto edits, split ends, animation and recall features.

The Z6C incorporates all the features of the Z6B plus the capability for tracking and converting SMPTE non-drop-frame and drop-frame code.

The Z6D includes all of the features of the Z6B plus dump to tape, dump to printer, drop frame and non-drop frame capabilities.

The Z6E includes all of the features of the Z6D, plus switcher control, A/B/C external rolls, text editor and individual microprocessor-controlled interfaces.

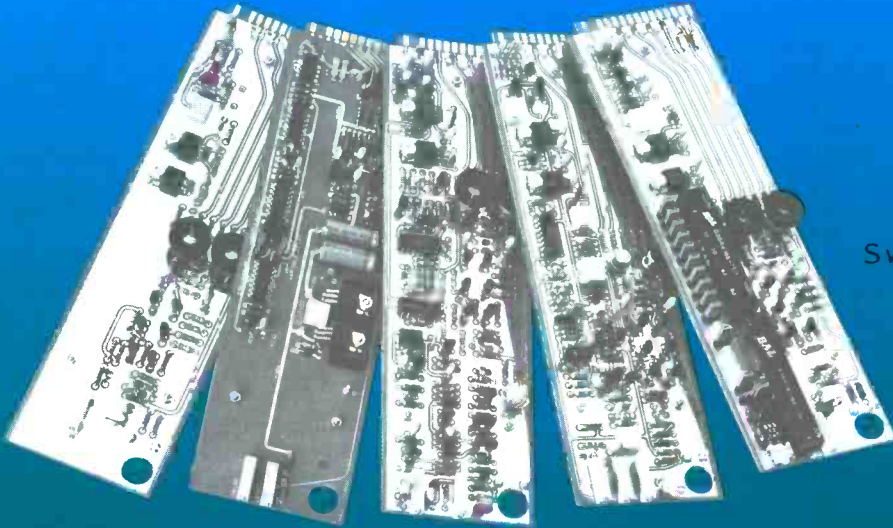
The Z6-M editing system allows control of virtually any transports via the Z-600 interface and performs all functions of the Z6E except special effects switcher control. An optional 6X1 audio-follow switcher for "cut only" use is available.

The Z6000A was introduced this year. The newest member of the Z6 family includes the following standard features:

- A/B rolls
- Up to 4-way split edits
- Auto extend
- Auto edit tag
- Full VTR status verification
- Four Z-80 microprocessor controllers.

Circle (266) on Reply Card

# SIX OUTPUTS!



VDA-661  
Video Distribution Amplifier

VEA-660  
Video Equalizing Amplifier

VCA-660  
Video Clamping Amplifier

SVD-660  
Switchable Video Delay Amplifier

PDA-660  
Pulse Distribution Amplifier

## FR-660 MOUNTING FRAME

- Two rack units.
- Two plug-in power supplies.
- Looping inputs.
- Any mix of up to ten amplifiers.

## FR-661 MOUNTING FRAME

- One rack unit.
- One plug-in power supply.
- Looping inputs.
- Any mix of up to four amplifiers.

*Full compatibility with 600 Series mounting frames and amplifiers.*



# LEITCH

*Progressive Concepts in Television Technology*

Leitch Video Limited, 705 Progress Avenue, Scarborough, Ontario, Canada M1H 2X1  
Tel: (416) 438-5060 Telex: 065-25420

Leitch Video Inc., 1151 Clinton Street, Buffalo, N.Y. 14206  
Tel: (716) 852-1535

Circle (31) on Reply Card

# Sony unveils its High Definition Video System

In an industry surprise move following NAB '81, the Sony Corporation announced in Japan that it had developed a new, high-standard video recording and playback system called *Sony High Definition Video System (HDVS)* to expand the uses of video and television toward the new image requirements of the 21st century. Sony claims to have become the first company in the world to demonstrate a high-definition TV system that incorporates video recording capabilities. This high-definition video system is a result of Sony's research and development work in future-oriented visual information technology.

The prototype HDVS by Sony features 1125 scanning lines and 60 fields per second with a frequency

band width of about 30 MHz, which can contain five to six times more information than the present NTSC standard color TV system. The NTSC system used in Japan, the United States and some other countries uses 525 scanning lines and 60 fields per second with a maximum bandwidth of 4.2 MHz.

Based on the recording and processing of wide-band video signals, this is a total video system to meet the requirements of high-definition images, including a new video camera, VTR, display unit and other video-related equipment.

With the standard TV system, which uses 525 scanning lines, it is impossible to obtain pictures of high resolution approaching the quality of 35mm film. However, supported by the rapid

advances in video technology in recent years, there has been a growing interest in high-definition pictures among the TV broadcasting, cinema and other image-handling industries in the world. This global interest in high-definition images has already stimulated the reassessment of the present broadcasting systems.

In the meantime, Japan Broadcasting Corporation (NHK) conducted research and development in this field for the first time back in 1968. The NHK system, which also uses 1125 lines, was demonstrated at the SMPTE conference in San Francisco in February, 1981. (See *BE* April, 1981, pp. 100-102.) NHK showed its high-definition TV system at an FCC



Photo print of a picture produced by Sony's HDVS (1125 lines, 60 fields/sec.)  
(Courtesy of Sony Corp.)



Photo print of a picture produced by the standard TV system (525 lines, 60 fields/sec.)  
(Courtesy of Sony Corp.)



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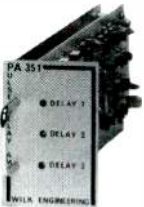
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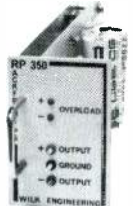
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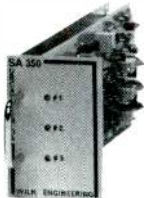
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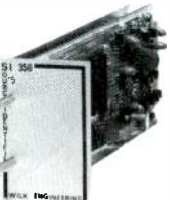
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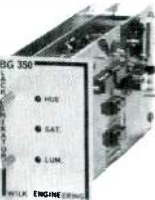
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## HDVS

gathering in Washington also. With remarkable features, the NHK system is attracting the keen interest of the world's broadcasting industry as an initial step toward the coming era of high-definition visual information.

Based on NHK's HDTV technology, Sony has developed this high-definition video system by adding video recording, time base correction and other capabilities. Sony expects to play a significant role in promoting and enhancing the high-definition technology as proposed by NHK, and

providing a direction for the new image industry of the coming era.

Sony has demonstrated this HDVS prototype so as to substantiate its feasibility as a highly potential video system in the coming age of high-definition pictures. The new system is expected to improve dramatically the economical efficiency and expand the production techniques of motion picture production with its electronic shooting and editing capabilities. The system ensures that the picture resolution is the same as the present 35mm

film.

The 1125-line Sony High Definition Video System mainly consists of the following equipment:

- High-definition 3-tube TV camera, which incorporates a newly developed 1-inch Saticon high-resolution pickup tube.
- 1-inch wide-band RGB VTR, which employs a new high-density recording format.
- Wide-band digital time base corrector, which features a new wide-band A/D converter.
- 20-inch and 32-inch high-definition Trinitron monitors with a fine-pitch Trinitron picture tube.
- 100-inch high-definition TV projector with a wide-band picture tube for projection use.

The HDVS incorporates a 3-channel component signal system that processes three different color signals (red, green and blue) separately from the input to the output of video signals. This new signal system accommodates a wide band width of about 30 MHz for each of the three color channels.

### Main specifications of the Sony High Definition Video System

Signal system . . . . .	RGB component 3-channel system
Horizontal scanning lines . . . . .	1125 lines
Number of fields . . . . .	60 fields per second
Interlace . . . . .	1:2
Aspect ratio . . . . .	1:1.33 (Standard) or { 1:1.85 (Vista) 1:2.35 (CinemaScope)
Band width: . . . . .	About 30 MHz per channel

### Numerous possibilities of HDVS

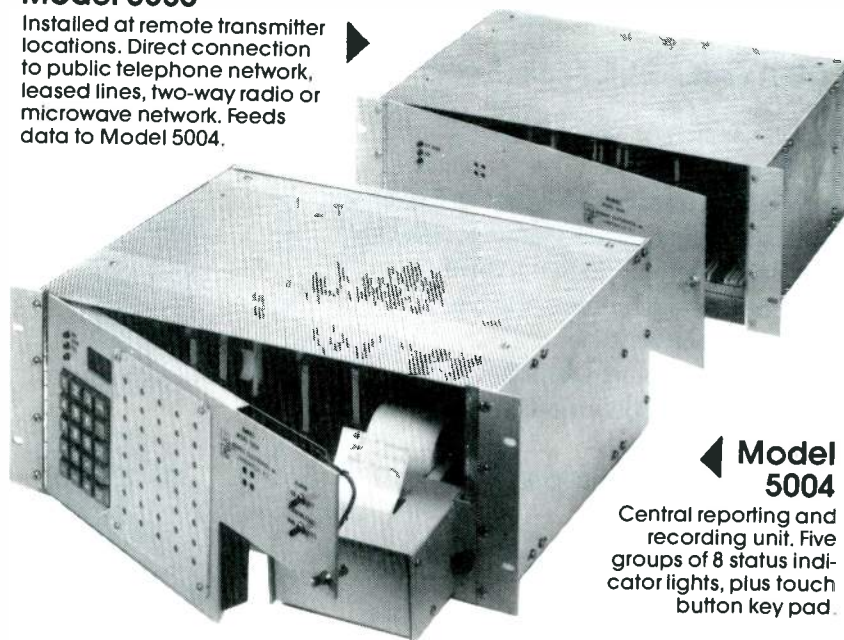
Sony's 3/4-inch video system has been used in Electronic News Gathering (ENG) by TV stations in the last nine years, steadily replacing 16mm film because of its economy, efficiency in program production and convenience in editing. Video is used not only in news events, but also in production and editing of programs. Now, the Type C 1-inch VTR developed by Sony is widely used for producing, editing and broadcasting TV programs.

However, the present standard TV system, which uses 525 lines and 60 fields per second, cannot provide a picture resolution as high as that of

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That's astounding efficiency. But that's the *bulb's* output. How much of that light gets onto the subject depends on the efficiency of the lamp-head. How many watts are drawn depends on the efficiency of the distribution system.

HMI bulb efficiency has made it worthwhile to overcome the draw-

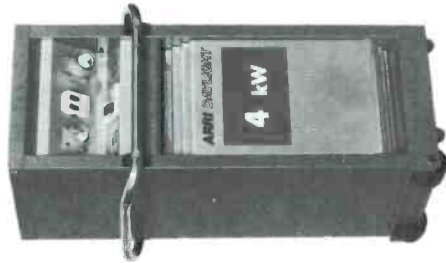
backs — notably flicker. ARRI began on that early. We've been making motion-picture lighting equipment since the Thirties. In the Sixties, we began experimenting with HMI's forerunner, Radium street lights. In 1972, we pioneered the use of HMI for filming, at the Olympic Games.

But at the Olympics we were still plugging the new HMI bulbs into conventional lamp-heads designed for tungsten point sources. (HMI, of course, is an arc.) As Osram perfected the HMI bulb, one thing became obvious: Since efficient output was the HMI bulb's claim to fame, the delivery system must, above all, be as efficient as possible. That meant *new* lighting designs.

ARRI's engineers didn't have to adapt. Their new lamp-head designs take maximum advantage of the HMI bulb's characteristics. The ARRI 4K, for example, has a 19.7 inch diameter Fresnel lens. Most other 4K HMIs use a 14 inch.

Peter Edwards is Chairman of the Society of Television Lighting Directors, Canada; and he is Supervising Lighting Director at CFTO-TV

Connectors and switches on ARRI HMI ballasts are recessed. A yellow ground test button lights up if you have a good ground.



ARRI HMI lights are available in the four standard AC configurations: 575W, 1200W, 2500W and 4000W, plus a 200W battery-powered unit. Shown here: the 4000W.



4000W light shown here has 19.7 inch Fresnel lens with wire safety grid.

Tube frame protects ignition housing, acts as floor stand.

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in Toronto. He has won two Emmy Awards for lighting. He ran side-by-side tests of the ARRI HMI 4K and two other brands of imported HMI 4K lights. "At 40 feet and full flood position, the best of the other two measured 150 foot-candles; the ARRI measured 200 foot-candles," says Mr. Edwards.

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## HDVS

35mm film because of its technical limitations. At present, therefore, 35mm films (occasionally 16mm films) are used for shooting and producing TV movies and motion pictures for theater projection. 35mm film provides about one million picture elements.

Sony's High Definition Video System, however, equals the 35mm film capabilities in definition and color fidelity, as it uses 1125 lines (with 60 fields per second) and the RGB 3-channel signal system. The HDVS, therefore, is expected to change the production and distribution methods of motion pictures dramatically in the future, challenging the dominance of 35mm film.

Some of the advantages of using video in movie making are:

*Economy and production efficiency.* The use of video in motion-picture production will lead to drastic reductions in raw film consumption, film developing, editing and other related costs.

A story can be perfected progressively and efficiently because video enables repetitive recording and playback of any segment of the story for on-the-spot preview and trial

editing at the time of collative reading (of a dialogue script) or rehearsing. Thus, the HDVS will reduce production time greatly by simplifying the work involved, including automation.

The new system can expand the range and scope of special effects by producing special effects through electronic processing with accompanying cost reduction.

As such, the use of video technology will reduce the total cost of motion picture production. Called *Electronic Cinematography* and enthusiastically promoted by Joseph Flaherty, CBS vice president, Hollywood film directors, Francis Coppola, George Lucas and other leaders, this kind of movie production is expected to change the conventional filmmaking techniques dramatically.

*Picture quality.* The Sony HDVS ensures as high picture resolution as 35mm film even on a VistaVision-size screen (aspect ratio 1:1.85), as it provides a wide band width of about 30 MHz for each of the three color (red, green and blue) channels. Also, because of its high definition, the new system ensures a wide range of color reproduction and fidelity characteristics unique to video.

*Distribution.* Electronic cinematography is expected to change the conventional method of film distribution as well.

What is produced in video can be transferred onto 35mm film by an electron beam recorder, or by means of laser recording, and then distributed to movie theaters. Also, the video production can be distributed in ¾-inch cassettes to so-called mini-theaters that are becoming popular in the United States and Europe, after converting it to an interim signal system (using, for example, 800 lines) between the HDVS and the NTSC standard systems.

Uses of the HDVS can be further expanded through satellite broadcasting, cable TV, or fiber optic transmission in the future.

In addition to the expansion of motion picture production techniques through video, the HDVS is expected to enhance the techniques of TV program production and broadcasting by the present NTSC system.

• Such special effects as electronic zooming and trimming can be easily provided in the post-production process, without degrading the picture quality.

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# HDVS

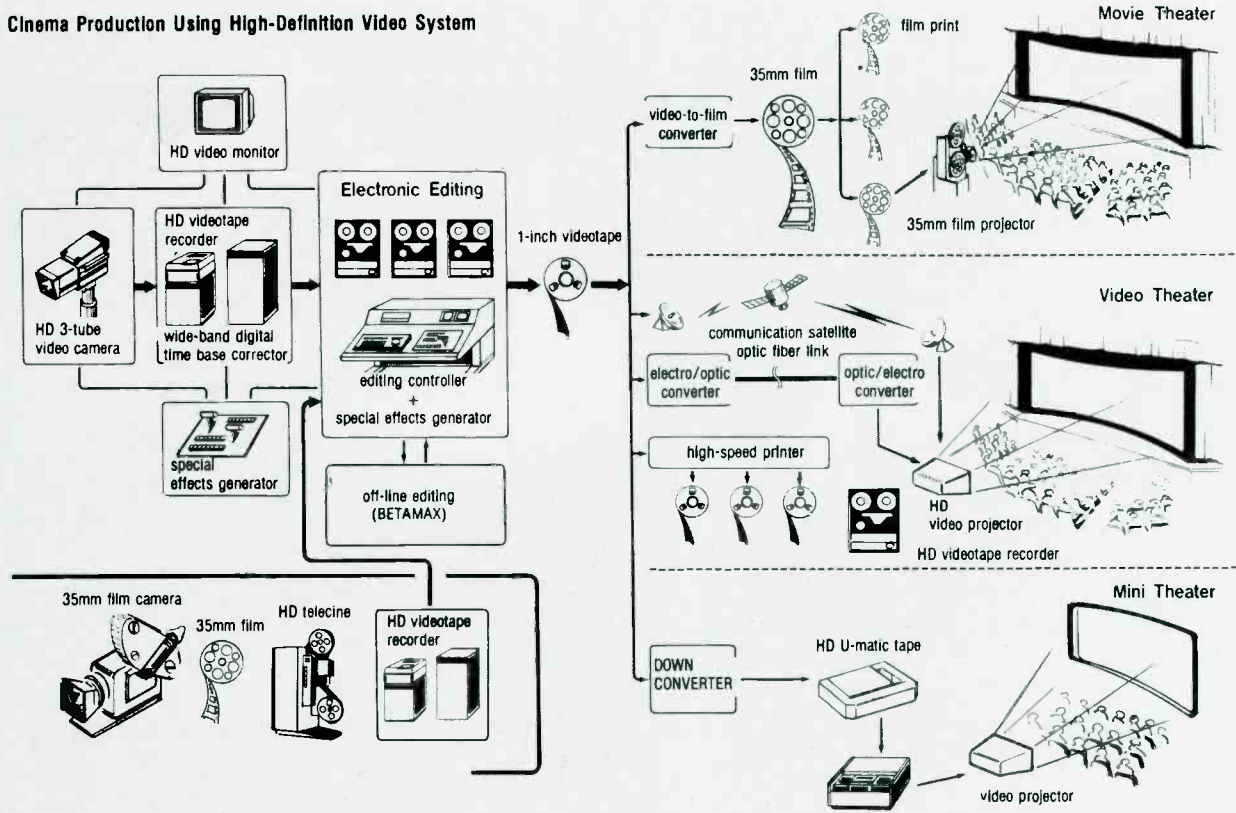
- Image enhancing, noise reduction, conversion to PAL or SECAM, besides NTSC, and other operations

can be done easily through digital image processing before broadcasting of programs that are produced by the HDVS.

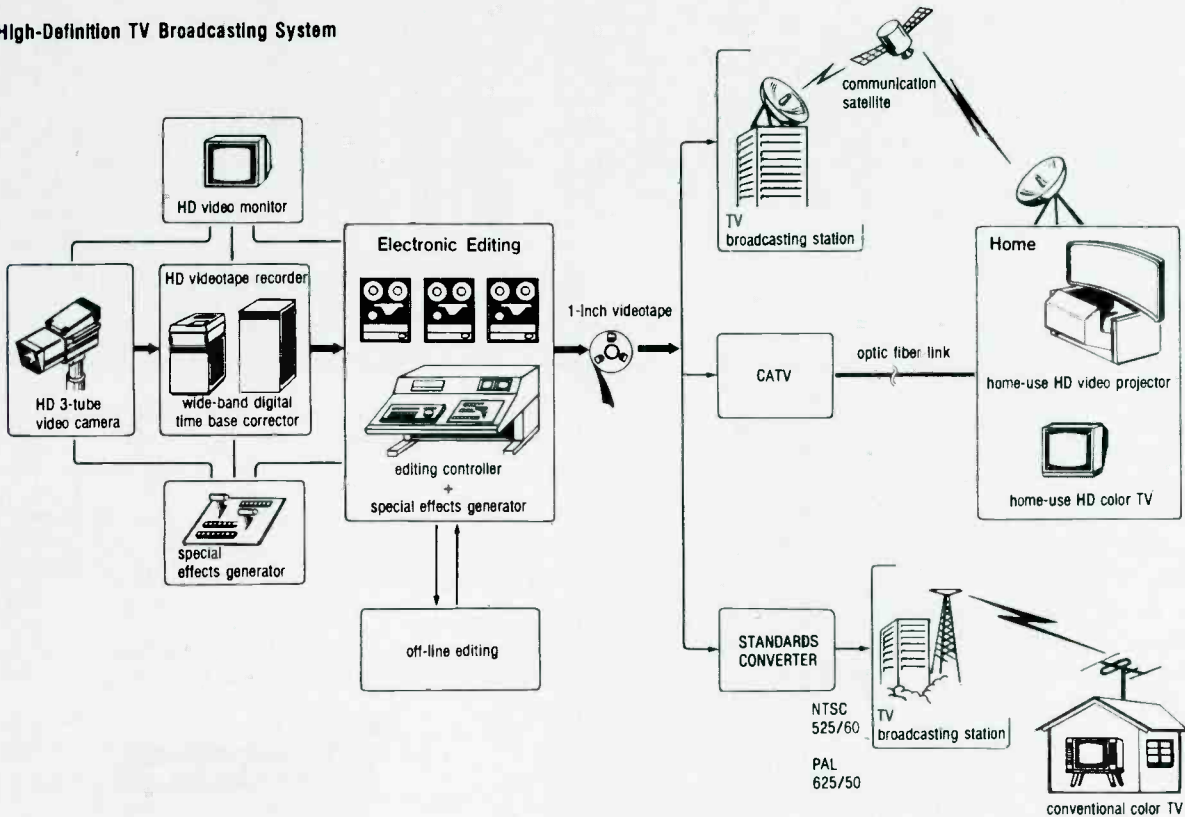
The demonstration of its prototype High Definition Video System puts

Sony definitely on a firm technological base for this advancing technology, and Sony plans to continue its research and development in the field for the coming era of high-standard visual information. □

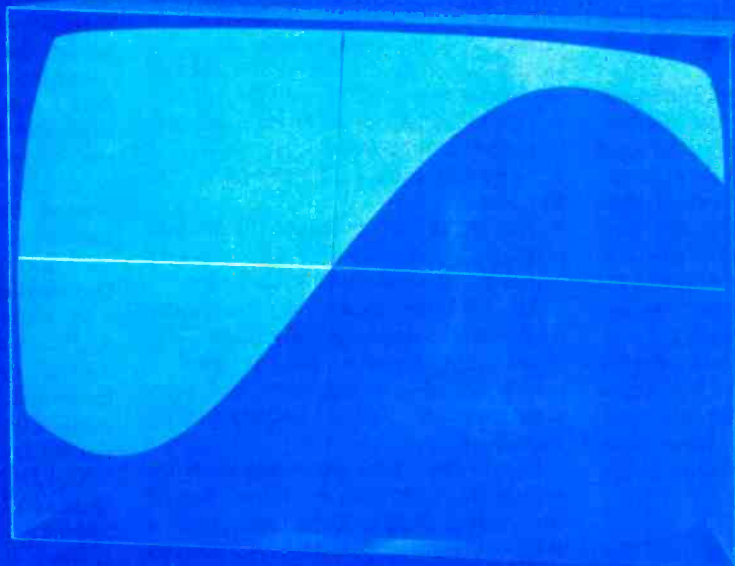
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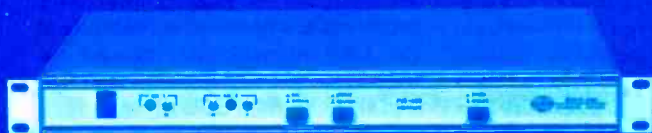
The Videoscope will display a full cycle of sub-carrier and will tell you when correct SC/H phase is (or isn't) on the mark.

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# Digital audio: A KQED experience

By Fred Krock, technical supervisor, KQED, San Francisco

KQED-FM has been using Sony PCM digital audio recording since last September. Its San Francisco Opera broadcasts Saturday afternoons on NPR were digital recordings.

This article will take a look at the elements of digital audio recording for a radio station. Although it will not cover the theoretical operation of digital audio, it will look at practical ways to integrate PCM recording into a radio operation.

There are many different models of videotape recorders on the market. Although the PCM system can be used with most of them, the general information about video recorders that follows may not apply to the particular machine being used. Radio stations associated with TV stations or with schools probably have easy access to video recorders already.

The Sony system offers broadcasters many advantages, but there are limitations that must be considered. The KQED-FM experience shows that it is worthy of serious consideration by NPR stations.

## The sound quality

The Sony PCM system sounds superb. It allows stations to go digital immediately, at modest cost. Up to four hours can be recorded on a single cassette, so operators do not have to monitor the feed to find tape change points in long programs. This means that tape stock costs and storage space can be reduced up to 75% over 7½ ips analog tape recordings.

Digital recording and broadcasting offer some challenges to the radio engineer: Editing is electronic,

A version of this paper was presented at the Public Radio Conference '81 held April 27–May 1, 1981, in Anaheim, CA. Highlights of this conference are carried elsewhere in this issue.



(Photo courtesy Norm Howard)

The author, on remote with the PCM 100, backstage at the San Jose Center for the Performing Arts at a performance of the San Jose Symphony.

allowance must be made for pre-rolling tapes, sequencing of digital tapes is more sophisticated than analog, and certain additional test equipment is necessary.

The Sony PCM system converts two audio channels into a standard NTSC video signal with the audio information digitally encoded. Sony uses existing video recording technology to obtain the required bandwidth. The system comes in three levels of sophistication:

- The PCM 1610 uses 16-bit quantization and costs \$28,000.
- The PCM 100 uses 14 bits and costs \$11,500.
- The PCM 10 records with 14 bits nonlinear and will play back 14 bits linear at a cost of about \$2500.

All systems can use the same 44.056kHz sampling frequency. The more sophisticated models give a larger signal-to-noise ratio, but they also require higher quality video recorders.

KQED-FM's first experiments were with a PCM 1600, an earlier version of the model 1610. Sony specified a BVU-200 (¾-inch U-matic recorder) as the minimum quality recorder for this device. When KQED used a cheaper ¾-inch U-matic recorder with synchronous capstan, the playback intermittently broke up at the TV field rate. Tapes recorded on the synchronous capstan machine would play back perfectly on a servo capstan machine.

The biggest drawback of the ¾-inch U-matic machines is the 1-hour maximum playing time of the U-matic cassettes. Wagner and others wrote opera acts longer than one hour with no pause to change tapes.

In order to seque digital tapes using only one PCM processor, two servo capstan VCRs, a video editor to synchronize the transports and a vertical interval switcher had to be used. If the switch was not made during the vertical interval, or if the two recorders were not synchronized, the digital decoder would usually crash when switched. It would mute and require about two seconds to recover.

The PCM 100 works with any Betamax, ¾-inch or VHS machine except at the slowest speed. The tape running time problem is solved because a single cassette can provide up to four hours recording.

The recordings made on the PCM 100 sound superb, and playback sound is identical with input. The biggest improvement is not the greatly increased signal-to-noise ratio. Rather, the most striking feature of the digital

recordings is how clean the high-level passages sound. This is probably caused by the total absence of noise modulation and the extremely low distortion levels of the digital signal.

People who have not recorded live music probably do not realize how much the signal is degraded by being recorded on tape. Virtually all the music played on the air or on phonograph records has been tape recorded somewhere in the process and already degraded. To demonstrate what happens, make an analog recording of a good digital or direct-to-disc phonograph record. Make an A-B comparison of the recorded sound with the original. The better the playback system the more dramatic the difference will be. Try the same experiment with a tape recording or with a phonograph record made from an analog tape recording. The difference between the tape and original source will be much less marked.

In a comparison of original music and that recorded by the Sony PCM digital recording system, the difference in sound is almost undetectable. The improvement in fidelity of the digital recording is startling.

KQED-FM uses the PCM 100 with a Quasar VHS recorder, a machine that happened to be available from the TV station that owns KQED-FM. The choice was not the result of extensive research.

KQED-FM uses 250-meter RCA cassettes that provide either two or four hours playing time. At the slower speed, the PCM 100 indicates more dropouts and a higher degree of error correction, but no audible changes oc-



## KQED Digital In Use

The author (left), demonstrates the Sony PCM 100 digital audio processor to Victor Ledin, KQED's music director. The station has been using the Sony system for recording and delayed "live" broadcasts of symphony performances. The complete season of the San Francisco Opera, as well as all tape-delayed broadcast performances of the San Francisco Symphony, San Jose Symphony and the San Francisco Concert Orchestra are included in KQED's programs. Programs are uplinked via satellite to the NPR network and carried nationally.

cur. However, the radio station had two cases in which manufacturing defects in the cassettes caused the PCM 100 to mute for about one-half second.

The RCA cassettes are not top-price cassettes. In fact, local dealers sell them as loss leaders. Whenever a local dealer had a particularly attractive sale price, the radio station would stock up below the wholesale cost, usually paying less than \$14 for each cassette.

The PCM 100 will mute when no signal is present or when the signal is too defective to decode properly. The PCM 100 is specified to correct for dropout errors of up to 32 TV horizontal lines and to compensate for errors up to 64 lines. Once the signal starts, the decoder requires about two seconds to synchronize and un-mute. The VHS recorder requires about five seconds to produce signal after pushing the start button. To allow both the recorder and decoder time to synchronize, the recorder must be started 10 seconds before the actual on-air cue for both recording and playback.

The pause button should not be used to reduce start-up time. Leaving the recorder in pause for a very long time can cause tape damage, which produces a dropout at that point when the tape is reused. Some video recorders have a timer that will switch the machine from "pause" to "off" after a fixed period of time. When analog tapes are mixed with digital tapes on the same program, KQED-FM put a strip of aluminized sensing tape on the back of the analog tape 10 seconds before the end as a visual cue mark. Subsonic tones could be used for the same purpose with reel-to-reel machines. Tertiary control tones could be used with cartridge machines. The same sensing tape could be used to automate switching.

The pre-roll requirement has not caused any major problems. It does require the operators to plan ahead more carefully.

#### Electronic editing

The digital tapes cannot be edited without using an electronic editor. As a minimum, two video recorders that can be synchronized and an editor to control and edit PCM tapes are needed. Sony also makes a digital audio editor for this purpose. A tape requiring extensive editing can be assembled electronically almost as rapidly as by using a razor blade and splicing block on analog tape.

A tape requiring a single edit, or just a few edits, in a long program is a different story. Removing 10 seconds from the middle of a one hour program, for example, will take at least

one hour to be done electronically. Tapes edited electronically must be played all the way through in real time so the minimum editing time is the length of the program.

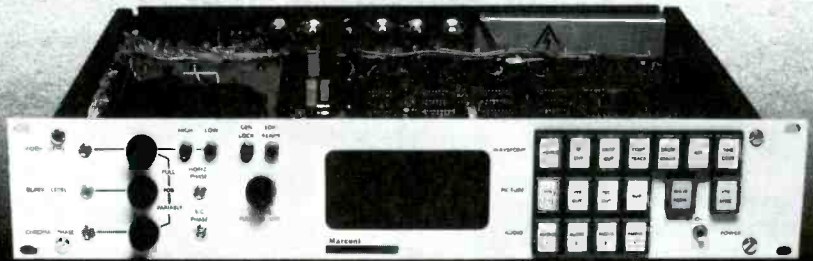
Digital tapes that have been dubbed or edited electronically are identical with the original tapes. The big advantage of the digital process is that the tape may be dubbed or edited many times without causing any signal degradation.

Another use for the PCM system is to provide extremely high-quality stereo audio using a single video microwave link. Even a link path too noisy for good pictures will produce

good audio. A PCM 100 can be used as an encoder and a PCM 10 as a decoder. Although the PCM 100 contains separate independent encoders and decoders, they share too many components to separate them.

At last a recorder is available at a reasonable price that matches the audio quality of the NPR satellite system. Sony gives off-the-shelf delivery of the PCM system. At its present stage of development, the Sony PCM system works extremely well. It is ideally suited to recording, with superb fidelity, long continuous programs typical of much NPR operation. □

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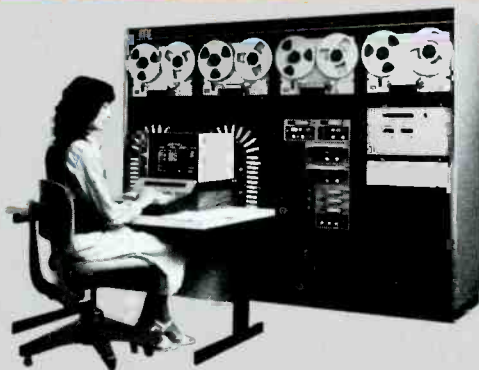
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## Digital video:

The Society of Motion Picture and Television Engineers (SMPTE), in preparation for the 1981 meeting of CCIR scheduled for September, has gathered and considered a great deal of information internationally on the subject of digital video. This effort is directed to encourage standards that have worldwide compatibility. Work on this effort has been progressing since February 1980 and has included many meetings nationally and internationally and practical demonstrations and assessments performed last February (See **BE**, April, pp. 92-102).

Most recently, the society's experts have met with the EBU in Brussels and the Japanese Ad Hoc Committee on Digital Video in Tokyo. At the Brussels meeting, the EBU Working Party V recommended use of the 13.5MHz sampling frequency to its technical committee as the basis for a worldwide compatible standard. At the same time, the task force of the society recommended that the Working Group on Digital Video Standards consider a similar proposal.

Members of the group, and others with a direct interest, were asked to consider the proposal and its impact on the NTSC TV system and, thus, to prepare statements for a meeting April 15 in Las Vegas. (See Blair Benson's digital update from NAB '81, **BE**, pp. 54-56, June, 1981). The statements were presented and discussed in detail. Although the majority of the statements presented at the meeting favored the 13.5MHz recommendation, when polled, the members of the Working Group present could not agree to include it in the recommendation to the United States Study Group for CCIR (USSG-CCIR). An Ad Hoc Committee chaired by Stan Baron was then established to study the issue further, with an emphasis on the effect of sampling frequency of the NTSC code in the interface with the digital system.

The Ad Hoc Committee finalized the first stage of its work in a series of meetings May 4 and 5, and presented to the meeting May 6 of the Working Group a report on the major issues of the equipment compatibility differences related to the choice of sampling frequency and anticipated performance level. After some discussion, it was confirmed that the Ad Hoc Com-

\*The material included here is from a recent formal statement by the SMPTE.



# Working toward a worldwide standard

mittee had satisfactorily addressed the major issues. A poll of the members present then indicated a majority favoring the recommendation of 13.5MHz be forwarded to the USSG 11E for CCIR to be included in the digital video proposal from the United States. This recommendation was based on the condition that it result in a worldwide standard.

The society recognized the significance of the Japanese concerns raised at the meeting April 15 and was fortunate to receive an invitation to meet with the Japanese *Ad Hoc* Committee on Digital Video to exchange views on the key parameters of the component coded digital TV system. The results of this meeting in Tokyo are summarized in a joint statement (below) issued May 14.

The Working Group continued its discussion in a series of meetings held at the Montreux Television Conference, and a further meeting that took place June 16 in San Francisco.

## Joint statement meeting on digital television SMPTE/EBU/Japanese Ad Hoc Group

The Japanese *Ad Hoc* Study Group on Digital Video hosted delegations from the European Broadcasting Union and the SMPTE at the NHK Technical Research Laboratories in Tokyo for two days of discussion on the subject of digital video. OTI (Ibero-American Television Organization) was also represented in the discussion.

Through discussions and exchanges of documents, the four groups were able to obtain a clearer understanding of the various views concerning the evolution of digital technology in the TV field.

The participants discussed the important technical parameters of future digital TV systems and the approaches that might be followed to bring such systems into use. In the meetings, the importance of achieving a worldwide compatible standard for digital video was stressed.

As new results are obtained from the continuing work in the various organizations, it is expected that further discussions and exchanges of information will take place among these groups.

### Editor's Note

The SMPTE, at its Toronto winter conference in February 1980

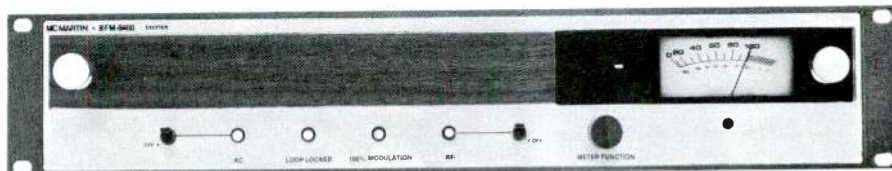
christened the '80s as the *digital decade*. This meeting has been followed by a series of worldwide meetings on digital standardization.

Behind the scenes, the action is fierce as participants try to form a worldwide acceptable digital video standard. With this in mind, the preceding statements by the SMPTE seem mild. The important thing for

broadcasters to realize is that progress is being made toward a digital standard, but that the final results may be years away.

Until the negotiations are concluded, and the standard actually written, the SMPTE can be expected to maintain its position of great care in issuing formal statements concerning the steps toward that goal. □

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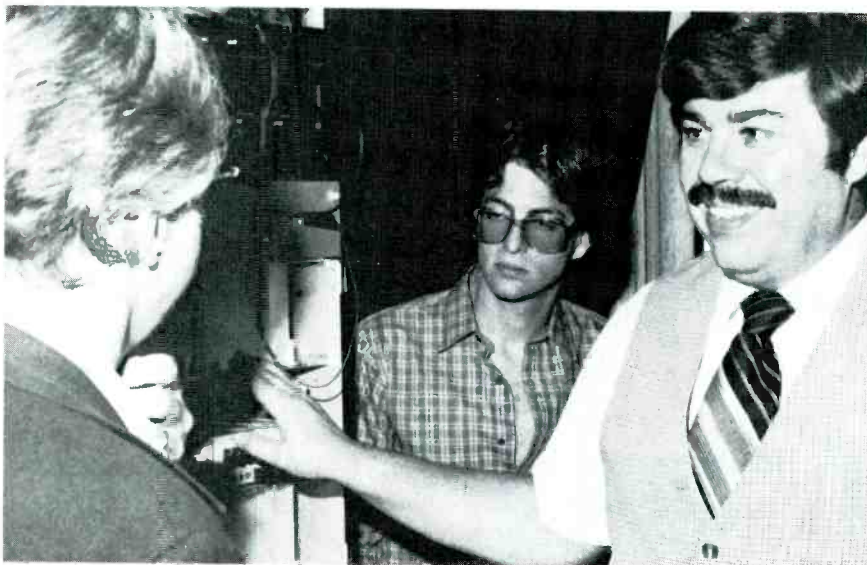
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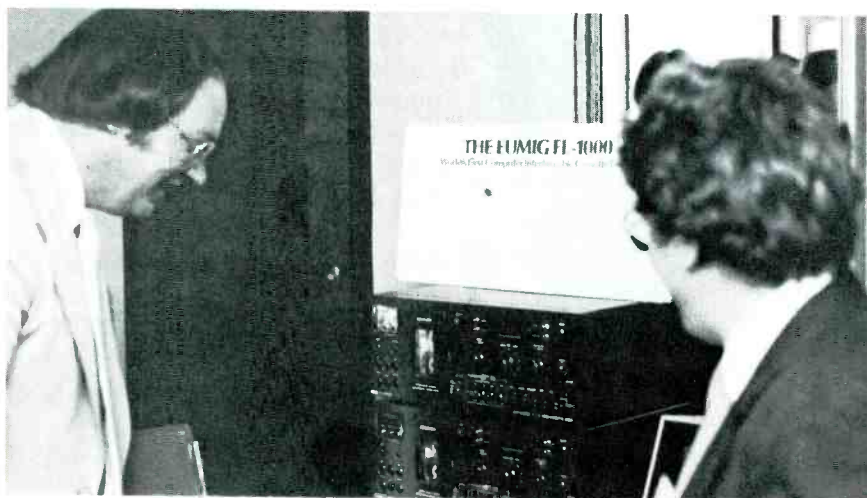


# PRC '81: A conference replay

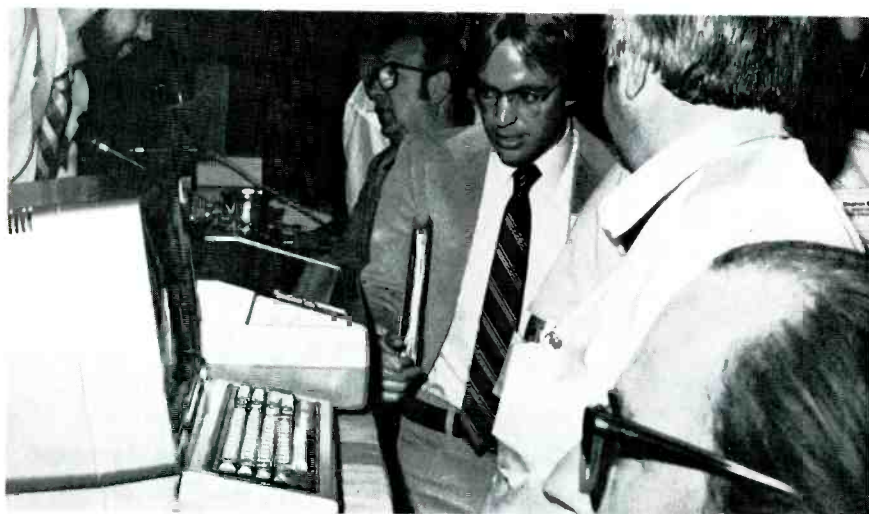
By Brad Dick, chief engineer, KANU, Lawrence, KS



Tony Warren, Coastcom, explains digital telephone transmission equipment.



Roger Karwoski (left), of KBIA, inspects the Eumig FL-1000 cassette deck, one of several decks on display at PRC '81.



Desk-top computers drew interest from the participants.

- April 27 – May 1, 1981
- Anaheim, CA
- 720 Attendees

The annual Public Radio Conference (PRC) allows public radio stations to gather and discuss common concerns and learn of the latest technology and techniques applicable to noncommercial broadcasting.

For many of the participants, this is the only conference they attend during the year, making the intensity of many sessions quite high. The technical sessions are directed toward problems encountered by noncommercial stations. Because some of these problems are unique to those stations, the topics would go unaddressed without the PRC.

One of the major concerns of this public radio conference was the recent funding difficulties coming from the Reagan budget. Not only was the future of funding for the Public Broadcast System (PBS) in doubt, but the possibility of losing the 3-year advance appropriation loomed ominously. Although public broadcasters were willing to take their lumps with everyone else, the subject of the advance appropriations was of even greater concern.

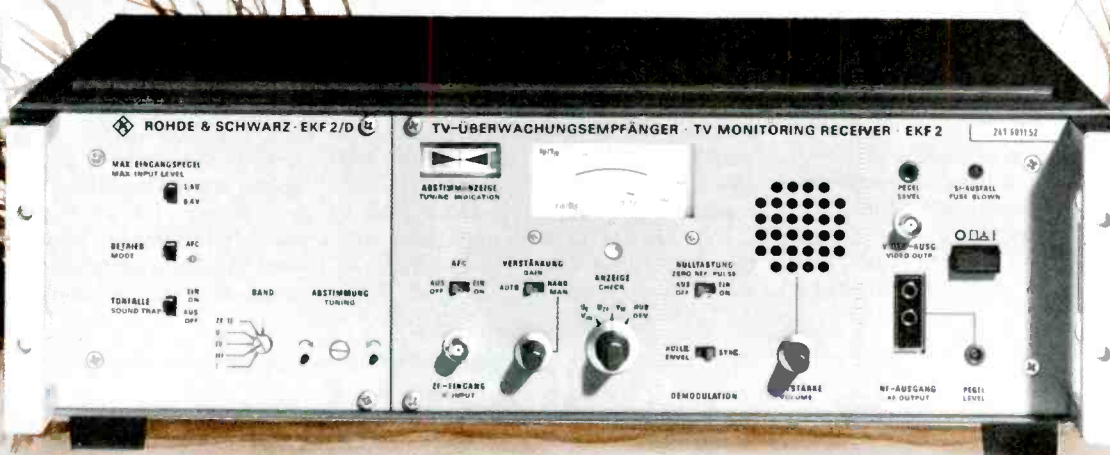
Currently, the PBS is funded for three years in advance of the current fiscal year. The intention of this process is to keep politics from interfering in public broadcasting by isolating the system from political motives. Public broadcasters saw the proposal to change the process as a devastating blow to the freedom that the system currently enjoys. Frank Mankiewicz, president, National Public Radio, saw the problem as serious enough to possibly eliminate NPR and all national distribution of programming. As he put it, "Public radio colleagues, we have less than six months to learn to live under water."

The engineering personnel attending the conference left such topics to the managers and devoted their time to better understanding technical matters. There were many seminars held on technology, some beginning as early as 7:30 a.m. and others continuing until 9:00 p.m. The subject covered a broad range of topics including: satellite uplink problems; microphone production seminar; FM transmission

One of the papers presented at PRC '81, which describes the digital audio efforts at KQED, is included elsewhere in this issue.

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## PRC '81

performance; desk-top computers; peak program meters; SCA/stereo mobile laboratory; Walt Jung seminar on op-amps; and first/last mile distribution.

Many other topics were covered in sessions dealing with mobile recording vans, FCC topics with John Reiser, Sony PCM recording, and satellite maintenance. Of the many seminars presented at PRC '81, only four will be covered in Parts 1 and 2 of this article.

### FM performance seminar

Bob Gonsett, president of Communications General Corporation, led off the FM performance seminar by addressing the often talked about, and little understood, topic of intermodulation interference. Having a great deal of experience in the area, Gonsett was able to provide specific examples of how intermodulation problems can cause severe trouble for broadcasters.

Intermodulation problems in the RF area are similar to those encountered in audio. The frequencies mix and produce sums and differences in frequencies, some of which create problems with the stations' coverage.

Typical complaints resulting from IM interference are: "Weak signal downtown," "Lots of multipath, especially downtown," and "Your station has a picket fence sound on my car radio—why?" Most station engineers have heard these complaints before and may not have known what caused them.

Gonsett described how the products of two FM stations can mix and produce the interference. Although all IM products are possible, and most exist, only the third order products are common troublemakers. The products are described by the number of factors in the equation: (general form)  $\pm aB \pm bB \pm \dots nN = IM(a + b + \dots n)$ . In practice the equation simplifies to:  $a \pm aA \pm bB + IM(a + b)$ .

Because no second order products exist in the FM band, we usually only need to be concerned about the third order types. Examples of IM products:

- 2A-B = 3rd order mix
- 3A-2B = 5th order mix
- A + B + C = 3rd order mix
- 9A-B = 10th order mix.

Assuming an interference problem exists for station A, let's see how this theory might be applied. Assume that station X is on 96.1MHz and station Y is on 100.1MHz and that these stations are near each other, about 17 miles away from a town with three

other stations. Those stations (A,B,C) operate 92.1MHz, 91.5MHz and 105.3MHz, respectively. The manager for station A finds that he can hear his competitor, station Y, in the downtown area as well as the other stations (B,C,X), but his signal seems to fade in and out with severe multipath. Looking at the situation with an eye toward IM problems, it is obvious that there exists a real possibility of IM interference to station A. Applying the formula for third order mixes, interference can be found occurring at 92.1MHz. It turns out that 2A-B when used with 96.1 and 100.1 results in a 3rd order product being generated at exactly 92.1MHz, the frequency of station A.

One might assume that because the X and Y stations are 17 miles away from the downtown area, and that the A, B and C stations are closer, that the IM interference would not be objectionable. There is, however, another factor to add to the problem. Figure 1 shows how the signal levels of the stations might be viewed if measured over a distance. Note that the multipath results in a notching of the signal strength of the primary station, in this case, station A. Also the intermodulation level is relatively constant over the same distance. The reception problem occurs when the notch (weak



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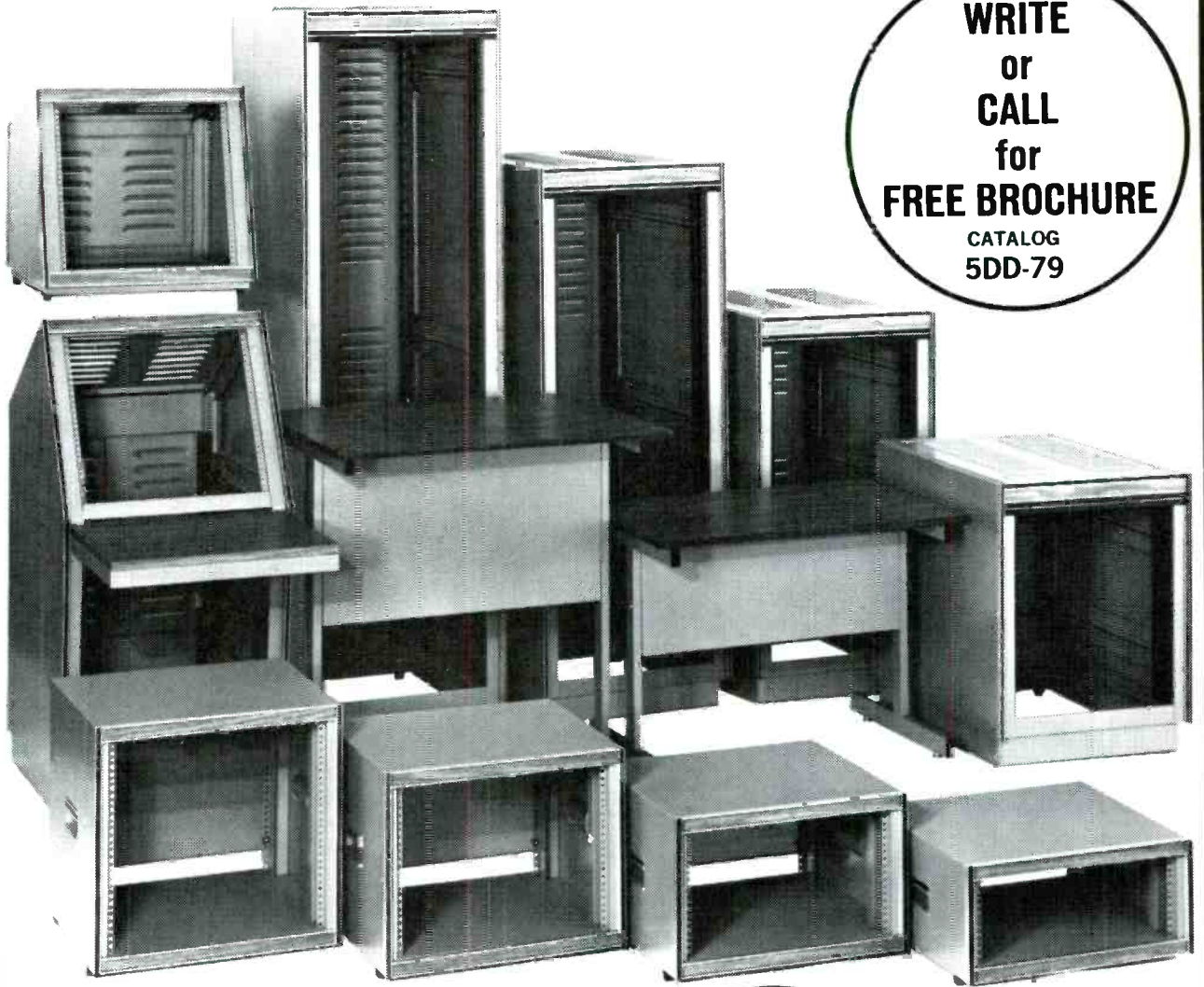
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July 1981 *Broadcast Engineering* 61

signal) of the multipath falls below the intermod level. The receiver then sees only the intermod signal, not the primary station signal. This is a typical occurrence that most stations can expect to encounter.

One of the first steps toward a solution might be to consult with a company familiar with this type of problem. There are many factors that need to be considered, and the consultant could not only save you money, but also could improve your chances

for a success by being more familiar with possible solutions.

Usually a set of field strength readings are taken in a cluster area, and the values are averaged. This gives a field strength figure that can be used as a basis for further interference predictions.

One also needs to examine the possibility that another transmitter could be retransmitting an interfering signal. Figure 2 shows a graph developed to plot turnaround loss vs. frequency for a station. Turnaround loss is the amount of coupling that a transmitter has through the PA cavity of an interfering signal. The level of

this signal is plotted as dB attenuation vs. difference in transmitter frequencies. The graph was developed based on a number of tests performed by Robert Silliman of Silliman, Moffet & Kowalski. By plotting the level of the spurs in the output of the transmitter on the graph, one can judge how significant the amount of coupling is in relation to the interference problem. The amount of coupling is determined by several factors, including the type of transmitter and total power output of the transmitter.

Silliman suggests that his data is based on older transmitters, and newer ones will present significantly different amounts of turnaround loss. Gonsett performed a series of tests more recently that seem to support this view. The reason for the increase in coupling of spurious signals, according to Silliman, is that new transmitters tend to be more broad-band than older ones. The manufacturers' emphasis in broad-banding has made the transmitters less critical in terms of tuning, but perhaps more susceptible to intermodulation problems in some cases.

If we assume a total power output of 100kW and a turnaround loss of 50 dB to the next transmitter, then you have 1W in the PA cavity of transmitter B. In this case, the second harmonic of transmitter B does not have to be that strong for the mix to take place. If, for example, you had two transmitters, one operating at 94.1MHz and one at 99.3MHz, the output could include products at 88.9MHz and 104.5MHz. Both of these products fall within the FM band and could cause interference to other stations.

The best way to reduce those interfering signals is to mount a trap on the output of the transmitter. Typically, a type 902 notch filter will be mounted on the transmitter and field tuned for maximum rejection, usually about 30 dB. The filters are three-quarter wavelength filters and capacitively tuned. It is important to leave about 4 feet of room at the end of the filter to allow for the field trimming of the capacitor. The location of the filter in the line is also important, especially if the line has VSWR problems.

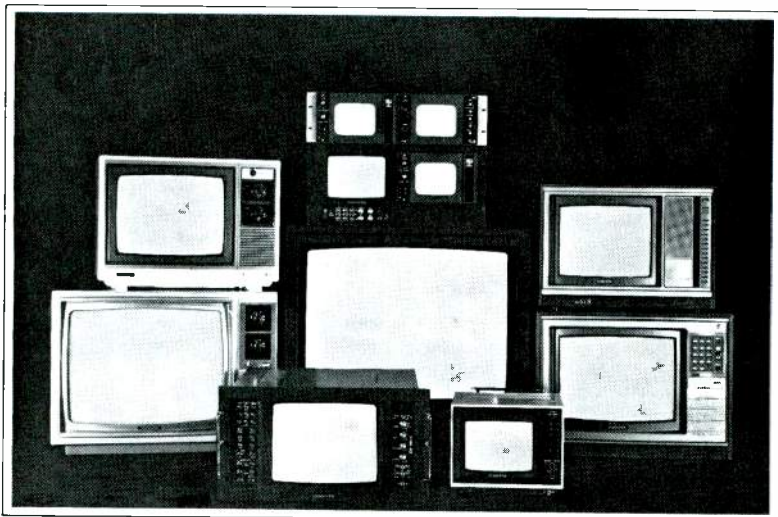
The area of IM interference is becoming more important as the band fills with stations. Should the FCC approve closer spacing of stations, even more interference will exist. Station engineers should spend time becoming familiar with the effects of IM on reception and be prepared to outline the options to management if needed.

PRC '81 coverage of FM transmission, SCA/Stereo labs and the Satellite Operating System will be presented in the August issue.

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## Digital Automatic Video Measuring: The Tektronix 1980 ANSWER

By Les Dunn, assistant chief engineer, KBTB, Denver, CO

The engineering management of our station is committed to technical quality equal to or exceeding FCC re-

quirements. Therefore, KBTB, in Denver, CO, was happy to accept Tektronix's offer of a demo unit of their 1980 ANSWER Automatic Video Measurement Set for test and evaluation.

The ANSWER system is a versatile tool that may be used in the studio for checking camera, film, videotape and switching equipment; for measuring and comparing STL and ENG equipment; and at the transmitter site for complete in-service system measurements as well as some off-air types. It is a microprocessor-controlled automatic video monitoring instrument, all digital except for the digitizing front end. It is designed to make video measurements faster, more accurately and with better repeatability than a

good operator could using a waveform monitor, vectorscope, noise measuring equipment and a camera to record the results. Figure 1 shows a typical test setup.

This set makes its measurements on either VITS/VIR or full-field signals so that either in-service or out-of-service tests may be made. The baseband video is immediately converted to digital form and processed to reduce the effects of most noise. Timing and signal relationships are easily measured, as well as the amplitude of all relevant parameters.

The system supplied by Tektronix was a rack-mount unit occupying 14 inches of rack space in a 24-inch-deep rack. A terminal is needed to communicate with ANSWER, and a Tek

### Editor's Note:

The field report is an exclusive BE feature for broadcasters. Each will be prepared by the staff of a broadcast station, production facility or consulting firm. The intent is to have the equipment tested on-site. The author is at liberty to discuss his research with industry leaders and to visit other broadcasters and/or the manufacturer to track down pertinent facts.

In each field report, the author will discuss the full applicability of the equipment to broadcasting, including personal opinions on good features and serious limitation—if any.

In essence, these field reports are prepared by the industry and for the industry. Manufacturer's support will be limited to providing loan equipment and to aiding the author if support is requested in some area.

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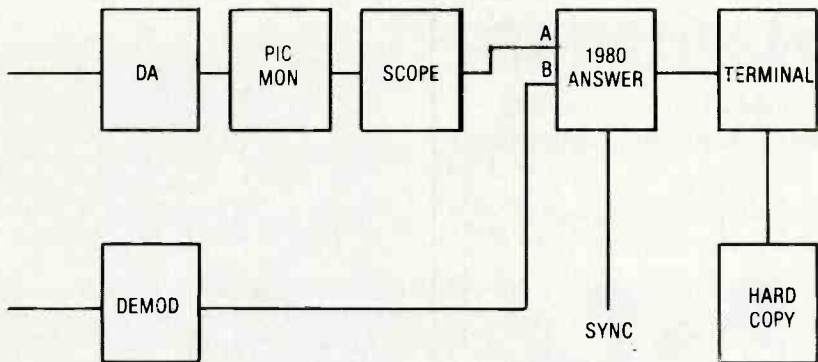


Figure 1 Typical 1980 ANSWER system test setup.

APPLICATION PROGRAM INIT (U1.01)

```

REQ'D 1 0 APL
OPT'L 2 0 VIDEO SOURCES
OPT'L 3 0 CUSTOM MEAS. LIMITS
OPT'L 4 0 TERMINALS
OPT'L 5 0 MODEM PHONE #'S
OPT'L 6 0 TITLE
OPT'L 7 0 MONITOR SCHEDULING
REQ'D 8 0 POWER-UP PROGRAM SELECTION
REQ'D 9 0 CHROMA GAIN

```

MOVE KEY TO NUM WRITE ENABLE (IF POSSIBLE)  
AND ENTER (CR) - ALL SECTIONS  
OR A # (EX 4) - TO RUN THAT SECTION ONLY  
OR E - EXIT FROM INIT

Figure 2 Information to be supplied to the system.

MANUAL GROUP MEASUREMENTS  
(NON-RESIDENT GROUPS ( ) TAKE MORE TIME)

```

(R) 1 COMPOSITE VITS
(R) 2 MULTI-BURST/COMBINATION VITS
(R) 3 VITS
(R) 4 ZERO-CARRIER VITS
( ) 5 NOISE
( ) 6 H&V TIMING
( ) 7 OUT-OF-SERVICE MEAS
( ) 8 SAMPLE & GRAPH
( ) 9 SCAN VERTICAL INTERVAL
( ) 10 QUICK FCC H&V BLANKING
( ) 11 LIST CHANNELS (= A0 CHANNEL A)
(R) 12 CHANGE TIMING STANDARD (= FCC)

```

ENTER # (AND ,FIELD,LINE IF DESIRED)  
OR CHANNEL (A# OR B#)

Figure 3. List of measurement groups available.

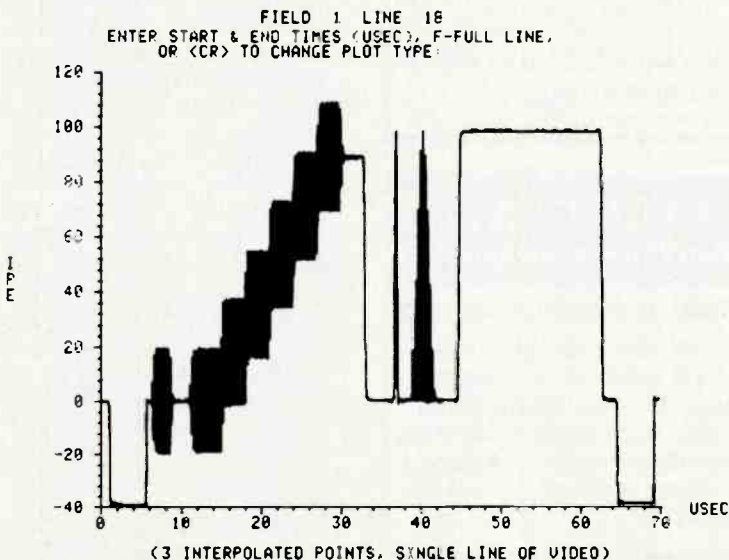


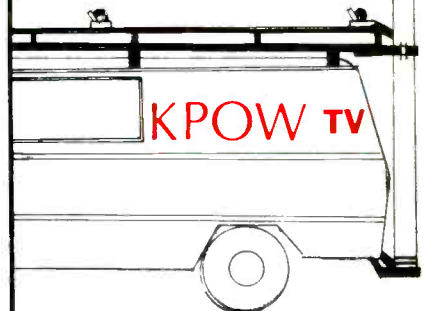
Figure 4 Sample and graph presentation of FCC composite VITS signal.

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## Field report

### Tektronix 1980 ANSWER Automatic Video Measurement System

The 1980 is an automatic digital measuring set, capable of a broad range of baseband video measurements. Measurements are made using in-service test signals (Vertical Interval Test Signals, for NTSC, or Insertion Test Signals, for PAL) or full-field signals. Also, timing and signal element relationship measurements are easily made by the 1980. Test results may be displayed, logged (printed out) or used on a selected basis.

Conversion from the analog video signal to digital code is accomplished by an 8-bit 20MHz analog-to-digital converter (ADC). Signal averaging provides significant noise reduction; averaging of 32 lines reduces noise by 15 dB. Also, 1980 measurement accuracy is increased through signal offset, dither, and gain adjustment.

Digital processing in the 1980 is accomplished by a microcomputer with a 16-bit microprocessor as the central element, supported by read only and non-volatile memory. The accessible non-volatile memory is 8k words, of which about 7.5k can be used for user program storage. The other memory in the instrument is the working memory, which has a capacity of 32k words. About 5k of the working memory is consumed in system overhead.

A real-time clock is used to automatically make measurements at user-specified time intervals; the time reading can be recorded along with the measurement results. The clock is crystal controlled but an external 1MHz reference signal, such as the output of a rubidium standard, may also be used.

Programming language for the 1980 is Tek ANSWER BASIC. It is especially structured to meet the unique measurement requirements of the video signal.

Communication with the 1980, through RS-232-C ports, is in standard ASCII code. The user may opt to use teletype or graphic terminal for input/output communication with the 1980.

An Operator's Documentation set, provided with the system, consists of:

- Operator's Manual.
- 1980 Applications Manual.
- TEK Answer Basic Programmer's Reference Manual.

- 1980 Terminal (TTY) Driver Manual.
- TEK Answer Basic Graphics Manual.
- Measurements Application Program Reference Card.
- TEK ANSWER BASIC Programmer's Reference Card.

#### ANSWER Programs

The following in-service measurements (Amplitude and Phase) are factory programmed in ANSWER:

- \*Bar Amplitude
- \*Sync Amplitude (VITS not required)
- \*Average Picture Level (VITS not required)
- \*Reference Black Level
- \*Line Time Distortion
- \*Pulse to Bar Ratio
- \*T Step Ringing
- \*Relative Chroma Gain
- \*Relative Chroma Time
- \*Amplitude/Frequency
- \*Luminance Non-Linearity
- \*Chrominance Non-Linear Gain
- \*Chrominance Non-Linear Phase
- \*Differential Gain
- \*Differential Phase
- \*Chrominance-Luminance Intermodulation
- \*Signal-to-Noise Ratio (VITS not required)
- \*Low frequency periodic noise (VITS not required)
- \*Relative Burst Gain
- \*Relative Burst Phase.

In addition to the above in-service measurements, the following out-of-service NTC 7 measurements may be performed with ANSWER:

- \*Field Time Distortion
- \*Long Time Distortion
- \*Dynamic Gain Distortion
- \*Color Burst Width
- \*Breezeway Width
- \*H Sync Rise and Fall Times
- \*Equalizing Pulse Width
- \*Serration Width
- \*Vertical Blanking Width.

The following measurements may be made at the Demodulator Output when the carrier reference pulse is presented:

- \*Blanking level (VITS not required)
- \*Reference White Level.

#### FCC AND RS-170A TIMING MEASUREMENTS

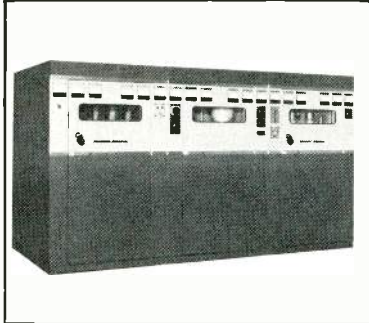
For all timing measurements, blanking level is 0 IRE. VITS are not required for timing measurements. RS-170A information, where different, is given in parentheses.

- \*H Sync Width
- \*Front Porch Duration
- \*Sync to Start of Video Duration
- \*Sync to Burst Start Duration
- \*Sync to End Burst Duration
- \*H Blanking Width.

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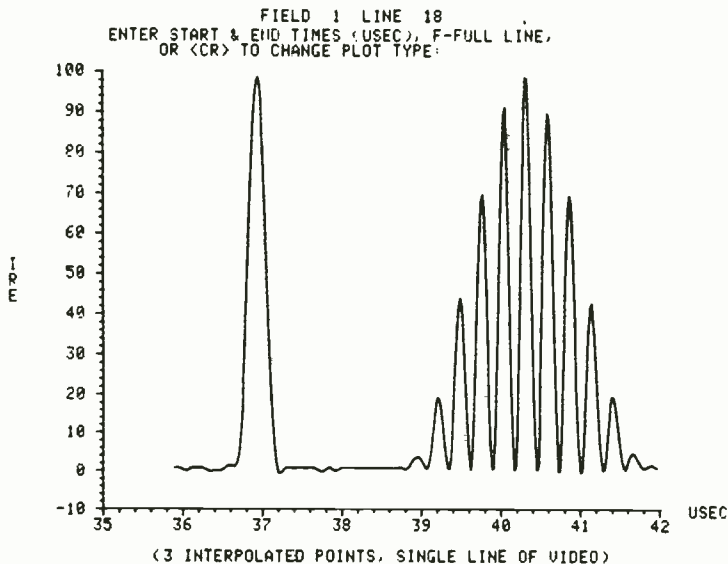
## Field report

4006-1 was supplied, although others may be used.

Because this was intended for use in several different areas, it was mounted in a portable short rack on wheels, making it easy to move from place to place. With ANSWER weigh-

ing more than 50 pounds, it can be placed with easy access to the signals that are to be measured.

For transmitter measurements, a precision broadcast-type demodulator is essential. ANSWER will measure exactly what it gets, whether it's a clean studio signal or a degraded off-air signal. Also, if the signal to be measured is an off-air signal, a good



**Figure 5** Composite VITS expanded to show 2T and 12½ pulses. Note that the V scale has been changed, and the H scale also changed to show relationships in microseconds—automatically.

MANUAL INDIVIDUAL MEASUREMENTS  
(NON-RESIDENT FUNCTIONS ( ) TAKE MORE TIME)

- ( ) 1 MEASURE
- ( ) 2 MNEMONICS LIST
- ( ) 3 SAMPLE & GRAPH
- ( ) 4 SCAN VERTICAL INTERVAL
- ( ) 5 LIST CHANNELS (= A0 CHANNEL A)
- (R) 6 CHANGE TIMING STANDARD (= FCC)
- (R) 7 CHANGE MEASURE MODE (= CONTINUOUS (TYPE S<CR> TO STOP))

ENTER # OR CHANNEL (A# OR B#):

**Figure 6** List of individual measurements of information desired.

KBTU CHAN 9 X-MITTER  
CONTINUOUS (TYPE S<CR> TO STOP) T. STD = FCC 21-FEB-81 16:36:31

LIMIT FILE: FACTOR.LIM SOURCE: A3 CHANNEL A  
SYN: INTA

APL = 36 % (IRE) VIOLATED LIMITS  
LOWER UPPER

BAR AMPL	98.5	IRE
SYNC AMPL	-39.9	% BAR
BURST AMPL	39.7	% BAR
BAR AMPL	98.5	IRE
SYNC AMPL	-39.9	% BAR
BURST AMPL	39.7	% BAR
BAR AMPL	98.4	IRE
SYNC AMPL	-40.0	% BAR
BURST AMPL	39.7	% BAR
BAR AMPL	98.5	IRE
SYNC AMPL	-39.9	% BAR
BURST AMPL	39.7	% BAR
BAR AMPL	98.5	IRE
SYNC AMPL	-39.9	% BAR
BURST AMPL	39.6	% BAR

**Figure 7** Sample of Manual Individual Measurements with bar, sync and burst being measured continuously (group readouts are approximately 15 seconds apart.)

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dedicated receiving antenna is necessary. This became readily apparent to KBTB during the initial setup and checkout. It should also be noted that some transmitter measurements should be made with envelope detection, and others are more accurate using synchronous detection. A Tek 1450-1 demod, which came as a part of the test unit, has a switch-selectable choice.

#### Understanding the system

Training in the operation of the system began with a 2-hour session, with the assistance of our local Tek field engineer, covering the four basic routines, how they are developed and how best to use them. Another hour of hands-on use with a few questions here and there, and the operator begins to feel more comfortable with it.

The four main routines give the operator a wide range of control and choice. The first is *Application Initialization* (Figure 2). This describes the video inputs as composite or non-composite, internal or external sync, reviews or changes limits, addresses the *Automatic Call* (option), assigns a heading for the readouts for an input channel, date and time of day, *Monitor and Report* scheduling and others.

The second, *Manual Group Measurements* (Figure 3), permits the operator to look at a group of related measurements. They may be timing, amplitude or vertical interval content. Also included is a *Sample and Graph* selection that will graph a particular line of either field and will also expand the graph both vertically (amplitude) and horizontally (timing). (Figures 4 and 5.)

The third mode is *Manual Individual Measurements* (Figure 6). Here, the operator may scan one or several measurements continuously while



The Author with the Tektronix ANSWER system.

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GATES BC1T	\$400
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GATES FM-1B	\$450
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```
(REPORT)
KBTU CHAN.9 X-MITTER          NOISE F1 L12          21-FEB-81 16:29:35
LIMIT FILE: FACTOR LIM          SOURCE: A0 CHANNEL A
APL = 0 % (IRE)                  SYNC: INTA
                                  VIOLATED LIMITS
                                  LOWER    UPPER
S/N UN-WTD          68.9    DB
S/N LUM-WTD         78.0    DB
S/N CHR-WTD         73.7    DB
S/N LOW FREQ        46.4    DB      (PK-PK)      *    49.0    1000.0
```

Figure 8

```
(REPORT)
KBTU CHAN.9 X-MITTER          VIRS F1 L19          21-FEB-81 16:28:08
LIMIT FILE: FACTOR LIM          SOURCE: A0 CHANNEL A
APL = 32 % (IRE)                SYNC: INTA
                                  VIOLATED LIMITS
                                  LOWER    UPPER
VIRS SETUP LEVEL    7.1    IRE
KBTU CHAN.9 X-MITTER          ZERO-CARRIER VITS F1 L16 21-FEB-81 16:28:29
LIMIT FILE: FACTOR LIM          SOURCE: A0 CHANNEL A
APL = 46 % (IRE)                SYNC: INTA
                                  VIOLATED LIMITS
                                  LOWER    UPPER
```

Figure 9

```
(REPORT)
KBTU CHAN.9 X-MITTER          FCC MULTIBURST F1 L17 21-FEB-81 16:27:05
LIMIT FILE: FACTOR LIM          SOURCE: A0 CHANNEL A
APL = 22 % (IRE)                SYNC: INTA
                                  VIOLATED LIMITS
                                  LOWER    UPPER
WHITE FLAG AMPL     98.5    IRE
MB 500 KHZ          59.0    % FLAG
MB 1.25 MHZ         58.0    % FLAG
MB 2.0 MHZ          60.0    % FLAG
MB 3.0 MHZ          60.0    % FLAG
MB 3.50 MHZ         60.0    % FLAG
MB 4.1 MHZ          61.0    % FLAG
```

Figure 10

```
(REPORT)
KBTU CHAN.9 X-MITTER          FCC M. TIMING          21-FEB-81 16:29:43
LIMIT FILE: FACTOR LIM          SOURCE: A0 CHANNEL A
APL = 42 % (IRE)                SYNC: INTA
                                  VIOLATED LIMITS
                                  LOWER    UPPER
M. BLANK 4          11.60   USEC
SYNC WIDTH          4.69   USEC      **    10.46   11.19
SYNC RISE TIME     148.0   NSEC
SYNC FALL TIME     128.0   NSEC
SYNC-SETUP         8.81   USEC
FRONT PORCH        2.88   USEC      **
SYNC-BRST END      7.74   USEC
BURST WIDTH        8.0    CYCLES
BREEZEWAY          82     USEC      *    8.5    1000.0
```

```
(REPORT)
KBTU CHAN.9 X-MITTER          FCC U. TIMING          21-FEB-81 16:30:22
LIMIT FILE: FACTOR LIM          SOURCE: A0 CHANNEL A
APL = 66 % (IRE)                SYNC: INTA
                                  VIOLATED LIMITS
                                  LOWER    UPPER
U. BLANK 4 F1      20.4   LINES
U. BLANK 4 F2      21.7   LINES      **    18.3    21.1
EQUALIZER WIDTH    49.9   % SW
SERRATION WIDTH    4.93   USEC
```

Figure 11

Figures 8-11 Typical readouts taken from Monitor and Report programs, with errors introduced to show caution (\*) and violation (\*\*) of established limits.



## Field report

making equipment adjustments (for instance, differential gain, differential phase, bar, sync, burst). Any number of some 50 measurements may be entered via a mnemonics list and ANSWER will continuously measure and read them out. In practice, only two or three would usually be read at a time. Figure 7 is an example of this type of operation, and the groups are approximately 15 seconds apart.

Fourth is the Monitor and Report mode. (Figures 8 to 11.) In this mode, the system continuously monitors both inputs for more than 20 different parameters, timing and amplitude. At the Initialization, specified times of day may be entered for a Report to be made. For example, this could be early morning, mid-afternoon and late evening. While in the monitor mode, no Report is made until the specified time, or a limit is exceeded. When a limit is exceeded, this program will continue to Report until the parameter is corrected. In Figures 8 to 11, errors were introduced to show Caution (\*) limits or Violation (\*\*) of limits. Options are available for such out-of-limits measurements to activate an alarm or to originate a call to one of several telephones.

We learned that a valuable option would be a hard-copy unit to receive and print out the Reports, for providing documentation of measurements at any time, or for A/B comparisons. Furthermore, with the date, time of day, APL, field and line and all pertinent parameters of the measurements being printed out, a certified document is provided.

ANSWER is particularly useful in the studio for measuring or monitoring H and V blanking widths, pulse rise and fall times, and timing relationships. Figures 12 and 13 illustrate some timing measurements. Figure 14 is a measurement of a line selected at random with a full field multiburst signal.

The transmitter at KBTB is normally unattended, operating with a Tek 1440 pre-correction unit in a closed loop around it. Monitoring the demod on one channel and the transmitter input on the other gives a world of information on what the transmitter is doing. Or, monitoring bar, sync and burst, as in Figure 7, is an efficient way to accurately set modulation depth quickly.

### Installation

Installation of ANSWER is simple and straight-forward. All it really needs to know is the date and time, and zero and 100% APL. From this, it

will take over because the battery-operated memory only needs this the first time. However, the A and B inputs should be identified, along with the station call letters, channel number and any other information that you may want included.

Violation and Caution limits are factory pre-programmed, but may be changed by the user. Measurements may be made showing FCC, NTC-7 or RS170-A limits—or any other desired limits.

It would be nice to be able to chart the length of time it takes to call up a particular program or run a set of measurements. The fact is that the user has such a wide choice of measurements and programming options that this is difficult. A user with a need for a small number of measurements to be made at frequent intervals may program the unit to make just those in a matter of seconds, while another wanting a full group may have to wait for as long as a minute.

It takes no time at all to begin to fault this machine for taking 30 seconds to make a measurement, and failing to remember how long it formerly took to do it manually using a scope and vectorscope with a camera. A fair idea of the maximum times that might be involved would be about one and a half minutes to call



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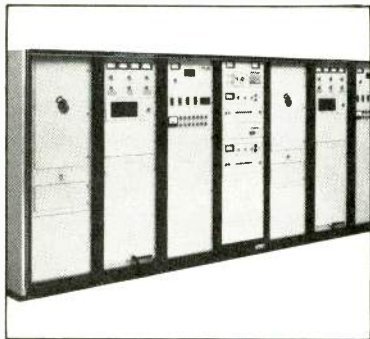




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**Field report**

up or change from one program to another, about two minutes to go through a full *Monitor and Report*, a *Sample and Graph* display in less than a minute, and roughly twice that for a 3-point interpolated trace.

**System construction**

Construction is of the usual Tek high quality. The boards are made by Tektronix and the microprocessors are by Texas Instruments. A circuit

board map, board versions and options are outlined on the inside of the front door. This information is necessary in the event of a call for technical support. There is a key lock for the front access door and a key switch for writing access to the memory.

Quality control is said to be rigorous, and a detailed examination of the chassis and boards bears this out. According to Tek sources all com-

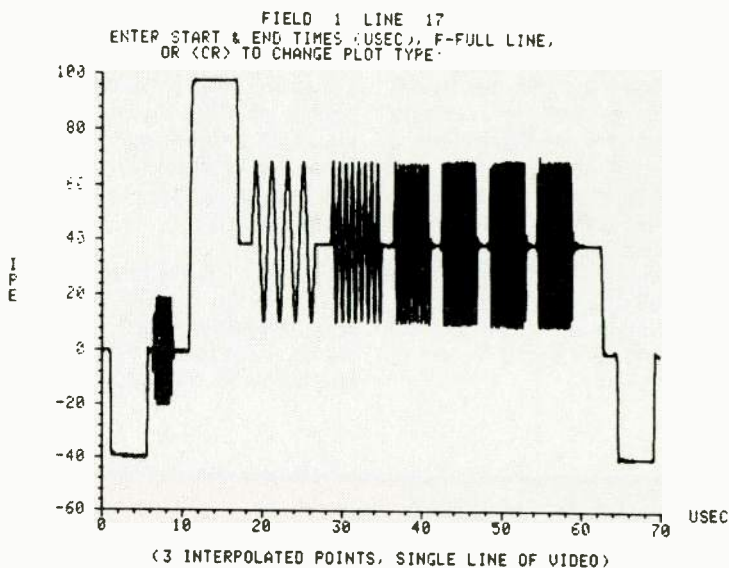


Figure 12 Sample and graph presentation of F1/L17.

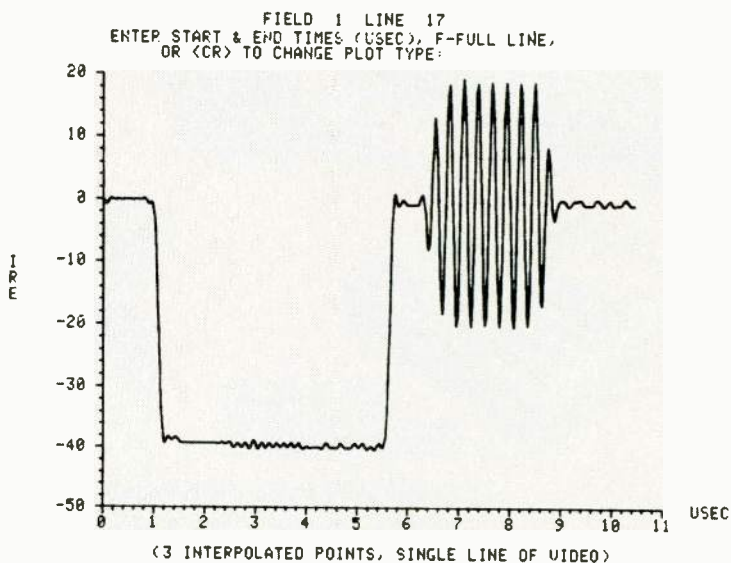


Figure 13 Sample and graph of F1/L17 expanded to show sync to burst timing.

ponents are spot checked on receipt. Boards are individually tested under hot and cold conditions, and finally the entire unit is similarly tested as well as shake-tested. The equipment that KBTU received was well-packed and could have withstood rough handling. Unless a customer requests otherwise, all units are shipped by air.

**Documentation and software**

As with most Tektronix equipment, manuals and full documentation come shipped with the unit. Complete programming information is also supplied for the user to modify or write any new programs for a particular need.

Software support is vital to software-controlled equipment, and Tektronix's experts provide several resources. Updates would be issued annually to correct known bugs, and to incorporate enhancements found desirable. New software would be guaranteed to run on any operating system provided that it has been kept updated. A monthly newsletter would keep the user up to date with helpful hints. A library of program listings would be set up and available to those

subscribing to it. (These are all in addition to the telephone hotline for specific problems.)

Special purpose software will not be available from Tektronix. They prefer that the user contact a programmer familiar with ANSWER to handle special requirements. An alternative for a station with strong programming talent available is a 1-week Tek-instructed class at the factory to train those wanting to learn how to program the system. It was interesting to note that a competent programmer, without prior knowledge of the instru-

ment, was able to communicate with it within a few minutes.

Technical support is as vital as is software support. The first 90 days of use is the period most errors or interface problems might occur. If there are problems that cannot be immediately rectified either over the phone by conversation, or via modem, Tek promises to have a specialist on-site anywhere in the country within 48 hours. Users not able to or desirous of maintaining the equipment over a long period of time have the option of a maintenance contract. These con-

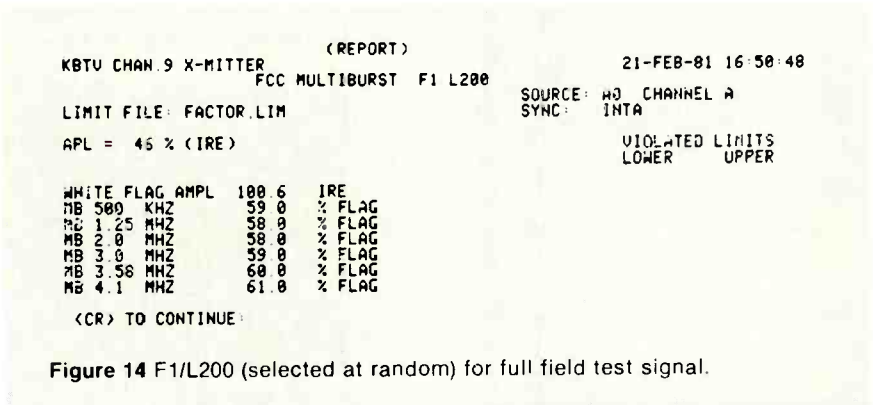


Figure 14 F1/L200 (selected at random) for full field test signal.

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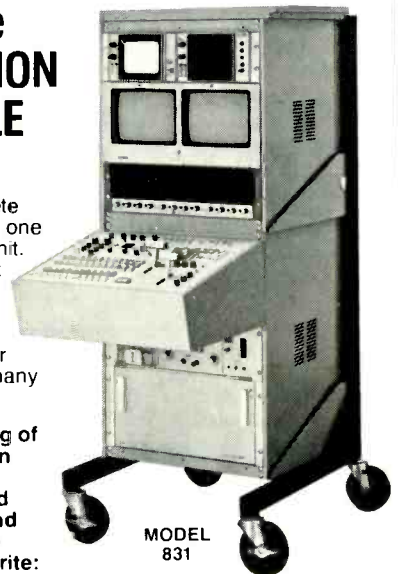
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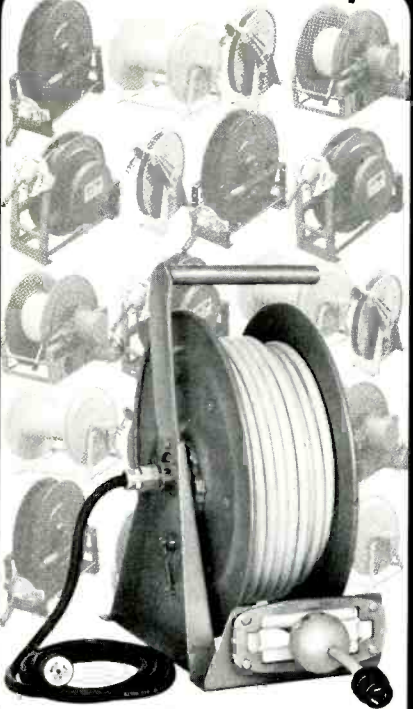
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## Field Report

tracts are individually negotiated, as the distance for a service call is a factor. Also, there are three different levels of service, depending on the urgency of the need. All repairs are made on-site, not on a ship-to-factory arrangement.

### Locating the system

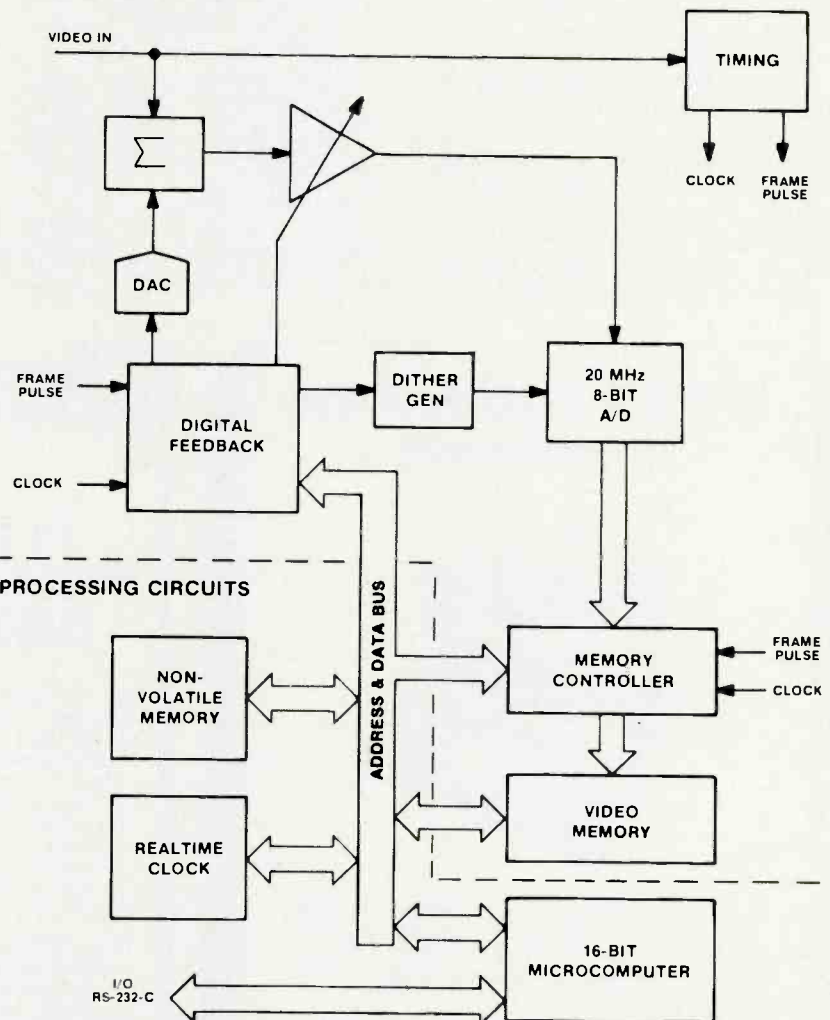
One of the first questions asked was about the best place to locate this type of equipment. Having worked with it extensively at both transmitter and studio locations, my feeling is that the master control area is the most practical. The transmitter can always be monitored off-air with a demod. If it is portable, it is that much more useful.

This is an impressive and powerful piece of test equipment. It is well-

designed, sophisticated, highly specialized, state-of-the-art and expensive. During our tests, it performed well and did everything asked of it. For what it can do, it is money well spent: the larger the operation, the more efficient it becomes.

The future of automatic digital measuring techniques seems to be limited only by imagination. The technology is already here for highly accurate RF measurements with the programmable spectrum analyzer. It would seem to be only a matter of time and packaging before an entire TV proof of performance can be done almost automatically. A combination of a state-of-the-art programmable spectrum analyzer, automatic digital measurements and frequency measurements could make the time-consuming *proof* a thing of the past. □

### ACQUISITION CIRCUITS



**Block Diagram.** The 1980 consists of two major circuitry blocks: acquisition and processing.

The Analog-to-Digital Converter (ADC), along with the Comparator, Variable Gain Amplifier, Digital-to-Analog Converter (DAC), Dither Generator, Acquisition Memory, Memory Controller, and Digital Feedback comprise the acquisition circuitry.

The Non-Volatile Memory, Real-Time Clock, Microcomputer, and the Data and Address Bus structure are the processing circuitry.

## people

COMSAT General TeleSystems Inc., has named **Richard W. Jahnke** vice president, marketing. As vice president he will be responsible for TeleSystems' day-to-day marketing operations, including domestic and international sales and product planning. Jahnke has over 20 years' experience in the telecommunications industry, including management positions with the Pacific Telephone Company and RCA Corporation.

**John Edward Pritchett**, president of Quantam Audio Labs in Glendale, CA, died January 29, 1981, age 41. Pritchett had a controlling interest in the company and had been with them since 1975. Prior to that he worked for Fender Music, Altec Lansing, and the James B. Lansing Company.

Microwave Associates Communications Company, CATV/satellite division, announces the organization of their new sales force that will focus on the sale of satellite and FM microwave products to the CATV, institutional and commercial markets. Sales managers for indicated regions: northeast, **Don Sicard**; mid-Atlantic, **Gary Deaner**; southeast, **Phil Cass**; midwest, **Dave Headley**; southwest, **Jim Rushing**; Rocky Mountain, **Gary Atkins**; western, **Al Gillingham**; Canada, **Bob Trowhill**.

**Frank B. Logan** has moved to national marketing manager for Datatron Video Systems, Tustin, CA, from a similar position at Convergence Corporation.



Schiff



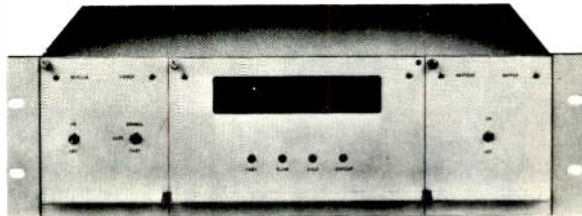
Rhodes

**Herb Schiff**, Broadcast Engineering's West Coast marketing manager, received the 1980 BE Marketing Achievement Award during the NAB. The award was presented for his record market share and sales increases during 1980.

**Bill Rhodes**, editorial director of Broadcast Engineering magazine, is shown with the 1st annual Intertec Publishing Electronics Group Editorial Excellence Award presented during NAB for the editorial content of the December, 1980, issue of BE, "Broadcast Technology: Update 1981." □

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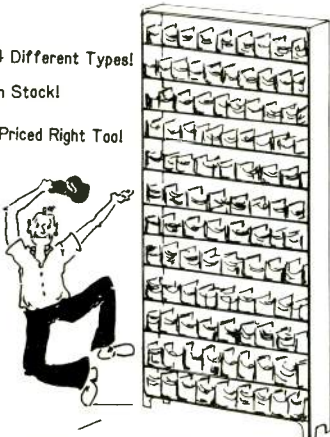


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## new products

### News/production camera

A small, light and portable broadcast news/production color TV camera, the PK-60, has been introduced by **Toshiba America**. The PK-60 weighs 9.4 lbs. and measures 11x9x3.7 inches. Minimal power consumption of 20.6W allows more than two hours of camera operation with a NiCad battery. The camera can be set up at the studio and used on remotes with no additional setup required.

Circle (201) on Reply Card

### Varactor chips

**Microwave Associates** has announced development of the MA-45200C series of silicon microwave tuning varactor chips. The new devices are specifically designed to obtain high Q and large capacitance changes with bias voltages by an essentially abrupt junction. High density glass passivation techniques promote high reliability and low reverse leakage. Close capacitance tracking between chips is maintained. Metalization on the top and back surface of each chip is closely controlled to guarantee minimum contact resistance and to assure reliable bonding with conductive epoxy, thermal compression, or solder. Custom designs available.

Circle (202) on Reply Card

### Consoles for recorders

Two floor-standing consoles have been made available for **Tascam** recorder/reproducers. The CS-600 is for use with the model 35-2B 2-track mastering recorder that has separate housings for transport and electronics. The CS-800 is for use with either the model 80-8 8-track multichannel recorder or the model 40-4 4-track multichannel recorder. Provisions are made to accommodate the optional dbx processors, model DX-8 or model DX-4. Both consoles are made of metal and feature heavy-duty casters and padded arm rests.

Circle (203) on Reply Card

### Noise reduction system

**dbx Inc.** is introducing the model 140, a 2-channel simultaneous encode/decode Type II Tape noise reduction system for broadcast applications. This 1¾-inch high rack-mountable unit features RFI protected active balanced inputs, single-ended outputs with on-board provision for Jensen output transformers, barrier

strip termination for inputs and outputs and dbx encoded disc playback capability.

Circle (204) on Reply Card

### Tunable converter options

The tunable down converter from **Tektronix** provides precision front-end RF to IF frequency conversion for Tek's new 1450-2 and 1450-3 demodulator mainframes. Known as TDC1 and TDC2, the tunable down converters, with options, may be used for demodulator applications. The TDC1 supports the System B VHF band and is tunable over channels 2-12 (but not Channel 2A). TDC2 supports System G and I UHF bands and is tunable over channels 21-69. Either of these two converters gives users precise channel demodulation, and both feature several high performance capabilities.

Circle (206) on Reply Card

### Digital reverb system

**Ursa Major** presents a new digital reverberation system, the model 8X32 that produces a range of natural and artificial reverberation effects suitable for studio, broadcast, live performance and other applications. The microprocessor-based front panel has separate LED read-out and control for each adjustable reverberation parameter. The 8X32 also features a bank of 32 non-volatile storage registers that allow users to store and recall 32 complete reverb set-ups, and to edit them at will. Four basic programs are available.

Circle (205) on Reply Card

### To INTELSAT specifications

**Mitsubishi Electronics America** (MELA) is marketing dual conversion down converters for satellite communication earth stations and IF filter/equalizers for INTELSAT earth stations. The down converters — series U-4536 — operate in the 4GHz (3.7 to 4.2) down-link frequency band and can receive all carriers specified in INTELSAT B.G. specifications. Although so compact that two can fit side by side on a 19-inch rack shelf, the down converters offer six options, including frequency synthesized HLO Type 1 (in 125kHz steps, fully automatic and applicable for FM-FDM carriers), and Type 2 (in 1MHz steps with mechanical cavity tuning and ultra-low noise characteristics suitable for SCPC traffic).

Circle (207) on Reply Card

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# Field Service Engineers

The Grass Valley Group, Inc., a leading manufacturer of television broadcast equipment, is looking for people who want challenging professional positions. Openings exist in California, Indiana, New Jersey, and Georgia.

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 1114, Grass Valley, CA 95945. An Equal Opportunity Employer M/F/H.

**The Grass Valley Group, Inc.**  
A Tektronix Company

**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 intimately 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

**WE'RE IN THE MARKET** for a qualified maintenance engineer with aspirations to become assistant chief. Needs background in studio and transmitter. Offering good salary and benefits package and the Monterey Peninsula to live. Send resume to Ken Warren, Chief Engineer, KMST-TV, 46 Garden Court, P.O. Box 1938, Monterey, California 93940. A Retlaw Broadcasting station. EOE. 3-81-4t

**HELP WANTED TECHNICAL:** Radio Stations WEOK-AM and WPDH-FM, Poughkeepsie, New York, has an immediate opening for a Chief Engineer. Minimum 2 years experience, first phone, state-of-the-art equipment. Salary negotiable based on experience. Checkable references...Equal opportunity employer. Call Ralph Arrigale at (914) 471-1500. 7-81-1t

**WJBF-TV IS LOOKING FOR AN EXPERIENCED** broadcast engineer. Applicants must have ENG maintenance experience and some transmitter experience would be helpful. Duties will include studio maintenance on RCA and Ampex equipment. An excellent opportunity to be with the market's leading station. Excellent salary and benefits. Send resumes to: Doug Moore, WJBF-TV, P.O. Box 1404, Augusta, GA 30903. An equal opportunity employer. 7-81-2t

**ASSISTANT CHIEF ENGINEER** for medical video production facility. Innovative staff. Type C-1" and 3/4". Requirements: Two years university or technical school in electronics and three years experience in television broadcasting. \$1510/month plus excellent benefits including 5 wks. paid vacation. Deadline: August 1, 1981. Contact Personnel Office, Southern Illinois University School of Medicine, P.O. Box 3926, Springfield, Illinois 62708. Affirmative Action/Equal Opportunity Employer. 7-81-1t

**LIGHTING EQUIPMENT SALES:** Bardwell & McAlister needs sales engineers, sales reps., dealers, and agents for full line of TV and motion picture lighting and grip equipments. Many U.S. Territories and overseas open. Please write to Arthur Florman, President, Bardwell & McAlister, 7051 Santa Monica Blvd., Hollywood, California 90038. 5-81-3t

**TECHNICAL SUPERVISOR-PRODUCTION:** Responsible for all technical aspects of studio production from pre to post. Knowledgeable and capable in all areas including camera, 1" and 2" VTR, SMPTE editing and audio. Consult on lighting. Must be capable of delivering consistent high quality product. Limited field work, maintenance. Supervisory experience required. Salary commensurate. Contact Director of Finance, WYES-TV, P.O. Box 24026, New Orleans, LA 70184. An equal opportunity employer. 6-81-2t

**\$20,000/PART TIME.** Several engineers needed for unusual field project. South, east, mid-west. Keep your present job. Flexible hours; many benefits. Requires degree or equivalent work experience plus ability to deal with people. Resume to Mr. Melsar, 3615 Saxon Way, Marietta, Georgia 30062. 6-81-2t

**MAINTENANCE WIZARD WANTED—** Maintenance Engineers imagine this: a sleek modern videotape production facility that produces national spots for major agencies as well as non-broadcast projects for large corporations. Staffed with young, energetic, dedicated personnel. If you qualify in the maintenance of RCA and Norelco cameras, Ampex 2" and 1" type C videotape, CVS EPIC computer tape editing, Vital Squeezezoom, and would like to work in the Chicago market, call or write: John Gebhard, Chief Engineer, Telemation Productions, 3204 W. Westlake Avenue, Glenview, Illinois 60025, (312) 729-5215. 6-81-2t

## HELP WANTED REGIONAL SALES MANAGER

Manufacturer of Broadcast Microwave systems seeks Regional Sales Manager in Midwestern Region.

Applicants should have broadcast sales experience. R. F. systems knowledge an asset. A reputation for reliability and fair dealings is essential.

Excellent compensation includes salary, commission and expenses. Reply in confidence to J.A. Smith, Vice President, R.F. Technology, Inc., 2016 Tondolea Lane, La Canada, Calif. 91011; 213-790-4393. 7-81-1t

**ELECTRONICS TECHNICIAN (TV Maintenance).** The Veterans Administration Center for Endoscopic Program (VACEP), VA MEDICAL CENTER, LAKE CITY, FLORIDA, announces an opening for an Electronics Technician in the television engineering department. This career Civil Service position is at the GS-9 level with an annual salary starting at \$18,585. VACEP is a fully equipped two-studio, television production center which utilizes latest state-of-the-art equipment including computer editing, 2-inch high band, full-frame videodisc, computerized routing switcher, and studio and low-light level cameras. Applicants must have experience which has demonstrated the knowledges, skills, and abilities to perform scheduled and preventive maintenance, digital equipment repair, line operation of all equipment, and operational testing and set-up of equipment. Candidates' directly related experience must demonstrate competence in the maintenance of 2-inch quad/helical VTR's general broadcast experience, and general maintenance experience in digital and analog video equipment. Send Personal Qualifications Statement (SF-171) or resume to: Personnel Officer, Veterans Administration Medical Center, Lake City, Florida 32055. An equal opportunity employer. 7-81-1t

**REMOTE ENGINEERING SUPERVISOR—**New 32' Truck, Ikegami Cameras, Ampex & Sony 1" Type C, Ross Switching, and much more, needs qualified engineer to maintain and operate. Salary open. For more information call: John Gebhard, Chief Engineer, Telemation Productions, Inc., (312) 729-5215. 6-81-2t

**MARKETING SPECIALIST** position with growth potential to Product Manager. Requires 3-5 years experience with technical products, preferably relating to electronic communications and video technology. BSEE degree preferred. Selected candidate will be involved in all aspects of marketing. Some travel. Send resume to G. Vanasek, P.O. Box 659, Santa Ana, CA 92701. Equal Opportunity Employer M/F/H. 7-81-1t

# CHIEF ENGINEER WANTED

Our client, a television group broadcaster, is seeking a very special person with strong management credentials to become chief engineer at one of their network affiliated VHF television stations in a top 75 market. Prior supervisory or management experience is mandatory and labor relations experience is highly desirable.

This is a turnaround situation. The task is not easy. The challenge is great. But the opportunity for a bright, ambitious individual to establish a strong track record and be recognized throughout the industry, as an outstanding engineering manager and leader, is even greater.

Our client is an equal opportunity employer and your name will not be discussed with our client without your permission.

If you have what it takes, and would like to discuss this position in total confidence, send us your background profile or call today.

**Joe Sullivan  
& Associates, Inc.**

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1270 Ave. of the Americas, N.Y. N.Y. 10020  
(212) 765-3330

**TV MAINTENANCE ENGINEER.** Central California NBC affiliate is looking for an engineer to fill a vacancy on a 6-person maintenance staff. Prefer computer experience and first phone. State-of-the-art equipment, good hours and top pay in an area with a low cost of living. Send complete resume to Personnel Manager or call Bob Hess, Chief Engineer, KSEE, P.O. Box 12907 Fresno, CA 93779, (209) 237-2424. An Equal Opportunity Employer. 7-81-2t

**MAINTENANCE ENGINEER:** Growing independent in Atlanta offers competitive compensation to a person with maintenance experience and with RCA equipment; digital experience/education desirable. Send resume and salary requirements to Manuel Marquez, WANX-TV, P.O. Box 98097, Atlanta, Georgia 30029. EEO/AA Employer. 7-81-2t

**MAINTENANCE TECHNICIAN:** WBZ-TV seeks an experienced broadcast ENG maintenance technician. Applicants must be experienced in the testing, repair, and installation of ENG and other types of broadcast equipment and systems. A First Class FCC license and a background in digital electronics is required. Send resume to WBZ-TV, 1170 Soldiers Field Road, Boston, Massachusetts, 02134, attention Joseph Blake, Assistant Engineering Manager. WBZ-TV is an equal opportunity employer. 7-81-1t

## HELP WANTED (CONT.)

**CHICAGO BASED** religious production company needs video maintenance engineer for 4-camera remote unit. Entry level considered. Contact: Bob Billman, H. S. Productions, Inc., 137 Kingston Rd., Bolingbrook, IL 60439, (312) 972-0078. 7-81-2t

### BROADCAST MAINTENANCE TECHNICIAN

Immediate opening for individual with experience repairing state of the art ENG equipment, including Sony ¾ and 1 inch tape machine, RCA TK76, and IKEGAMI HL79, and Sony BVP300 cameras.

Qualified applicants send resume to:  
Richard W. Roberts  
Corporate Personnel Director  
P.O. Box 1410  
Tampa, Fla. 33601  
WFLA-TV

An Equal Opportunity Employer M/F 7-81-1t

**FIRST CLASS BROADCAST ENGINEER** for WQUE/WGSO, New Orleans. Take charge of FM studio and transmitter operation. Able to assist AM directional operation. Contact Herb Korté, Insilco Broadcasting, P.O. Box 85, New Haven, Connecticut 06501. Phone 203/281-9600. Affirmative Action/Equal Opportunity Employer. 6-81-2t

**HELP WANTED - TECHNICAL: SOUTHERN CALIFORNIA OPPORTUNITY.** Experienced videotape maintenance engineer for rapidly expanding successful post-production facility. Knowledge of 2" Quad, 1" VTR's and CMX editing systems required. ALSO SEEKING qualified CMX editors and 1" videotape operators. Salary negotiable. Send resume or call Dick Wellman or Rich Thorne, The Post Group, 6335 Homewood Avenue, Hollywood, California 90028, (213) 462-2300. 6-81-2t

**TELEVISION MAINTENANCE ENGINEERS:** First-Class FCC License. Strong Background in all phases of TV maintenance required. Famous year around Colorado recreational area. Contact A. L. Ladage, DOE, XYZ Television, Inc., P.O. Box 789, Grand Junction, CO 81502. 303/242-5000. 5-81-4t

**REMOTE VEHICLE SUPERVISOR** experienced in remote operations to oversee construction in 43 ft. state-of-the-art vehicle and take charge of same upon completion. Heavy field experience, ability to maintain and control operations of vehicle and certain public contact required. Ability to meet uncompromising technical standards under difficult conditions. Salary commensurate. Position available immediately. CONTACT: Director of Finance, WYES-TV, Box 24026, New Orleans, LA 70184. WYES-TV IS AN EQUAL OPPORTUNITY EMPLOYER. 5-81-3t

**INDEPENDENT DALLAS UHF STATION** has immediate opening for full-time experienced VTR editor technician. Rush resume and salary requirements to KXTX-TV, 3900 Harry Hines Boulevard, Dallas, Texas 75219, or contact Harold Nash (214) 521-3900. Equal Opportunity Employer. 7-81-1t

**TV MAINTENANCE ENGINEERS:** Need 2 good engineers with 2-3 years maintenance experience on TR-600's, TK-28's, TK-45's, and/or TT30FL. Mid-west location, good benefits and pay. Send resume to Dept. 541, Broadcast Engineering, P.O. Box 12901, Overland Park, KS 66212. 7-81-3t

**EXPANDING POST-PRODUCTION FACILITY** for advanced consumer entertainment and industrial video disc programming has the need for: MAINTENANCE ENGINEERS, TECHNICAL OPERATIONS MANAGER and CMX EDITORS/OPERATORS. Excellent salary and benefits. Send resume to: D. Leverett, DISCOVISION, P.O. Box 6600, Costa Mesa, CA 92626. An Equal Opportunity Employer. 7-81-1t

**VIDEO ELECTRONICS DOCUMENTATION ENGINEER:** to document video production switchers. Must have at least three years of video electronics design or repair experience and have technical writing skills. Career opportunity. Send resume to: Industrial Sciences, Inc., P.O. Box 1495, Gainesville, Fla. 32602. Attn.: Documentation Dept. 7-81-1t

## ENGINEERING AND TECHNICAL SALES POSITIONS

We specialize in the placement of **Technical Engineers with Television Stations, Cable TV, Satellite Programmers & Networks, Pay TV, Manufacturers, Industrial TV, CCTV, Production Houses & Dealers. Also, technical sales with Manufacturers & Dealers. All levels, positions & locations nationwide. Employers pay all fees - confidential, professional. Over \$3,000,000.00 in Salaried Positions Placed. Employee & Employer inquiries invited.**

PHONE/RESUME - Alan Kornish (717)287-9635

### KEY SYSTEMS

106 new bridge center, kingston, pa. 18704

## SITUATION WANTED

**RADIO ENGINEER** seeks a secure position with a non-commercial educational entity. Multi-faceted with a desire to do live recording/remotes, especially jazz. Also enjoy board shifts, and can do any routine studio/transmitter maintenance. Strong background in analog/digital technology. Quality oriented attitude with ear for high grade sound. First class radio-telephone. Willing to relocate for the right job. TV and commercial stations need not reply. Contact T. Leifert, 1102 Catalpa Circle, Madison, WI 53713. 7-81-1t

## FOR LEASE

**COMPLETE AIR PAC SYSTEM:** 2 Hitachi SK 90's, Ross Switcher, RTS, Sony BVH 500, Full Monitoring, All Accessories. Lease to Own. O.W.C. Call (213) 541-9488. 5-81-6t

## WANTED TO BUY

**WANTED;** Pre-1928 radio equipment and tubes. August J. Link, Surcom Associates, 305 Wisconsin Ave., Oceanside, CA 92054, (714) 722-6162. 3-76-1t

**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. 2-79-1tn

**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). 6-79-1tn

**PRIVATE COMPANY** would like to purchase a used RCA TK-76B or Ikegami HL-79A. Contact Glenn Przyborski (412) 765-3910 or (412) 231-7573 after 5 P.M. Eastern Standard Time. 7-81-2t

**INSTANT CASH for Broadcast Equipment:** Urgently need UHF transmitters, microwaves, towers, weather radar, color studio equipment, AM & FM transmitters. Call Bill Kitchen, Quality Media. 404-324-1271. 7-81-1t

**WANTED:** Radio Transcriptions 16" E.T.'s, any Eddy Arnold, or other Country 15" 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. 9-80-1tn

**WISH TO PURCHASE** Thompson CSF Micro Camera MC 602, NTSC. May be second hand/good condition. Please contact Zane Bair, 10100 Santa Monica Blvd., Suite 1075, Los Angeles, CA. 90067. Telephone 212-553-3345. 6-81-1t

**WANTED: USED RECORDING EQUIPMENT OF ALL AGES AND VARIETIES. MICS, OUTBOARD, ETC. DAN ALEXANDER, (415) 441-8936. 6-81-12t**

# Broadcast Engineers

• Camera • Transmitter

## Bored With Your Job Or Career?

If you feel confined in your present job, sitting behind a desk or trapped in a day-to-day routine with no future in sight, then a career with RCA Service Company may be your ticket out.

RCA Service Company's Broadcast Engineers travel all over the world to install, maintain and service television cameras, television tape recording equipment, and/or transmitting systems. A digital background, and experience in the maintenance of television broadcast and related equipment are necessary. RCA equipment experience is a real plus.

We are looking for a few of the best Broadcast Specialists, who are able to work without close supervision and who would enjoy working from home to travel throughout the U.S. and occasionally to many foreign countries.

Naturally we provide excellent salaries and Company paid benefits including medical and life insurance, vacations, holidays, and income savings, dental and retirement plans.

For immediate consideration, call collect, or send a letter or resume to: John Thayer, (609) 778-0770, RCA Service Company, 102 Gaither Drive, Mt. Laurel, NJ 08054.

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To the audio professional, when a compressor or limiter is needed to tame the potentially disastrous consequences of uncontrolled level or to create special effects, one name stands out as the best: UREI.

Studio Standards for more than a decade, the compressors and limiters from UREI have earned their way into thousands of recording, mastering, and broadcast installations around the world.

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A single channel, half-rack unit with patented electro-optical attenuator. Featuring smooth, natural sounding RMS action, it offers selectable compression ratios, a large VU meter, adjustable output and threshold levels and stereo coupling.

#### The Model 1176LN

A peak limiter which features adjustable input and output levels; individual attack and release time controls; selectable compression ratios; switchable metering; and

stereo coupling. The 1176LN is the most widely used limiter in the world.

#### The Model 1178

A two channel version of the 1176LN in a compact (3-1/2") rack mounting design. Featuring perfect tracking in the selectable stereo mode, it additionally offers selectable VU or Peak reading meter ballistics.

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