

BROADCAST **engineering**

December, 1979/\$2.00



Broadcast Technology

For the '80s: What's Ahead

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RIGHT—NEC's 16K mosfet ram for high-speed applications in NEC's FS-15 Frame Synchronizer and DVE® Systems.

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BROADCAST engineering

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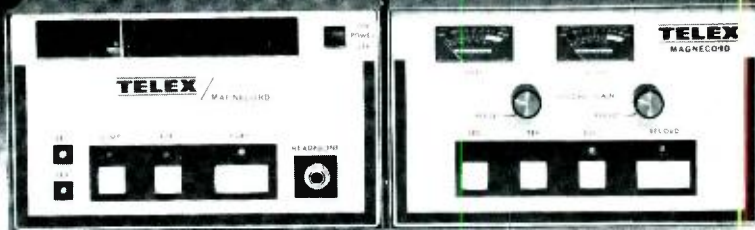
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THE COVER this month was generated electronically using the TELESTRATOR/TAPAS video imagery system and provided as a courtesy by Dr. Leonard Reiffel of the Interand Corporation in Chicago. The view shown here is just one of some 30 designs quickly created in striking colors and formats by the programmable system evolved with the latest in digital technology. (An article on this system is in preparation and will appear in a forthcoming issue of **BE**.)

Dr. Reiffel wishes to extend his appreciation to the Lenco Electronics Division of Lenco, Inc., Jackson, MO for the use of their color encoder in producing the cover illustration.

The cornucopia symbolizes an abundance of new equipment coming to broadcasters and serves as an excellent graphical introduction to the series of articles on What's Ahead in Broadcasting beginning on p. 20.

JANUARY, 1980

(**BE** enters its 22nd year of broadcast engineering coverage)

- Portable color cameras
- Helicopters for ENG
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Hitachi SK-90: portable ENG mode



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To appreciate the FP-40's agility in action, you need only slip it onto your shoulder (left or right, thanks to Hitachi's exclusive flip-over viewfinder). It's light, balanced, comfortable, and *totally* self-contained, down to its integral DC power pack. No battery belts—no wires.

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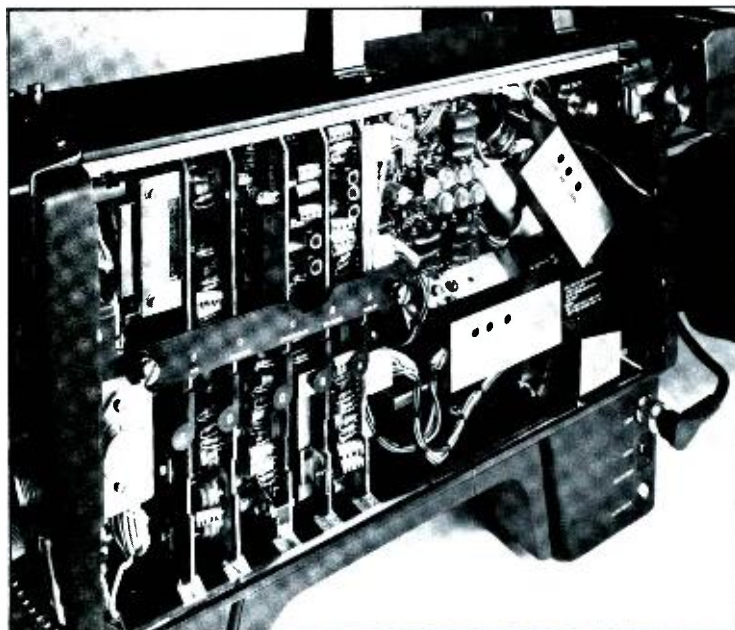
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FCC update



December, 1979

FCC approves AM 9kHz channel spacing study

The Commission has approved an additional \$190-210,000 funding for the AM 9kHz channel spacing study.

This supplements funding last January of \$35-45,000 for the study of the cost of AM licensees of an AM channel spacing reduction from 10kHz to 9kHz.

A study of the type proposed needs a computerized data base of US AM radio stations and their technical characteristics in order to fulfill an ITU requirement for the Region 2 CITEL Conference next March.

AM stereo

It is rumored in the industry that the pressures of the 9kHz study will delay the FCC plans to resolve the AM stereo selection. The extent of the delay has not been determined.

FCC deregulates receive-only earth stations

In deregulating domestic satellite receive-only earth stations, the FCC has given consumers the choice of getting or not getting a license to operate a satellite dish.

And not having to get a license means a considerable savings in the cost of preliminary frequency clear-

ance procedure. Without a license, however, the owner of an earth station would have no right to complain about interference to signal reception. Until now it has been necessary for users to resolve potential interference problems before filing for a CP and license.

If the owner of an earth station chooses not to be licensed, he still has to get permission from programmers to receive their transmissions.

The FCC is implementing the following procedures for earth station operators seeking a license: (a) immediate waiver of the required construction permit; (b) all earth station licenses will be issued for terms of 5 years instead of 3; (c) modifications of licenses for shared (nonprofit) use are no longer required; (d) current applications will be processed unless applicants request otherwise; and (e) when current licenses expire, station operators may file for renewal or not.

To reduce the administrative burden to the applicant, it will no longer be necessary to include a financial showing or articles of incorporation.

Brown applauds FCC deregulation

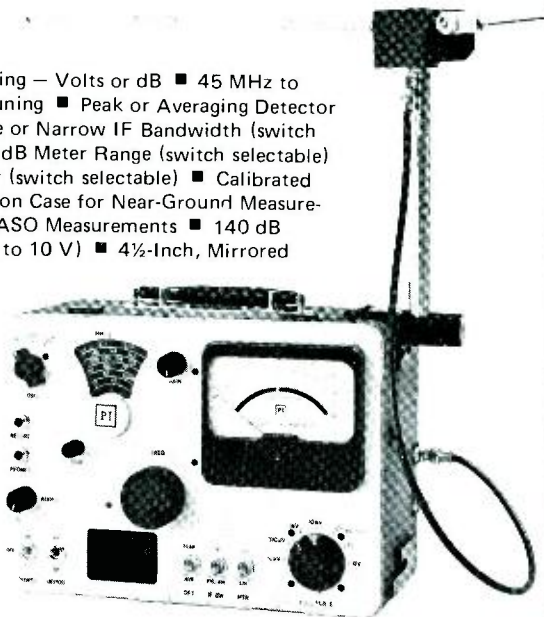
In remarks to the Maine Association of Broadcasters, FCC Commissioner Tyrone Brown comments that he hopes and expects that "we will soon see substantial deregulation of radio. But, at the same time I hope the FCC will not completely abandon its oversight of nonentertainment radio programming."

The FCC Commissioner discussed the Commission's recent notice which proposed elimination or modification of the FCC's nonentertainment programming and commercialization guidelines and its ascertainment and logkeeping requirements. Brown explained that the options proposed "range from complete elimination of FCC rules to changes in the rules to continuation of the status quo. I believe the notice invites the most comprehensive inquiry into the purposes and impact of Commission rules relating to nonentertainment programming that has ever been undertaken."

While substantial deregulation of nonentertainment programming is probable, he emphasized "I do not now believe that public interest considerations will permit the Commission to adopt the most far-reaching of the options proposed in the Notice of Proposed Rulemaking—namely, complete elimination of nonentertainment programming and commercialization guidelines and of ascertainment and logkeeping requirements."

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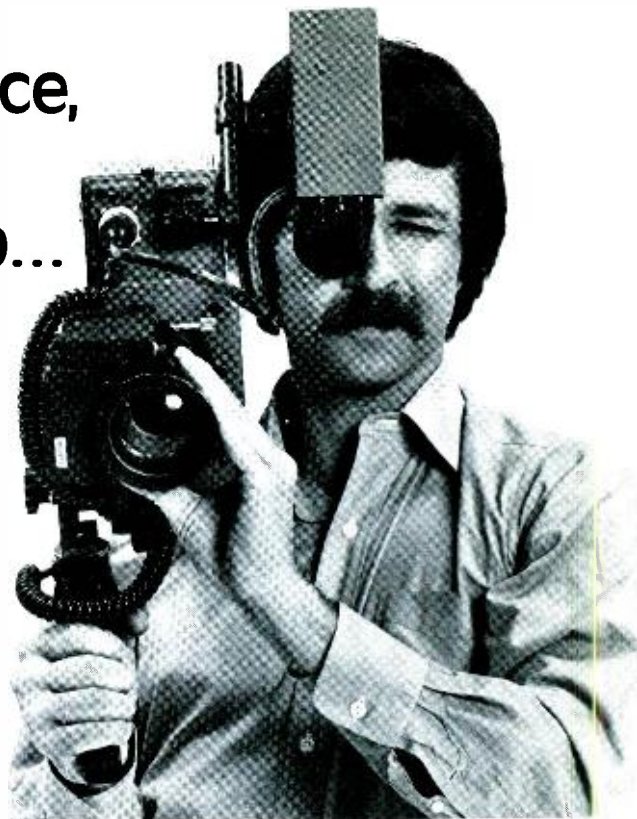
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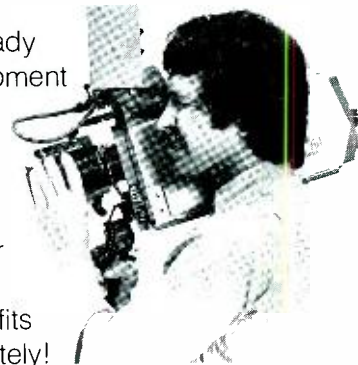
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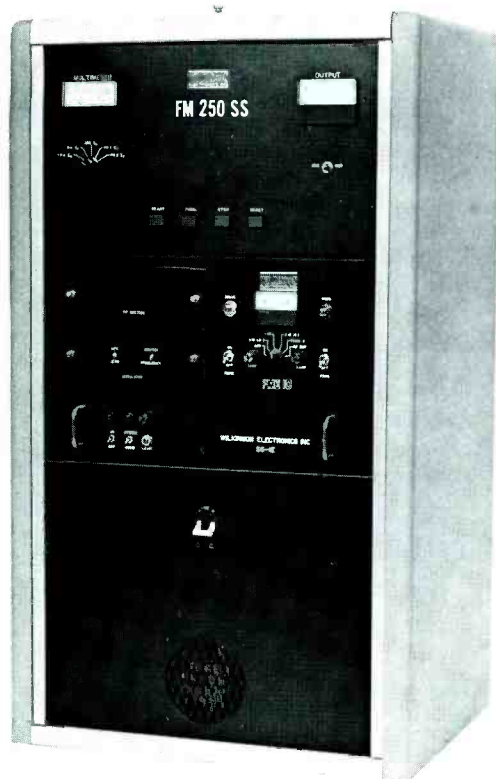
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**industry
news**

.....

Sony awarded complete victory

The California Federal District Court ruled favorably toward Sony on the Universal City Studios and Walt Disney Productions copyright law suit. According to Kenji Tamija, executive vice president of Sony, "It would have been contrary to public interest to have deprived the American people of such an exciting product that makes life more convenient and provides access to a greater diversity of TV programming. We believe this decision will encourage the future development of new video technology, of which Betamax is an important part, with a wide range of entertainment and educational benefits to society."

Divisional organization expanded

The communications group of Motorola announced the expansion of its divisional organization. Within the communications international division of the communications group, a second division has been formed and will be responsible for operations in Europe and Israel. Brad Kroha was elected vice president and named general manager of the European communications division.

The new division will report to Ray Farmer, vice president and general manager of the communications international division, which continues to be located in Schaumburg, IL.

Canadian broadcasting service by satellite

Federal Communications minister David MacDonald announced that a new chapter in television history opened in Canada as the Anik B satellite began transmitting TV programming directly to rural homes, community centers and cable television systems, which are being loaned small, dish-shaped earth stations for receiving the programming.

As a result of a project sponsored by the Federal Department of Communications in cooperation with broadcaster and provincial departments, Canada becomes the first country to install earth stations in private homes to test a direct broadcast satellite service. The project is planned to continue until at least next spring.

Public telecommunications facilities grants

Secretary of commerce Juanita M. Kreps announced the award of \$18,428,738 in grants to help plan and construct noncommercial telecommunications facilities throughout the nation. A total of 148 organizations in 42 states and the District of Columbia will receive the grants, which are being awarded by the Public Telecommunications Facilities Program of the Department's National Telecommunications and Information Administration.

Public radio goes satellite

October 1, 1979 marked the culmination of a major 5-year engineering effort by National Public Radio. The date heralds the beginning of public radio's program transmission via Western Union's Westar I satellite and also marks the accomplishment of several technological milestones in the satellite design industry. □

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

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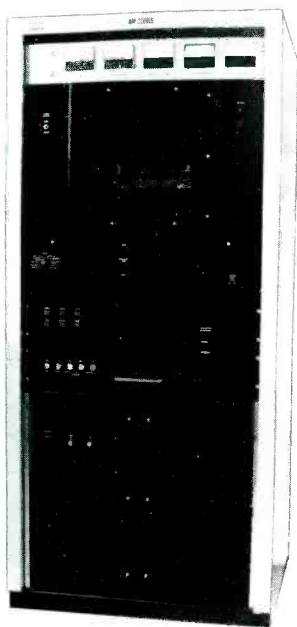
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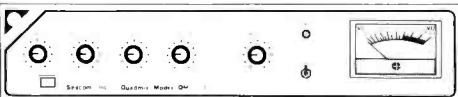
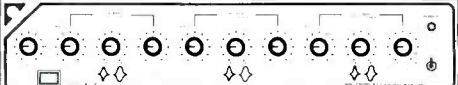
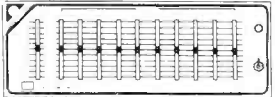
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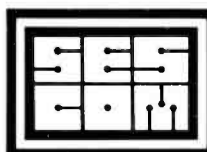
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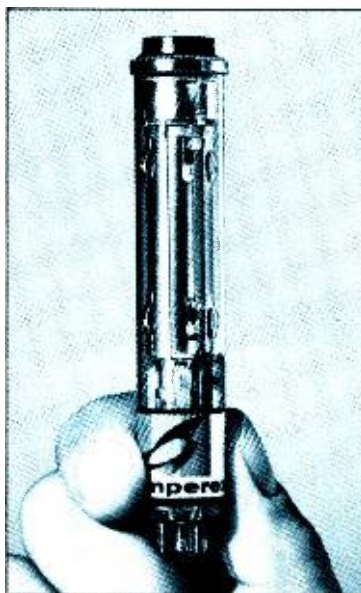
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National radio systems committee formed

The NAB and the Electronic Industries Association, (EIA) met Friday, November 2 to begin organizing a committee to study and recommend improvements to the radio broadcasting system including transmitting and receiving equipment—subject to formal EIA approval. The meeting was held at the Barron Suite Center in Waldorf Astoria Hotel. Membership on the committee is open to technically qualified individuals and organizations (including trade and profes-

sional) having a business or professional interest in radio broadcasting transmission and reception.

Slowdown request on 9kHz

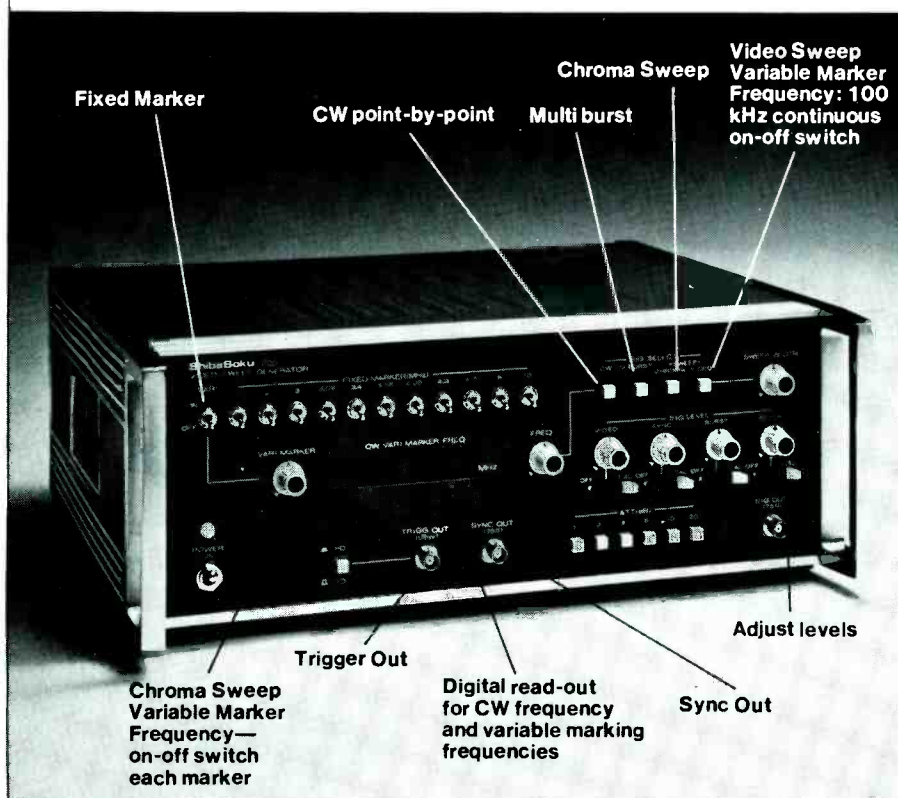
The NAB has urged the FCC not to act hastily in regard to a proposed reduction of channel spacing within the AM broadcast band from 10kHz to 9kHz. Additionally, it reiterated its call for a Joint Government-Industry Advisory Committee to administer the thorough and comprehensive studies on all interrelated matters "with a view

toward providing fulltime service opportunities for all radio stations, without significantly diminishing service by other classes of stations."

Wasilewski calls for federal action

Vincent T. Wasilewski, president of the NAB, stated to a senate subcommittee that federal legislation is needed to prevent the Federal Trade Commission (FTC) from basing rulemaking proceeding on theory and intuition rather than facts and hard evidence. Wasilewski said the FTC has abused the Magnuson-Moss Act in its proceedings dealing with children's television advertising and said the act should be amended to provide more detailed guidelines. The act requires publishing the proposed rulemaking and the reason for it, but does not offer a specific standard or measure to guide the commission's preliminary decision over whether to initiate a proceeding.

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The Asaca Video Sweep Generator 205 contains a built-in standard color sync signal generator. The color burst can be switched on and off so the 205 is ideal for oscillator comparisons to measure frequency response of color equipment.

There is a selection of output signals: video sweep (0.1 - 10 MHz), chroma sweep (sub carrier ± 2 MHz), CW and multi-burst.

Also, the 205 features facilities for composite sync signal outputs and trigger pulse outputs (H. D/V. D. Selectable) and so it can be used for oscilloscope triggering. Digital read out for CW frequency and variable marking.

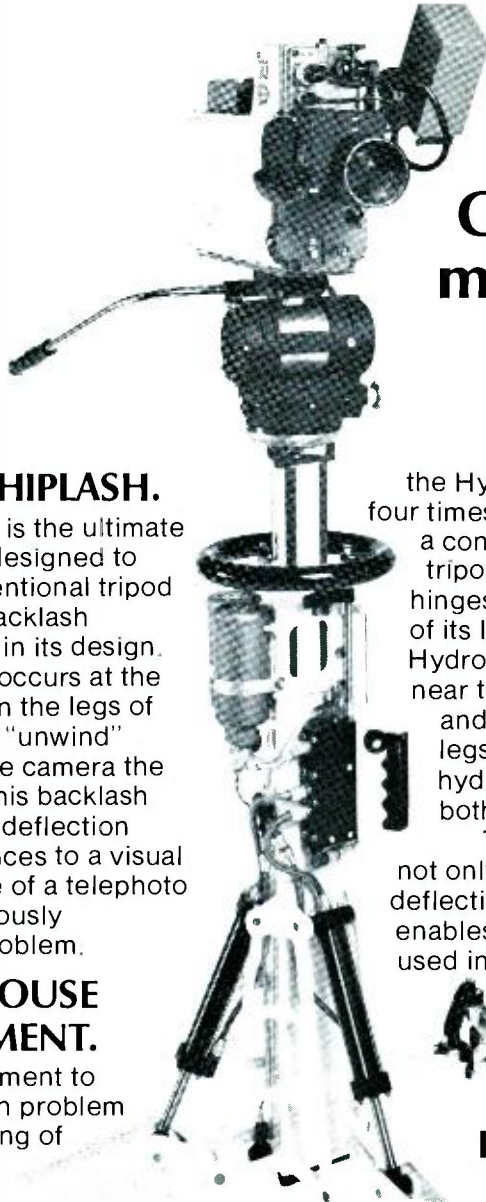
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The Hydro-Ped is the ultimate camera support, designed to replace the conventional tripod and correct the backlash problem inherent in its design.

Backlash often occurs at the end of a pan when the legs of the tripod tend to "unwind" slightly, jerking the camera the other direction. This backlash creates an image deflection subjecting audiences to a visual whiplash. The use of a telephoto lens will tremendously accelerate this problem.

LIGHTHOUSE EXPERIMENT.

An early experiment to solve the backlash problem included the filming of a lighthouse



through a telephoto lens from a mile away using a fluid head and a conventional tripod. The deflection of the image due to tripod backlash was 32 inches on a ten foot screen.

The Hydro-Ped was later put to the same test and the image proved to be virtually deflectionless.

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In torsion and bending,

the Hydro-Ped is four times as rigid as a conventional tripod which hinges at the top of its legs. The Hydro-Ped hinges near the ground and has short legs which lock hydraulically in both directions.

This design not only eliminates deflection, but also enables it to be used in the toughest terrain and tightest places.

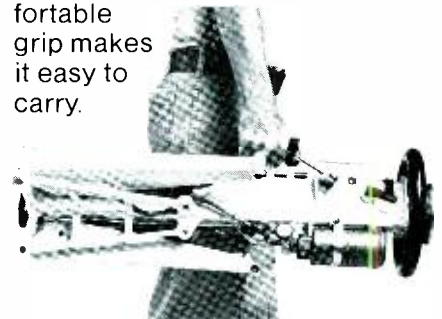
**SAVES
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PRIME
TIME.**

When minutes really count, the Hydro-Ped takes only seconds to position, level and lock.

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BUILT TO TRAVEL.

The Hydro-Ped is made of a sturdy magnesium and aluminum construction weighing only 29 lbs. It folds to 30 inches long and 10 inches in diameter. A single centered handle with comfortable grip makes it easy to carry.



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December 1979 **Broadcast Engineering** 13



National Radio Broadcasters' Association

1705 De Sales Street, NW
Washington, DC 20036

NRBA refutes merger rumors

The following statement was issued by Abe Voron, executive vice president of the NRBA:

We have noted in the trade press statements which give the impression that NAB and NRBA are considering a merger. As a statement of fact this is untrue; as a rumor it is misleading.

NRBA has no plans for merging with any organization and there have been no merger discussions with NAB or any other broadcasting organizations. Some NRBA, NAB and RAB board members have had informal, private conversations on the subject of improving communication, liaison and coordination of efforts between the major associations in our industry.

NRBA has always welcomed every opportunity to improve the service it and other organizations provide their members and the American public and we will eagerly and enthusiastically participate in any cooperative effort which achieves these goals, but a merger is not and has never been considered by NRBA.

Directors-at-large

The following people have been elected to serve two year terms as NRBA directors-at-large: Lynn Christian, Robert Duffy, Elmo Ellis, Loring Fisher, Jack Gennaro, Ray Livesday and Ken Mellgren. Directors-at-large currently serving their second year are Chester Coleman, James Conner, Dennis Doelitzsch,

Low Latto, Dave Raven, Stephen Trivers, Gary Worth and Thurman Worthington.

Executive committee

The NRBA 1979-80 executive committee includes: Bob Herpe, board chairman; Sis Kaplan, president; Stephen Trivers, vice president-east; Lynn Christian, vice president-west; Bernie Mann, secretary; and Ted Dorf, treasurer.

James Gabbert leadership award

James Gabbert, president of NRBA since its inception, was the recipient of the first annual James Gabbert Leadership Award. The inscription reads: In deep appreciation for his outstanding contributions to the radio broadcasting industry and the free enterprise system, the National Radio Broadcasters Association hereby establishes the James Gabbert Leadership Award.

In accepting the award, out-going president Gabbert urged all radio broadcasters to "please do everything in your power to strengthen the NRBA."

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Larry Pfister
VP Marketing

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Another Harris First.... FM-25K—25,000 Watt, One-Tube—High Power FM Transmitter.

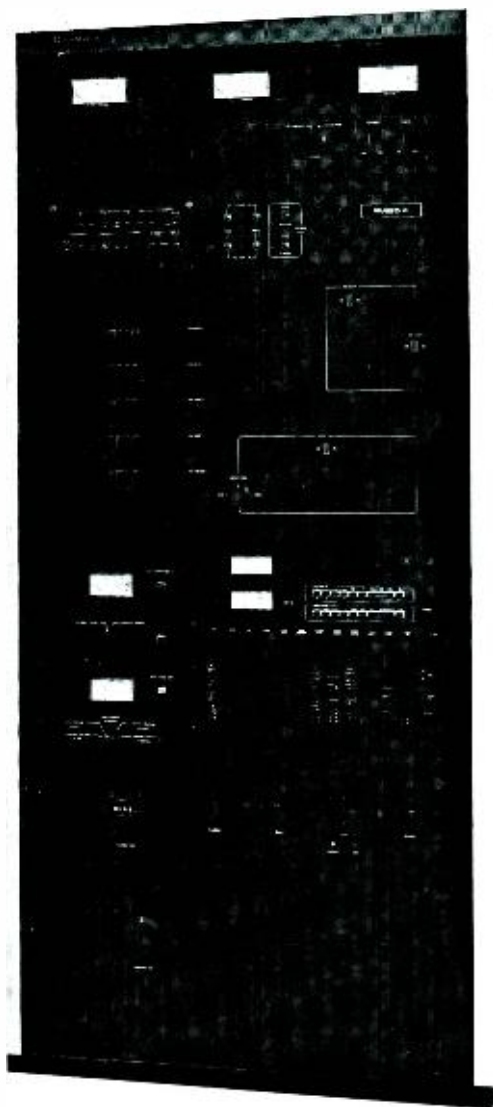
Introduced at the 1979 NAB show, Harris technology has combined advances in both tube and solid-state designs, bringing to the broadcaster the new FM-25K, 25 kilowatt transmitter, a major step forward in high-powered FM transmitters.

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

Simple operation is another plus with five wideband FM solid-state IPA modules combined to produce 350 watts of drive power, with plenty of reserve, providing back-up capability for improved reliability and reducing overall transmitter tuning requirements.

In answer to rising energy costs, the new FM-25K, 25 kilowatt FM transmitter requires less power which means low operating costs and longer component life. Its compact size, built-in protection circuits, status lights, automatic power control, and simple remote control interface make the FM-25K the best buy for broadcasters.

Let us tell you more, contact Harris Corporation, Broadcast Products Division, P.O. Box 4290, Quincy, ILL 62301.



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AMERICAN SOCIETY OF
TELEVISION CAMERAMEN, INC.

P.O. Box 296, Sparkill, NY 10976



Take 1: C.H. on training for TV Cameramen [and women]. (ASTVC Ed note: The following article was submitted by one of BE's readers who, for the time, would rather not receive name credit. All readers of this column are encouraged to contribute any thoughts or experiences that may prove informative and/or helpful to their fellows in the area of TV operations.

"There is no other means of training good (TV) cameramen than good ol' trial by fire (on-the-job training).

No college or university can successfully train camera operators and omit set-up and tear-downs of remotes, field ENG work (where competing elbow-to-elbow with 10 other crews is as important as the shots you get) and the highly routine

studio work. Constant and redundant operation of the camera leads to better camera operation.

Let us not forget that the television camera is a highly technical device. The television camera operator of the future will have to know more than how to point it. The operator will have to know:

- How to overcome minor technical problems to **save the shoot**. Especially in ENG.
- How to tell the maintenance types what the camera is doing wrong, or not doing.
- How to set up the viewfinder so a reasonable contrast and video level are recorded on the ENG videotape.
- How to avoid scenes that are out of the limits of the (TV) system (10 to 1 contrast for reasonable results,

20 to 1 for the most marginal results, etc.) to a go or no-go degree.

- How to stage the shoot for best scenic results in terms of picture level content as well as artistic composition, (ie: how to avoid grey against grey in luminance)
- How to diagnose trends in the gear: (bad battery), (blue, red or green component problems like comet-tailing, memory or dozens of others)
- How to detect follow focus or focus tracking problems,
- How to register and set up the camera.

It sounds like you will need a technical degree to get into television operations, and so you will!"

(C.H. works out of the Oakland, CA, area. He went on to mention a school that he felt taught "....all the elements needed for entry level work in television...." and encompassed the many areas of information spelled out in his article. Coincidentally, the ASTVC has already heard from this school and is currently studying their prospectus and available curriculum. Interested readers may write to ASTVC for further information.)

It's tough to compare something in a class by itself.

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The Sintronic SI-F-25 transmitter is designed for long-term, reliable performance in the 88-108 MHz FM Broadcast band.

It provides the broadcaster with a high specification, easily maintained, reliable transmitter with a long operating lifetime. Proven circuitry is combined with the latest technological advances to meet these design goals. All the specifications are verifiable and represent conservative statements which all transmitters will meet at a *minimum*. They are not engineering estimates of performance. Considerable care has also been taken in the mechanical design to ensure technician accessibility, ease of testing, and component replacement.

The same concern for detail and reliability are found in Sintronic 1.5, 3.5, 5.5, 17.5, and 55 kW FM transmitters. We wouldn't build them any other way.

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Shot with a Sony BVP-300 camera at f2.5 with approximately two footcandles' light.

DARK SIDE OF A CITY, YOU CAN'T WITH BRIGHT LIGHTS."

Henry Sheppard,
WCCO-TV, MINNEAPOLIS



"There are news-gathering and documentary situations where the use of artificial light is just too intrusive or difficult to achieve," says Henry Sheppard, Chief Engineer of WCCO-TV, the CBS affiliate in Minneapolis.

"That's why our Sony portable BVP-300 cameras are such a big plus. With them, we can shoot in low-light conditions and get a lot of detail other cameras might not pick up. We even get good pictures with as little as two footcandles of light."

WCCO-TV owns seven Sony BVP-300's, which the station's photographers use together with Sony BVU-50 recorders. The cameras are used to shoot public-affairs programs and segments of PM Magazine, as well as for ENG and documentaries.

"We're very particular about picture quality," says Sheppard. "And before we committed ourselves to Sony, we evaluated just about every portable color camera available."

"Sony's colorimetry is excellent, its signal-to-noise ratio is high, and it always turns out pictures that meet our standards. Many of our engineers find its quality comparable to studio cameras. And our photographers like the way Sony handles. For example, in a helicopter, they can cradle the camera on one shoulder to reduce vibrations and get a very steady picture."

"And with the Sony system, each photographer can operate independently, without a second person along to monitor sound."

When asked about Sony durability, Sheppard replied: "We don't coddle our cameras here. Each one gets handled by about 15 or 20 different photographers. They come in in the morning, grab their equipment, throw it into the back of the car, and they're off. Sony takes that kind of treatment remarkably well, and it's a good thing, because we can't afford to have our cameras down."

Of course, Sony makes a full line of one-inch broadcast equipment, including cameras, recorders, editors and the BVT-2000 digital time base corrector.

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



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Broadcast Technology

For the '80s: What's Ahead

We are teetering on the brink of the 1980s—but will the decade be marked with feverish activities in broadcasting or will disaster strike? Everyone is concerned about runaway inflation coupled with an economic slowdown and, in some industries, strikes. While broadcasters are concerned about price increases, there appears to be no need to worry about industry cutbacks.

Take a look at 1979: NAB '79 in Dallas was a record setting event; the same was true for NRBA '79 in Washington and for SMPTE '79 in Los Angeles. All these major industry shows set attendance and exhibitor registration records this year—and that speaks well for broadcasting.

Take a look at new equipment: the three major shows—NAB, NRBA and SMPTE—all featured new equipment representing every facet of broadcasting. And manufacturers are already alerting us to look for their new products emerging from R&D that will be introduced at NAB '80 in Las Vegas.

Take a look at the issues and opportunities: AM stereo, the 9kHz problem, expanded satellite usage, the Communications Act re-write, stereophonic TV, blanking, the clear channel pressures, deregulation, the first amendment, libel and protection, the 200kHz bandwidth, teletext, videodisc, accelerated

usage of 1-inch VTRs, captioning for the deaf, and growing complaints about the backlog on the FCC calendar. There seems to be no end to the issues and growth-related problems—but that is also a part of the picture of prosperity for broadcasters. Thus, as 1979 draws to a close, broadcasters find themselves in an industry vibrant with activity, anxiously teetering on the brink of a new decade.

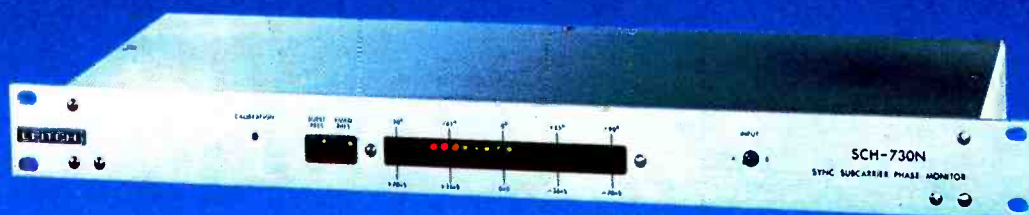
And what will this new decade bring forth? AM stereo? Of course; it's only months away—has been for years. Digital audio? Of course; it's already here, but far greater progress is steamrolling ahead. Digital video? Of course; but don't be too anxious. Experts agree that video standards are years away—mid-1980s at least.

Last year our December issue contained 16 separate articles in which manufacturers (chiefly) looked ahead at what they could offer broadcasters through future R&D. As a balance, this year we repeat the theme of **What's Ahead** but have asked major broadcasting organizations and influences to talk about what they plan to do in the future as we enter the 1980s.

These contributions appear on the following pages as a springboard into the '80s. **Broadcast Engineering** takes this opportunity to wish you happy reading and a prosperous new decade.

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The control room for the 1980 Winter Olympics promises to be an impressive array of modern instrumentation.



Cameras and crews for the 1980 Winter Olympics needed special care and protection.



What's ahead in broadcasting at ABC

By Julius Barnathan, president,
ABC Operations and Engineering

As the decade of the 1970s closes behind us, the American Broadcasting Companies welcome the 1980s with an assortment of major broadcast operations and engineering projects. These plans range from the upgrading of production facilities and the utilization of the newest, most sophisticated broadcast technology available to the massive undertaking of providing worldwide Olympic coverage and the very gratifying task of inaugurating a broadcast system to enable hearing-impaired Americans to more fully enjoy television viewing. Though some of these projects will unfold in the very near future while others will develop more gradually over the coming decade, they all illustrate the vast potential inherent in the future of ABC's basic business of broadcasting.

Just a couple of months from now, from February 12-24, ABC Sports will televise the XIII Winter Olympic Games from Lake Placid, NY. While these games will represent the

seventh time in nine consecutive Olympics that ABC has supplied exclusive television coverage to the American people, each Olympics is distinct from a technical viewpoint from all others.

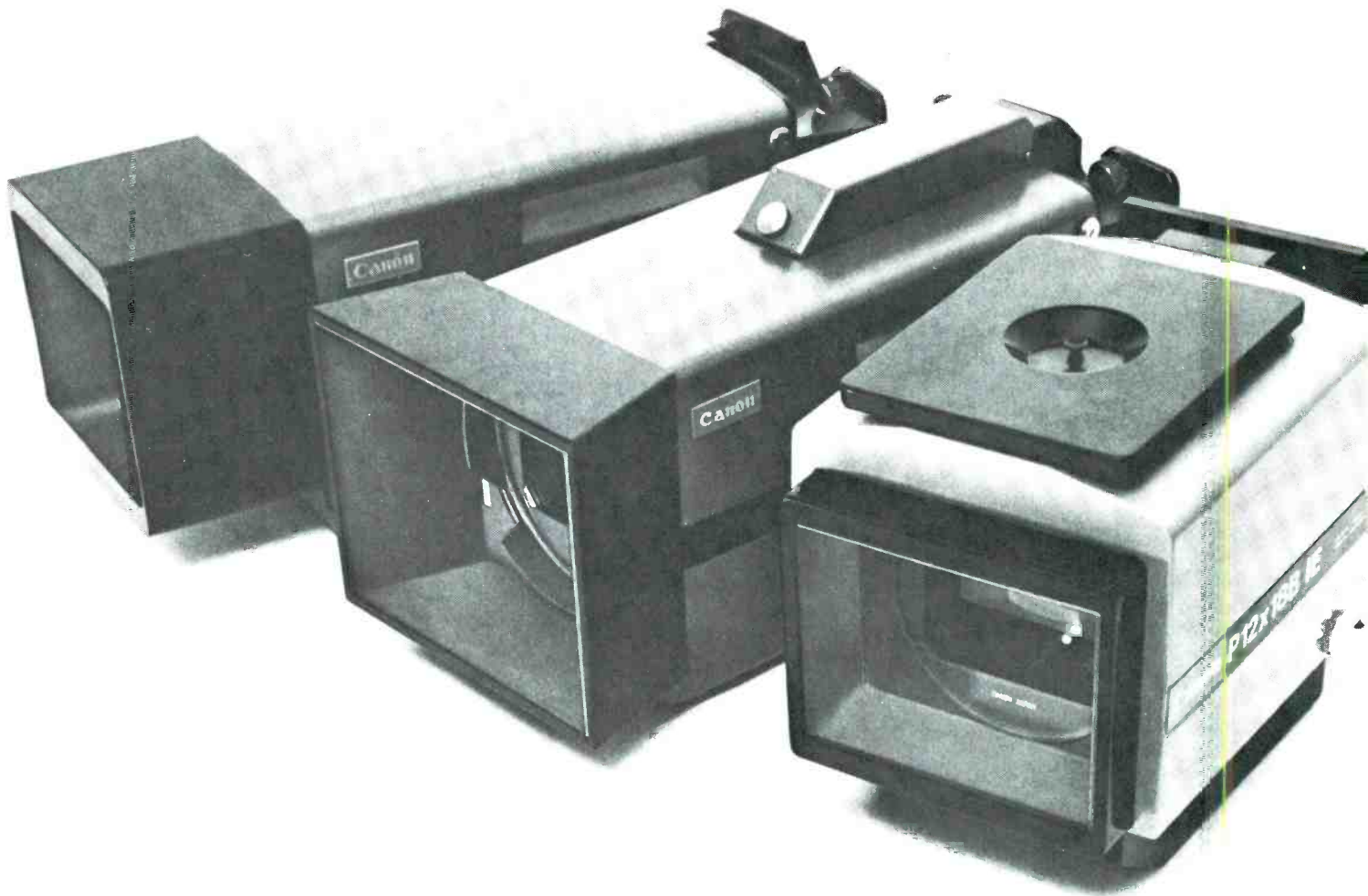
At Lake Placid, ABC Sports not only will air the most extensive coverage ever given to a Winter Olympics—50.5 hours worth—but it also will serve as coordinating broadcaster for the world, a function separate from its role as unilateral broadcaster for US viewers. This will be the first time that an American television network has assumed this tremendous challenge.

ABC will supply a clean feed with natural sound of virtually all of the competitions and ceremonies to foreign broadcasters who have contracted with the Lake Placid Olympic Organizing Committee (LPOOC). This world picture will be routed from the various Olympic venues back to the broadcast center in Lake Placid, from which point the picture, with commentary added in

the appropriate language, will be transmitted by satellite to the participating countries.

To fulfill this dual role—the most monumental single effort ever undertaken by an American television network—ABC Sports will have approximately 300% more equipment at Lake Placid than it had at the Innsbruck Olympics four years ago. Fifteen mobile units and nearly 100 cameras will be serviced by 66 miles of triax cable, with about two-thirds of that equipment devoted to worldwide as well as ABC coverage, and the rest deployed for unilateral American coverage. Nine completely portable mini-camera units and an aerial camera mounted in a helicopter will also be in operation at Lake Placid. The ABC staff at the 1980 Winter Games will consist of approximately 800 production, engineering and support personnel—almost double the 450 individuals needed at Innsbruck.

One of the most challenging aspects of our coverage at Lake



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Canon Amsterdam N.V., Industrial Products Division De Boelelaan 8, Amsterdam, Netherlands

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December 1979 **Broadcast Engineering** 23

Placid will be the alpine skiing events on Whiteface Mountain, where we will use about 25 cameras with 50 miles of triax cable for our complete top-to-bottom coverage, an innovation pioneered by ABC Sports. Eighteen of these cameras will be shifted by helicopter to the four different slopes involved and to more than 60 different camera positions on specially-built platforms. ABC will mark another first at Lake Placid by using a custom-designed Philips repeater amplifier which will enable any one of five of these cameras to transmit a picture signal over 15,000 feet of cable. Without such an amplifier, the picture signal would be limited to a distance of approximately 10,000 feet.

Our cross-country coverage also will feature some new technical applications. In fact, Lake Placid will represent the first time that an American television network will offer a live pick-up of this event. At the starting point, we'll have a home base consisting of a mobile unit with six cameras. Six additional cameras will be split into two groups and placed atop two specially-designed snowcat mobile units which will be placed at strategic and changing locations around the course. The picture transmitted from these cameras will be relayed to the mobile unit via microwave

over 14 towers constructed along the course.

The nerve center of the Olympic operations will be a 70,000 square foot 2-story television center built by the LPOOC. It will contain a studio and two production control rooms, each equipped with 35 television monitors. The center also will house seven editing cubicles and more than three dozen videotape machines, including 12 $\frac{3}{4}$ -inch U-matics and 25 Ampex 1-inch machines, the latter equipped with slow-motion and reverse slow-motion capabilities.

At the Olympics, ABC will inaugurate use of the Quantel 5000 PLUS, the most recently developed unit for providing digital video effects, which will be supplemented by a Vital Squeezoom. In the graphics area, we will use the Ampex electronic still store (ESS-2), with capability for storing up to 1600 individual TV frames or pictures. We will also employ the new Grass Valley Model 300 production switcher and a Grass Valley 440 routing switcher, which will interconnect the equipment at the television center with the Olympic venues. This switcher has the capacity to handle 64 inputs for distribution to 96 locations, plus four levels of audio.

So, new and much more tech-

nology, plus the additional technicians needed to operate it, increase our equipment and manpower commitments as well as our ability to provide exciting and sophisticated detailed coverage at each succeeding Olympics. This certainly will be the case at Lake Placid and, no doubt, at the 1984 Summer Olympics in Los Angeles, the broadcast rights to which ABC recently acquired. In 1984, ABC once again will serve as host broadcaster for the world, and we now plan to provide over 200 hours of television coverage, a great deal of it live.

When we think of the literally hundreds of millions of viewers worldwide who will watch some part of our Olympic coverage, a figure of 14 million viewers may seem relatively small. But this number represents the sizeable and significant portion of our country's populace with hearing impairments. And this special audience soon will be able to gain fuller access to prime-time commercial television through the inauguration of a major breakthrough in technology—closed captioning system for the deaf.

Early in 1980, this closed captioning system will go into effect on ABC, NBC and PBS. ABC's involvement with this project dates back to 1971 when the National Bureau of Standards asked us to participate in an experiment to present standard time and frequency signals over the air. While researching how this would work, we determined that it was possible to insert captions on the screen by using one line in the vertical interval. Later that year, at the first National Conference for the Hearing Impaired, we demonstrated the feasibility of a closed captioning system.

Early in 1972, I became chairman of a National Association of Broadcasters special subcommittee to develop standards for a captioning system for the hearing impaired. Since then, PBS, under a contract with HEW's Bureau of Education for the Handicapped, has been refining and testing the system. In 1974, under special temporary authority from the Federal Communications Commission, PBS began broadcast tests of the system. The FCC granted approval for broadcasters to present captioned material on a limited portion of the television picture in December, 1976. Shortly thereafter, the development of decoding equipment began.

The closed captioning system will utilize Line 21 of the vertical blanking interval to transmit captions that can be seen on television



Julius Barnathan, president of Broadcast Operations and Engineering for ABC, stands in front of a television monitor displaying how closed-captioning would appear on television sets equipped with special decoding devices. Barnathan was chairman of a special NAB subcommittee in 1972 to develop standards for a television captioning system for the deaf.

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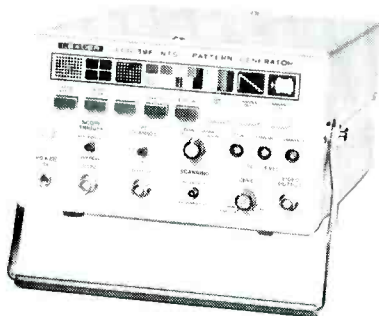


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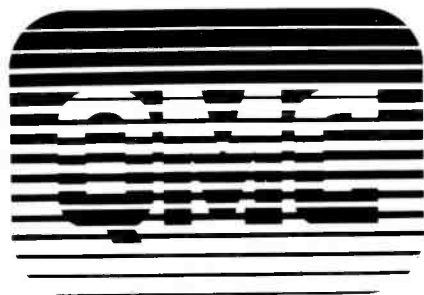
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WGBH engineers talk about the Ikegami HK-312



WGBH covers Boston Pops Orchestra concerts
with Ikegami HK-312 cameras from Symphony
Hall, Boston.

Eight Ikegami HK-312 studio color cameras are in service at WGBH, Boston, some dating back to October 1977 — long enough for intelligence on their performance. From recent interviews with key WGBH people, read these excerpts.

Pops without noise

Tom Keller, Director of Engineering:

“The HK-312s have such high sensitivity that we were able to reduce significantly our light levels at the Boston Pops and Symphony telecasts. Yet, despite the major light reduction, we experienced no visible noise with the HK-312s... With their remarkable reliability record, we can depend on 6 cameras for 6-camera coverage, and not 7 for 6 as in the past. After all, you can't stop a live orchestra performance for a retake if you've lost a camera.”

2 IRE, but a complaint

Ken Hori, Senior Engineer for Advanced Development:

“We tested several camera makes for RFI within a quarter-mile of a 50 KW radio transmitter. The HK-312 measured 2 IRE, whereas most others were in the 5 to 7 IRE area, and some as high as 20 IRE... For symphony remotes we'd need 2 to 5 hours for warm-up, but nowadays we're set up in less than an hour... We like its straightforward design — example, its truly high signal-to-noise ratio as compared to other cameras that resort to reduced bandwidth to attain a comparable ratio but wind up delivering noise too...”

We did get one complaint from the maintenance crew. They said that because they rarely found the problem of a down HK-312, they would never get to know the HK-312 well enough to fix it.

Washouts and dropouts

*Bill Fairweather,
Video Control Engineer:*

“During a lighting seminar staged here by Imero Fiorentino Associates, an actor in a normally lighted scene held up a sheet of white paper with printing on

it to show loss of detail in the case of more than 60 percent tv white reflectance. The HK-312, however, was able to retain enough detail for the printing to be readable on the monitor.

Next came a demonstration of the dangers of too much or too little light on a chroma-key background. The HK-312 held the key to such a low light level on the blank background that the lecturer grinned and said, “I guess WGBH has pretty good cameras!” and went on to the next subject.”

The HK-312 is the camera that met WGBH criteria for performance, stability, and reliability. They also have HL-53s, high-performance portable cameras that interface with HK-312 CCUs and can operate portably with their own CCUs.

Adapters for triax cable, using digital techniques, make their cameras remote-usable at nearly a mile from base stations, yet easily revertible to multi-core cable whenever needed.

In daily use, their HK-312s and HL-53s are interfaced with microprocessor-computer control units that automatically cycle them through all set-up adjustments, including black-and-white balance, flare and gamma correction, video gain, and eight registration functions, then recheck all those adjustments — all within 45 seconds. The cameras can also operate independently of the set-up computers, a feature that is an Ikegami exclusive.

If all of this suggests that the HK-312 is probably the best studio/field color camera in the industry, consider this: camera, set-up computer, and triax adaptor are not only operational, they are deliverable. For details or a demonstration, contact **Ikegami Electronics (USA) Inc.**, 37 Brook Ave., Maywood, NJ 07607, (201) 368-9171 / West Coast: 19164 Van Ness Ave., Torrance, CA 90501, (213) 328-2814 / Southwest: 330 North Belt East, Houston TX 77060, (713) 445-0100.

Ikegami HK-312

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screens only when decoded. Sears, Roebuck and Company will manufacture and distribute the decoding equipment as close to cost as possible. There will be two types of decoders: an adapter unit which can be added to an existing TV set, and an integral decoder built into certain new model television sets.

The encoding will be done by the National Captioning Institute, an independent, non-profit organization. The NCI editors will use a captioning console developed by PBS to recast dialogue into captions and onto a floppy disc, which will be sent to the networks for broadcast with the captions integrated into the tape of the show.

When this system is fully operational, ABC and NBC will each supply about five hours of captioned programming, most of it prime time, every week. PBS will provide 10 hours per week. We estimate a first year cost for ABC at around \$750,000—\$500,000 for the cost of captioning (at the rate of \$2000 per hour of programming) and an additional \$250,000 for transmission and other ancillary costs.

The present mechanisms of this system limit the captioning technique to taped programs, but research into broadening this capability to include film and live television coverage has already begun. The 1980s will bring great accomplishments in television's role in helping this group of handicapped Americans to participate more fully in society and will be remembered in the history of the hearing impaired as the decade in which the doors of televised information and entertainment were opened to them.

In the coming decade, we also will witness significant developments in the technology of television news, though these advances probably will not be as dramatic as those of the recent past. The 1970s brought major technical developments and improvements in Electronic News Gathering (ENG), particularly in terms of the size of the gear and the reduction in cost of the equipment.

Miniaturization of the ENG camera through the use of integrated circuits, $\frac{2}{3}$ -inch pick-up tubes, and push-button set-up controls made the first truly portable and practical unit possible. The arrival of the Ikegami battery-powered camera also contributed to ENG portability. Since then, weight and power reduction have continued to be focuses for improvement. Currently, the camera equipment is beginning to stabilize, although not yet at the level of standardization

which exists with film cameras. This is particularly true with regard to lens mounts.

Accompanying developments in $\frac{3}{4}$ -inch tape recorders, playback machines and editing equipment also have contributed to the genuine change in field news coverage that has occurred in the last few years. However, recording and playback machines, together with the time-base corrector, are still the weakest areas in ENG because the shock and vibration and wear and tear on the portables cause many failures. And though building a tape story can be much faster and easier than editing a film piece, improvements are still necessary in the editing equipment for longer news pieces.

Microwave transmission also made giant strides in the 1970s and is now used extensively for live ENG pickups. A new type of antenna called the golden rod, in the shape of a long 3-inch diameter rod, gives better performance than the previously used 3-5 foot diameter dish. Portable units operating on 13GHz provide signals over short distances, usually between the camera and the ENG van. Distances of up to 30 miles are provided by 2GHz microwave transmitters with 10W power amplifiers to deliver the signal from the van back to the designated receiving point or broadcast studio.

This equipment has been made frequency agile to operate not only at center frequency but also at the low or high side of center on the original seven channels. This provides 21 channels in the 2GHz band and reduces the risk of interference among several broadcasters attempting to cover the same news story. The need for more frequencies, however, still remains a significant problem for the future. Hopefully, manufacturers, broadcasters and the FCC can work together to find relief in this area.

Due to the rough handling and hazardous environment in which ENG equipment is expected to operate, further improvements are needed in its stability and reliability before it can totally replace film. At ABC News, our ratio is about 85% ENG equipment and 15% film. In local markets, the ratio is more nearly equal. Considering their different areas of strength, I believe tape and film will remain complementary in news operations, at least in the near future.

During the 1970s, live news coverage progressed from the spectacular to the expected as more and more Americans came to rely on television for their information on the

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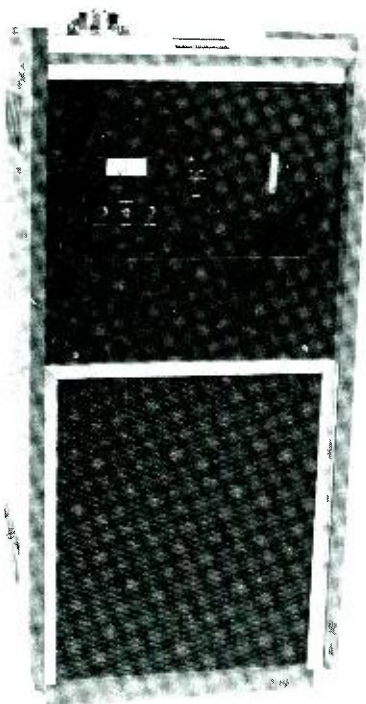
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events and developments of the decade. The expensive news programs which the networks provide and the worldwide production facilities and staffs they support will remain far beyond the resources of both local stations and pay-television outlets. For this reason (among many others), the maintenance of our present system of advertiser-supported free television will be vital in serving the needs and wishes of the future generations.

ABC is committed to developing and supporting the finest and most up-to-date newsgathering organization in the world. To reflect this commitment, we are building an ABC News facility in Washington, DC, which will be the largest ever built for use solely as a broadcast news facility. The 10-story building on downtown DeSales Street will consolidate the diverse operations of the ABC News bureau in the nation's capital, including the Washington desks for *World News Tonight*, *Issues and Answers*, *Good Morning America* and the special-events unit. Scheduled for completion in early 1981, it will house two television and three radio studios, 20 videotape editing rooms, six audio editing and production control rooms, and garage facilities for ENG vans and mobile units.

The ABC News bureau in Washington will be furnished with new 1-inch Type-C Format videotape machines. The state-of-the-art has progressed to a point where 1-inch tape quality is equal to or better than that of 2-inch tape. The 1-inch machines are smaller and less complex than the 2-inch models. One-inch equipment also has frame-by-frame editing and slow-motion capabilities built in, while the 2-inch does not. Aside from these technical considerations, using the 1-inch Type-C Format results in significant cost savings.

Over the next year, ABC will continue to phase out its 2-inch quad videotape machinery and replace it with the 1-inch format at both our network and owned station facilities. Our New York network operations are now 25-30% converted to 1-inch tape, and our Hollywood plant is 75% 1-inch. Of our five owned television stations, KGO-TV in San Francisco currently is fully operational in 1-inch while WLS-TV in Chicago and WXYZ-TV in Detroit are halfway converted. WABC-TV in New York and KABC-TV in Los Angeles have yet to begin their conversion to the Type-C Format, but both stations should be 100% 1-inch by the end of 1980. Altogether,

er, ABC has ordered over 170 1-inch tape machines from Ampex Corporation, with almost 100 of these machines now installed or operating. Twenty-five 1-inch machines will be used for the first time at the 1980 Winter Olympics before finding permanent homes at various ABC plants.

ABC's investments in ENG equipment, 1-inch tape machines and the ABC News building in Washington are just part of a \$200 million capital improvement program initiated in 1978 and slated for a number of broadcast operations and engineering projects. Some of these capital funds have been allocated for the upgrading and expansion of ABC's network facilities in Hollywood and New York and for new buildings for New York's WABC-TV and Detroit's WRIF FM radio station. Other amounts are being expended for new mobile units and for the erection of WABC-TV's circularly polarized antenna atop the World Trade Center. ABC's owned station in Chicago, WLS-TV, pioneered in the use of a CP antenna in 1974, after which ABC successfully petitioned the FCC to permit circular polarization for television. The CP antenna gives a stronger, more reliable TV picture than that transmitted by a conventional, horizontally polarized antenna and, in the presence of tall buildings, can reduce *ghosting*.

These capital expenditures underscore ABC's faith in the long-term future of radio and television broadcasting. Certain elements of the emerging new technology, such as fiber optics, also hold great promise. Due to its ability to carry many signals inexpensively, fiber optics will be a major means of distribution both within ABC's plants and from city to city. The standardization of the videodisc industry could help make the videodisc a big product in the future. The maturation of cable TV and Viewdata systems will contribute toward turning the American home into a complete information center.

I believe the application of these new technologies will result in an increased amount of television viewing. The new technologies will stimulate a larger appetite for the television set than we have seen before. And rather than eat significantly into the audience for traditional broadcast television, the use of these new methods of distribution will turn the home television screen into a *bigger pie*, which will be sliced according to each individual viewer's taste. □

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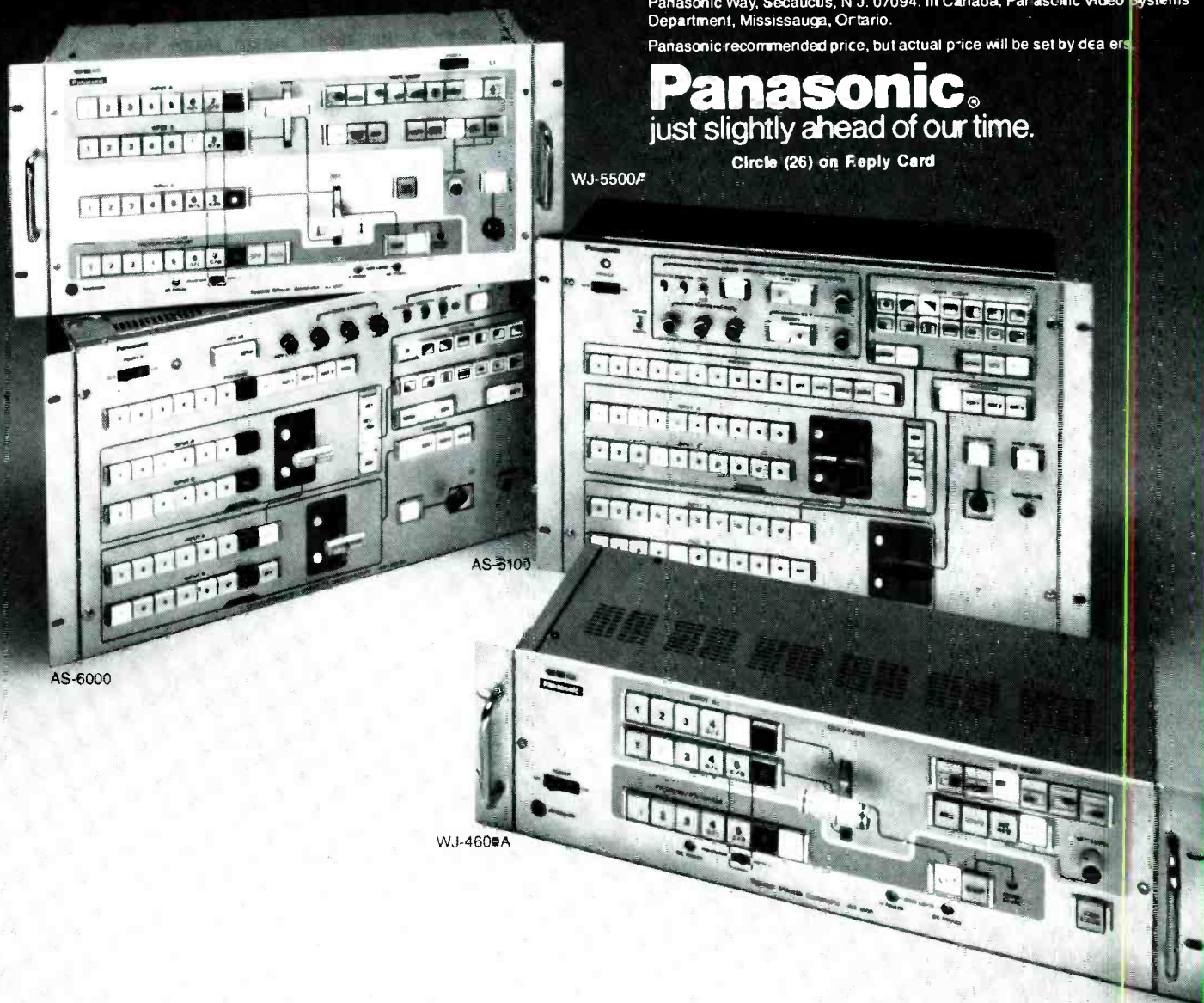
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The Future of Broadcasting



Ferris with the 0.9 meter antenna used by the FCC for experiments with direct-to-home broadcasting from the CTS satellite.

By Charles D. Ferris, Chairman, FCC

The broadcast industry in the 1980s will enter an era of rapid change more similar to the '50s than to the last decade. As in the '50s, there will be increases in the number of services broadcasters will provide and in the public's use of these services. There will be more choices for both broadcasters and the public to make, and these will come from a more varied menu of services. New technologies for the creation and distribution of program material will be responsible for this enhanced variety of programming and services.

Local broadcasters will find greater ease in obtaining programming from a variety of sources through geostationary satellites. That link will also be the means for local stations to send programming to the rest of the country. This interactive networking model, based on relatively inexpensive satellite transmission, is already at work in public television. The need for additional programming will come both from a larger number of broadcast stations of all types and from expanded cable services.

The FCC is examining several possible initiatives looking toward expansion of the number of broadcast outlets. For standard AM radio broadcasting, a proposed reduction in channel spacing to 9kHz is being examined. In addition, new international agreements under discussion in CITEL in the Western hemisphere could lead to better utilization of the existing allocation. In the FM radio service, new classes of stations will be authorized to permit more assignments to be made to noncommercial stations. Studies are also underway to examine whether FM channel spacing can be reduced.

For television, a number of key staff and contract studies have already been made and are being integrated into a comprehensive set of recommendations. Advanced TV receiver designs, superior transmitter facilities, and a more precise engineering of individual frequency assignments are among the major proposals being considered by the Commission. The FCC is also looking into the possibility of an expanded translator service. This will include using translators for local origination in areas underserved by present stations due to geography or lack of available channels.

Broadcasters, with their wide geographic distribution and close community ties, are in an ideal position to produce high quality television programming at relatively low cost. The current generation of 1-inch videotape recorders with simplified computer-assisted editing and electronic effects makes inexpensive production available to television stations. The concept of national commercial networks as having a small number of suppliers is likely to be modified by these changes. In recognition of this, we at the FCC have a strong interest in seeing an orderly transition to completely connected networks with many suppliers, and where sources and users are indistinguishable. Again, the public broadcasting system has already moved a long way towards this concept of network.

A key concern for broadcasters will be the flexibility to create program material and deliver it in final form economically. This will be a challenge to the technologists who will be asked to create an efficient integration of all terrestrial and space elements through which the program will flow. A critical element for profitable production will be broadcasters' incorporation of this technology. Should stereo AM be adopted, and as further uses for ENG technology occur, broadcasters will need to use wireless connections between their places of operation more effectively.

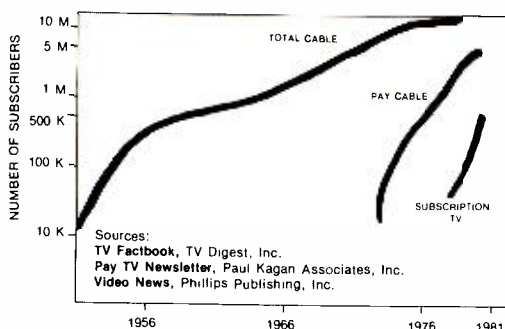
More sophisticated methods must also be found for handling the internal communications needs of broadcasters for distribution of written material, coordination of

facility use, and assembly and editing of program material. These internal broadcast operations will soon more closely resemble those of data processing organizations. As broadcasters meet the challenge, they will find a merging between program material and message data. Eventually, if broadcasters take the leadership role in this merger, the word broadcasting may come to include a far broader sense of communications services.

From the public's point of view, broadcasters will be providing services in new ways. Already, we have seen new uses for FM subcarriers and a variety of ways to use the vertical blanking interval of television stations. Teletext services are on the way. Over-the-air subscription television is introducing the public to a wider variety of programming, and increased cable TV and use of home videotape recorders are giving the public alternatives to off-the-air programming. The accompanying graph traces the growth of cable, pay cable, and over-the-air subscription TV in the past two decades. The rapid growth of these new services attests to the public's interest in innovative offerings.

Coaxial cable based on optical fibers that can provide two-way capability are even now being operated. With increased program availability through a satellite system, these fiber cable networks will be capable of providing many new services for which broadcasters can be the source through a home communications console. As more services can be offered and as cable technology costs decrease, cable delivery can be expected to increase. While not as unified a system as the telephone network, cable systems nevertheless share its potential to reach virtually all households.

Other new ways of reaching the public through direct broadcasting-to-home satellites or terrestrial microwave links will emerge. Systems based on these concepts can reshape the future of broadcasting. Some technologists predict that broadcasting satellites could provide many more broadcast programs to the public than are currently possi-



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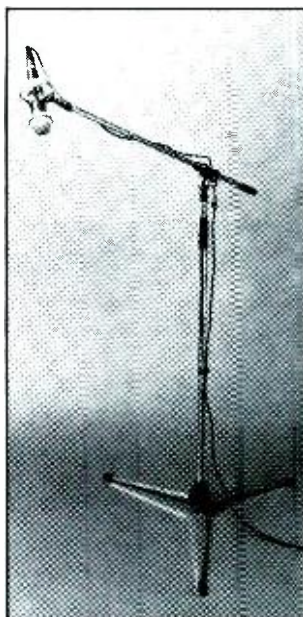
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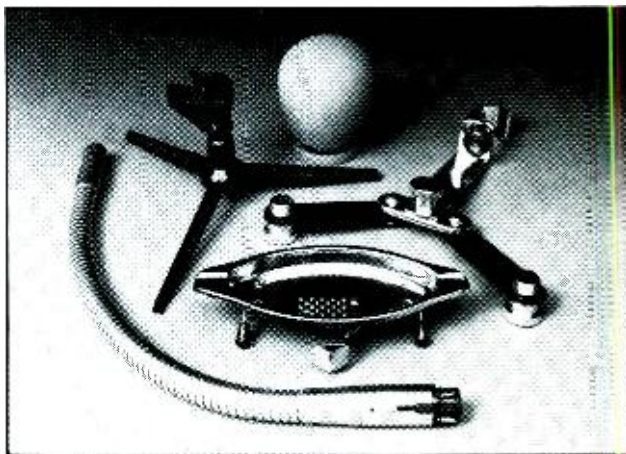
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ble with a terrestrial system and at the same time free valuable spectrum for additional services to those unable to access the broadcasting satellites, such as the mobile audience.

The World Administrative Radio Conference (WARC) is the arena where some of the most important spectrum allocation decisions have been made. The US must work within those guidelines in order to develop the best possible communication system both domestically and internationally. As a leader in providing broadcasting service, the US broadcast industry has a continuing need to understand its international potential and the positions of foreign administrations. The strength of our broadcasting system lies in its flexibility to adapt to the changing circumstances of complex international agreements.

The basic technology for new services is here today. The equipment needed to produce new programming services will be available to broadcasters who seek to provide those services to the public. This will call for creative thinking by program producers, who are ultimately responsible for the success or failure of the broadcast industry. The nature of broadcasting in the '80s will not be determined by government policy but by those visionaries, broadcasters or non-broadcasters, who take advantage of the innovative approaches that the technology of the '80s will make possible. There will be more outlets,

more service offerings, and more opportunities for both providers and users to create and gain access to the communications systems of their choice.

Spotlight on broadcasting satellite

Currently, domestic earth stations access the satellites through the 5.925-6.425GHz band and receive through the 3.7-4.2GHz band. The broadcasting satellite service will use higher frequencies in the 12GHz range. Technology for use of those frequencies is new and changing rapidly. Some key considerations that are critical for satellite applications are the limitations of power and information capacity of the satellite and the available figure of merit of the earth stations. These factors are traded off to achieve any practical system design. Several experimental satellites which were designed to allow some initial system specifications to be developed have been orbited, and testing is currently under way.

In the US, experiments with Canadian Communications Technology Satellites (CTS) have been conducted by the FCC to investigate the performance of small earth antennas under a variety of operating conditions. These experiments have shown broadcasting satellites to be technically feasible provided further economies can be realized. Current limitations on satellite power and mass will be greatly diminished when the Space Transportation System (STS) becomes operational. However, high power ampli-

fiers of sufficient size coupled with multiple beam antennas must be designed specifically to use the STS capacity to best advantage.

The design of earth stations for a broadcasting system requires that attention be paid to several competing requirements. The large number of stations means that the cost of each must be as low as possible. At the same time it is essential that the adopted receiver configuration not hinder the orbital utilization of the geostationary arc for there is a large demand for that resource by many different telecommunication administrations. The perfection of microwave integrated circuits is a key step in solving this problem through economies of scale. Also, more efficient modulation methods must be studied in order to reduce both the bandwidth and interference susceptibility of the broadcast signal.

Should current trends continue and the basic research be successful, home terminals in the US capable of receiving multiple signals from a satellite can be a reality in a few years. Even now, it is thought that an antenna and converter, built in sufficient quantity, could retail for \$250. If the space segment limitations can be relieved, orbiting broadcast satellites will provide increasingly attractive opportunities for corporations investing in new home informational and entertainment services. Indeed, COMSAT has already announced their intention to pursue such a system, targeted in the first half of the next decade. □



This computer is used to maintain a teletext file and will be used for news editing in the future. Computer technology makes possible this new broadcast service. (Photograph courtesy of KSL-TV)



These examples of Teletext pages demonstrate the requirement of these systems to handle large quantities of information. Broadcasters face the problem of assembling, editing, and updating this information in an efficient manner. (Photographs courtesy of William Loveless, director of engineering KSL-TV)

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We pushed performance to a new high.
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Authors Wasilewski (left) and Bartlett (right) are well known for their work at NAB and throughout the broadcasting industry and are extremely active at the NAB conventions.

Broadcasting for the '80s: An overview from NAB

By Vincent T. Wasilewski, NAB president, and George Bartlett, NAB engineering vice president

The influence of:

- WARC
- Satellites
- New technologies

Predictions on:

- Quadraphonic
- AM Stereo
- ATS
- SCAs
- Cable

Broadcasting managers and engineers must learn to communicate more often and more clearly with each other in order to meet the challenge of new technologies. As ABC chairman Leonard Goldenson once said: "We all remember when those (technological) advances were lumped together under the title 'blue sky.' Now, that 'blue sky' is directly overhead." New technology is directly overhead and broadcasters had best join hands with their engineers when they look up.

WARC

Any discussion of broadcasting's future must include speculation about possible actions by the delegates to the 1979 World Administrative Radio Conference. WARC '79, which convened in Geneva in September, does not "quicken the pulse of the average broadcaster....but could profoundly change the business of radio and television..." That is how one broadcasting trade publication phrased the importance of the conference. WARC '79, combined with new technologies, could

link the manager and station engineer closer together than ever before in broadcasting's history.

Engineers and managers will have to cooperate and communicate extensively in decisions about future expansion of broadcast operations to avoid poor business judgments. WARC '79—which takes the form of an international treaty to be ratified by the US Senate—will decide how much expansion is allowed in the AM band and how many additional UHF TV stations can be added to serve the American public during the next 20 years. The World Administrative Radio Conference could, among other things, extend the AM band, going from 525 to 1865kHz.

Managers will depend on engineers to interpret much of the highly technical information to emerge from WARC, and the two functions, of necessity, will be joined closely in order to make realistic business decisions.

The world is divided into three geographic regions for the purpose of frequency allocations with the US in Region 2. WARC encompasses all radio communications including government and commercial broadcasting, and results will affect virtually everyone involved in broadcasting operations—from station owners to satellite and short-wave equipment manufacturers.

The International Telecommunications Union, a specialized agency of the United Nations, called the conference, which involves about 150 countries and 2000 delegates. The Federal Communications Commission directs US nongovernment radio policy formation (includes television). Preparation for this conference has been underway since 1975.

While a WARC is held about every 20 years, 1979 is particularly important because a 1-nation, 1-vote concept has been added, allowing the tiniest country equal vote with the US. This new platform will challenge each of the approximately 100 US delegates, of which NAB's vice president for engineering is one.

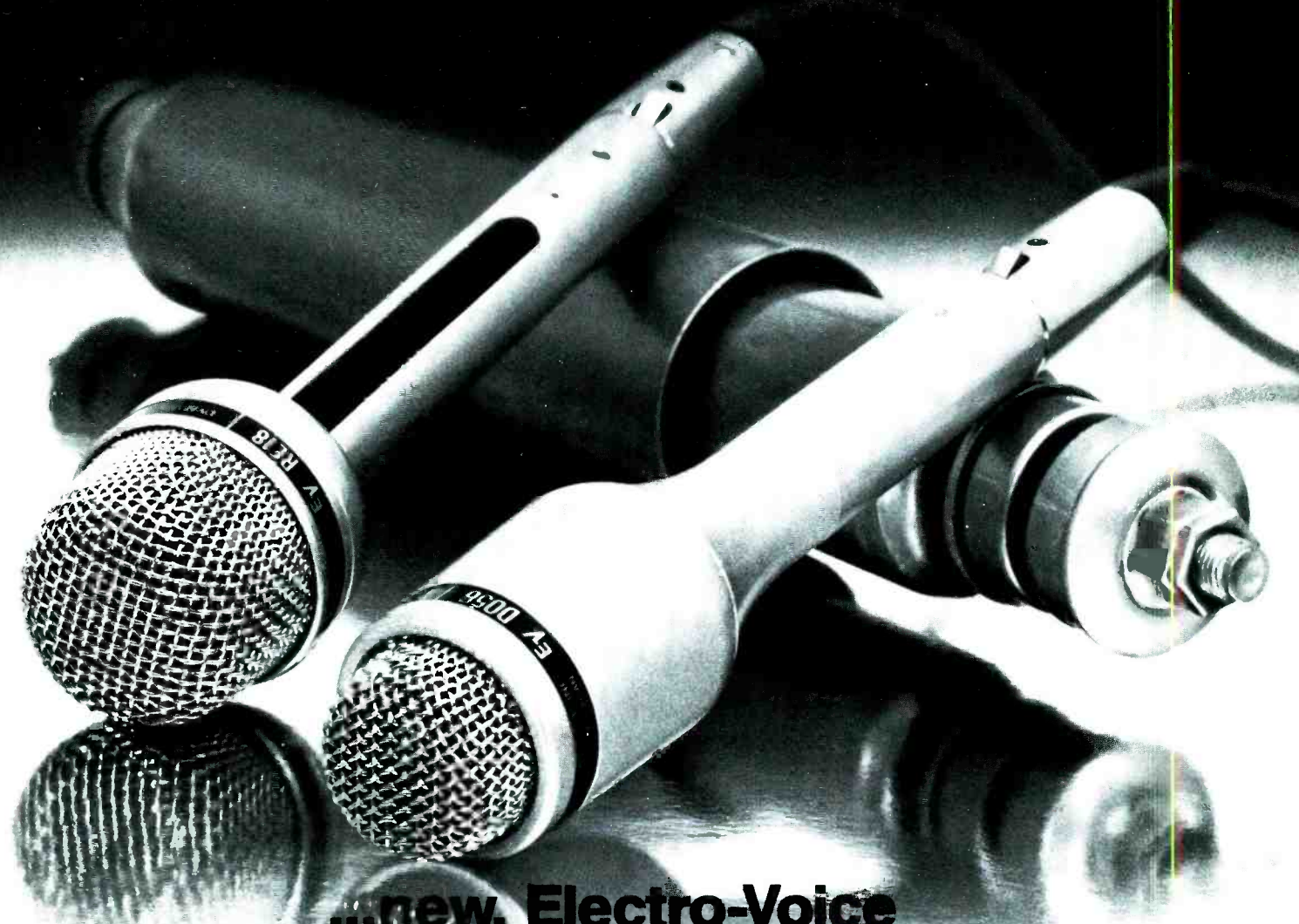
After WARC ends in December, NAB will translate the results for use by broadcasters. Potential representatives should, due to this year's platform changes in WARC, begin preparation for 1999. All those involved with broadcast policy would be well advised to start considering how to attract attention to US goals and new allies at the next WARC.

Changing technology

Aside from WARC implications for the future, technology is changing and will continue to mold radio and television. With this in mind, the NAB commissioned a study in 1977 to determine what impact the application of new technology would have on radio by the year 1985. Following are some of the projected results of that study:

- 1) Quadraphonics will be in general use in FM radio.
- 2) Stereo will be in general use by AM radio possibly by 1980.
- 3) FM signal reception in the moving auto will be significantly improved.
- 4) Fully automated transmission systems will come into far greater use.
- 5) The future will see a variety of uses for SCAs.
- 6) New use of television technology will affect radio's use of SCA.

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- 7) Cable system technology will offer additional competition for radio in 1985.
- 8) The marketing of CB units with AM/FM stereo reception will help radio hold its mobile audience.
- 9) Many stations will receive signals directly by satellite.

NAB has fought particularly hard for FCC approval of AM stereo, which will be another binding force between the technical and managerial side of broadcasting. The commission is so close to approving this new service that perhaps AM stereo will be a reality by early 1980. Conversion to stereo by AM radio broadcasters is sure to mean programming experimentation, format changes and considerable promotion of the new service, but monaural coverage will virtually remain the same. The FCC must decide which of the several proposed systems will be approved.

Receivers also will change with AM stereo. FCC approval will launch different designs and marketing techniques of all AM radios—automobile and home, monaural and stereo. Broadcasters will see the re-discovery of multiple bandwidths, whistle filters, noise cancelling and filtering techniques, external rotatable antennas, synthesized tuning, presence audio filters and synchronous detectors—and other apparatus sure to stir the pulse of engineers.

Since many moderate-cost FM receivers are limited in fidelity, the newer AM radios will sound as good as the typical middle-cost FM receiver, and audio processing on AM should be reduced on newer receivers.

A predictable change in AM and FM receivers will be the appearance of call signs or logos—such as KBES or KB-98—on a window on the set. Such a change would certainly help the listener locate a station and would aid in identifying stations for audience surveys and promotions.

FM radio—even in the face of WARC—probably will remain the same—88 to 108MHz, at 200kHz channel spacing. Things like terrain shielding and DAs could, however, result in a greater number of FMs on-the-air in the future. The public might see stations in urban and suburban markets, and Class A stations on Class B and C channels. Overall, FM will continue gaining in listener and advertiser popularity.

Satellites

Satellites are already a part of a

broadcaster's life and the future will produce more use. In radio, satellites could encourage everything from a renaissance of radio networking to easy quick remotes from anywhere.

In television, fiber optics, laser beams, computers, microprocessors, digital and high resolution TV are words being bandied about frequently. They are all techniques which have been around for a while, but have not found their way into an industry as regulated as broadcasting. For example, predictions abounded in 1961 that satellites would revolutionize broadcasting. Now 18 years later, satellites are truly becoming a part of the broadcasting industry. Traditionally, technology exists years before it reaches the consumer. That has been the case in broadcasting. But consumer demand and economic incentive now are beginning to encourage use of advanced technology.

Satellites present a particular problem for broadcasters. Radio and television station licensees are charged with providing local service to communities, but localism presents a possible conflict with direct satellite-to-home broadcasts. As long as the US continues to value localism, direct satellite-to-home broadcast systems probably will be less than totally successful. But there is a tremendous future for the Fixed Satellite Service for distribution of both radio and television program material.

Satellites can be especially effective in distributing syndicated programming. Syndication packages have been sent to stations on film or videotape by freight or mail by a primitive system called *bicycling*. Syndicated material can be distributed by satellite to subscribing stations through a coded address system and a descrambling device. When a station buys a program it will be added to the coded address system—allowing easy expansion based on a very simple system.

UHF television service

Future broadcasters undoubtedly (assuming all goes well at WARC) will witness great development in UHF television service and added uses of radio and TV signals. Tele-text—already being tested in this country—allows subscribers to view, on their TV screen, detailed electronic page information on subjects like the stock market, news, weather, and resort conditions, movie and TV schedules, recipes and even captioning for the hearing impaired. We are witnessing the

beginning of the home communication center which will use the television screen for countless purposes. Already that screen is being used for everything from video games to flight information at airline terminals and travel agencies. Soon the screen could be doing almost anything, including possibly holding a 2-way conversation with you. The technology is there—and the only question is whether the demand is.

The future holds broadcast transmitters the size of a building block, television receivers using flat wall type display devices, satellite earth stations of miniature size and affordable cost, a myriad of information piggybacked on the AM/FM and TV signals, a home entertainment center using the TV set as a display device and an infinite variety of other technological changes.

Summary

To sum up the future, perhaps the best phrase would be *information economy*. How information is delivered to the home and how it is then used will be a key factor in the information economy. The current methods of distribution of information—over-the-air broadcasting, cable hook-up, telephone service, mail and newspaper—will all be affected. An eventual blending into a single "information" receiver system—probably through the present day television set—is likely.

In the 1980s, one's television set may be connected to a computer to draw virtually unlimited information from various data banks. Newspapers may be delivered to the home through video display or perhaps through the use of a home print-out device. The mail may well be delivered in the same fashion; radio FM subcarriers equipped with printers to translate the broadcast signal onto paper may become a standard method of delivering the mail within 10 years.

Much of the promise and challenge of the future does, as emphasized at the beginning, depend greatly on the outcome of WARC. Should any portion of the spectrum be denied to broadcasters, the industry will have to develop substitution techniques. Managers and engineers who want to be included in the information economy must be informed themselves, informed about technology and about government activity—whether national or international—if it can affect the future of our industry. □



First World Conference & Exhibition on computerised TV based information education and entertainment

**26-28 March 1980, Wembley Conference Centre
London, England**

The Exhibition

All the major TV manufacturers will display the latest products based on the combined use of the video TV screen and the computer. The rapidly growing electronic publishing information provider industry will have a unique opportunity to demonstrate both the commercial and home use of these video based systems.

Organisations who have already booked exhibition space include:

ABC Travel Guides ● CAP ● Decca ●
D.M. England ● Eastern Counties Newspapers ●
Fintel ● G.E.C. ● Granada TV Rental ● ITT ●
Langtons Information Services ● Mullard ●
Philips Industries ● Rediffusion ● Standard
Telephone and Cables ● The Post Office

The International Conference

This will comprise multiple parallel streams of sessions which will include formal papers and informal discussion periods. Most of the speakers have now been invited but information providers may still submit papers for consideration on the following themes:

Electronic publishing and the information industry ●
Legal aspects of electronic publishing ● Viewdata and
electronic mail ● In-house viewdata systems

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Television and the new technologies *

By Fred Silverman, president, NBC



All of us here are broadcasters, and I want to talk to you today about the most important subject in broadcasting—our future.

There's been a great deal written lately about various new technologies, exciting services that some people think will make us obsolete. I've even read stories that made cable and pay and cassette recorders and the rest sound so good that it was almost easy to forget about poor old commercial broadcasting.

Well, let me tell you at the outset that I am absolutely and totally convinced that any of these other services would gladly trade their future for our present! The business that you are in, that we are in, is now—and will continue to be—America's first choice. As Damon Dunyon once put it: "The race is not always to the swift nor the battle to the strong, but that's the way to bet."

And NBC is putting its money where its mouth is: We are betting on the future of our business. Whatever our competitors may do, we have no intention of diverting our resources into the production of theatrical motion pictures. Whatever our competitors may do, we are not going to dissipate our creative energies by producing software for other media or other technologies. We are broadcasters, and we are going to remain broadcasters.

Are we being naive? Is commercial broadcasting really going the

way of the buggy whip business? Let's study the situation.

NBC, through its corporate planning department, has recently completed a study that details the outlook for home video over the next 10 years. We think it's a realistic and objective look at the decade ahead, and I'd like to share some of it with you now.

First, of all, the study tells us that in 1988 commercial television's share of viewing will remain high—close to 90%. That suggests that the impact of any one of the alternative program sources will not decrease our audience, but will increase the number of hours each household spends watching all televised services.

That finding is the key to our future and the future of the new technologies. These new services will have the overall effect of expanding the home entertainment and information market, and making it more important. Many of the new services will themselves develop into sound businesses, and will provide new challenges to our creativity and resourcefulness. But they will not make our kind of free, over-the-air television less important. Commercial television has had more than 25 years of unprecedented growth and success—and we are nowhere near the end of it.

Second, our study indicates that by 1988 there will be 89 million television homes, about 15 million more than now. Each of them will be a potential customer for us, for you and for the new technologies. Let's look at what kind of access each service will have to these 89 million homes.

By 1988, subscription television

should have reached 4% penetration. Cable is estimated at 30% penetration, with pay cable, as part of that total, at 12%. Videocassette recorders are forecast to be in 15% of US homes, videodisc players in 20%, home computers in 10% and video games in 20%.

By comparison, independent television stations are expected to increase their penetration to 65 or 70%, and the networks and their affiliates will maintain 100% penetration of those 89 million homes.

And in addition to the growth in homes, the proportion of multi-set homes—already at 50%—will continue to increase over the next decade. So the total viewing sector is getting bigger.

We expect that in 1988, homes with the capability to view any of the new services will spend no more than four to five hours a week doing so. These same homes will watch 47 hours of commercial television—network and local.

That's why I'm optimistic—and you should be, too.

As far as advertising support is concerned, our forecasts indicate a bright future. We project that a ratio of advertising to Gross National Product will increase slightly in the decade ahead, and that television will receive an increasing share of total advertising expenditures. Last year television's share was 21%. We expect this to continue to climb, with local television advertising showing the best gains.

With the other video services, part of the present attraction is the absence of advertising, and customers will certainly object if advertising is put in later. That could be a

*The text here was presented, in part, to the California Broadcasters Association in Monterey, CA. It is reprinted, with slight revisions and up-dating, by permission of NBC.

factor in other services remaining non-commercial, or close to it. In addition, as I've just detailed, we don't expect alternative services to offer enough audience on a regular basis to attract national advertisers away from network television and national spot.

Nor do our corporate planners anticipate that the new delivery systems will not compete, for the most part, with networks for original, mass-appeal programming. Except for pay, they will primarily be aiming at special-interest audiences with lower-priced programming. As for pay television, it may make some inroads on sports events, but we do not see it becoming strong in developing original entertainment programming or news. That kind of financial risk-taking—the ability to provide a national programming service—is simply not anything that pay TV or the other technologies will be able to match. The three commercial networks, by way of comparison, spent on programming—in 1978 alone—almost two billion dollars.

For several reasons, we do not expect that superstations will represent significant competition in the future. First, producers are now asking these stations to pay more for their programming, and the superstation program cost advantage may soon be reduced. Also, superstations have not been advertising. With higher program costs in prospect, it remains to be seen whether they will be able to attract added revenues.

There is some advertiser interest in occasional networks, brought together for the broadcast of a particular program. They are being formed only a few times a year, and there is not much room for improvement in their coverage. Over the long term, because of the program development risks involved, we do not expect any significant increase in occasional networks, even with increased use of satellites.

Future changes may come faster than we believe they will. With technology changing so rapidly, new developments like fiber optics could speed cable to a higher penetration than we expect. And future Federal regulatory actions—favorable or unfavorable—are unpredictable. However, unless the current system were to be radically revised—and we think that is very unlikely—the networks and their affiliated stations will remain the strongest force in television entertainment, and in providing a national news service.

A challenge could develop from

the process of consolidation now under way in the cable business. If several large multi-system operators emerge, there would be more programming resources available, particularly on national pay channels.

We welcome the competition, if it develops. How serious the challenge becomes will depend on how well we conduct our own business. How we and you do in the long run is in our hands—no one else's—and we are planning to meet the challenge.

Our mission for the future is clear. You and we must concentrate on making a better product. That product is programming, news and entertainment programming, and I can promise you that NBC, in the years ahead, is going to give 100% of its attention to making it better. Every waking hour is going to be devoted to improving our radio and television operations. If we can do that—and we can—we have nothing to fear from the new technologies.

We—and all of you—are part of a broadcasting structure in this country that serves every American through resources no other service can approach.

No other service has hundreds of affiliated stations spread across the nation, each geared to meet local programming needs. No other service has a national audience or the potential to bring a shared experience to a hundred million Americans. No other service has the financial resources to provide a round-the-clock schedule of high quality, original programming. And, most certainly, no other service can begin to match the network news organizations, which commit more than 300 million dollars each year to bring world-wide coverage into every American home.

Our challenge is to take this incredible service and make it better. At NBC, we think the most important long-term changes we can make will be in the area of news. We have something unique, something none of the new technologies will ever have: a professional staff of 1000 journalists with the ability to transmit world events into every living room in the country.

We have this, moreover, at a time when our world has never been more complicated or more difficult to understand. We intend to search for ways to make television more responsive to the public's need for information, more helpful in sorting out the complication of their lives. It is the most exciting challenge we face and the one, I believe, that is going to change the face of television.

At the same time, we must upgrade our entertainment programming by seeking opportunities to innovate, to be daring. Many of the most popular forms are going to continue well into the next decade, but we are also on the lookout for something more. We think reality-based programs have superb potential and I'm proud of NBC's pioneering efforts. We didn't make it with "Lifeline," but I think we will with "Real People."

In any case, we are going to continue to look for programs that are different from what anyone has done before. That will help us meet another challenge—attracting and keeping the best people in our business. Top people—whether they're executives, creative talent or stars—want to work where there is an appreciation of excellence and a chance to break new ground. We can get them working in broadcasting and keep them there only if we are serious about refreshing the medium and seeking to innovate. And we are.

At NBC, we feel good about the future—for our company and for the business of broadcasting. In the competitive arena of the three networks, we have set ourselves on a clear course of action that will build on the traditions of this company's distinguished past. We will have more news, we will strive to innovate, we will develop a cultural program from NBC's old Toscanini studio that would make the maestro proud. We are going to do everything we can to enrich our medium.

And we are confident that as we do, we will attract the best people—the people who will want to work where excellence is valued. In a business where our product is so intangible—fleeting images across a screen or the sound of a radio—the key to success is finding and keeping those people. We're going to do that, and I know you will, too. The personalized service provided to communities across this country by dedicated local broadcasters is unparalleled anywhere else in the world. It is the heart of our national programming service.

Broadcasters who strive to be better are going to succeed. Nothing is more central to our ultimate success than that commitment to excellence. The years ahead provide us with new opportunities to strengthen what is already the most important communications tool ever developed: broadcasting in America.

I look forward to those years. And so should you. □

Technology development in public television: What the future holds



By Daniel R. Wells, senior vice president, Engineering and Operations, Public Broadcasting Service, Washington, DC

No one can predict precisely the scope and nature of broadcasting in the years ahead. Some experts are calling for dramatic, far-reaching changes, and they cite the explosion in new distribution technologies as indicative of what telecommunications will resemble in the not-too-distant future.

Of paramount concern to public broadcasting is the application of future technologies in ways that will support television programming and be of maximum benefit to the public. Public television aims for the best in information, entertainment, cultural and special interest programming. It should serve as an outlet for creative people, people with new ideas, thoughts and points of view that may not otherwise be heard. Any application of new telecommunications technology must be viewed in light of those goals.

Public broadcasting has found it necessary to be engaged in some aspects of technology development in order to advance these goals, and the prospects are that this will continue in the future. Commercial broadcasters are responsible for much of the progress that takes place in technology development, progress that all broadcasters, commercial and public, can take advantage of. However, corporate goals affect the direction of technology development, and in some areas public television has found it advantageous to take the lead, such as in satellite distribution, captioning for the deaf and improved sound in television. Ultimately, these become cooperative efforts, and cooperation among all broadcasters as well as industry is always an important objective.

A frequent pattern of success in technological development involves a joint venture of a manufacturer and a broadcaster. The broadcaster knows the application, knows how individual components fit into systems, knows what performance objectives are necessary to accommodate the application and can help

the manufacturer to identify a market. The manufacturer, on the other hand, brings resources to a project not available to the broadcaster.

Communications technology has undergone a remarkable period of growth over the last few years with the development of domestic satellites, the growing penetration of cable, as well as the increased number of channels in cable and the prospect that fiber optics will further increase the channel capacity into the home. At the same time, devices have been and are being developed as home terminals to make use of new communications and information sources. Video-discs, videocassettes and home computers are rising in popularity.

Just as there is growing interest in improving the quality of the television set with high-quality, multi-channel sound, better off-air reception and wide screens, there is also an interest in increasing the television set's flexibility as a display device for information that can be coded in the off-air signal (Teletext, Viewdata, instructional use, closed captioning, and display of telephone calls).

As these communications systems become increasingly sophisticated, program suppliers from both traditional and new markets are beginning to supply products. The broadcaster will be involved in development work for some of these applications, but a number of projects will proceed independent of broadcasters' efforts.

How should the broadcaster change or adapt his or her role to become a contributor, a participant, a beneficiary of the new communications environment? In looking at the future of new technological developments, the importance of planning applications of communications systems should be kept in mind. Telecommunications technology must fit society's needs and, even more importantly, it must be applied so that it fosters a creative,

imaginative atmosphere in which broadcasting may flourish while it brings new ways of communicating into homes.

Perhaps the most significant technical development in public television is the growth of the satellite interconnection system. The system was essentially completed in October 1978, the culmination of five years of design, development, and implementation efforts on the part of public broadcasting in cooperation with Rockwell International and Comtech Laboratories, the system's two major equipment suppliers, and with Western Union, the carrier. National Public Radio is now in the final phases of completing their satellite interconnection.

The satellite system has resulted in improved technical quality; has enabled live interconnection of Alaska, Hawaii, the Virgin Islands and Puerto Rico; has reduced time to interconnect new stations; has reduced costs over the long term; and has provided multiple channels for programming. The multiple channels have opened up new opportunities for diversifying programs and serving target audiences. With the initial complement of equipment at the earth terminal, each station can select any two programs available on the satellite. Additional receivers can be added to the earth terminal if the station wishes to receive more than two programs simultaneously.

This multiple-channel feature has affected the long range planning in public television. At the PBS Membership Meeting in June, 1979, the stations adopted a plan calling for three separate program services: (1) high visibility national programming; (2) programs by regions or other consortia of stations primarily for target audiences; (3) instructional television and adult learning. Stations would have the choice of which program service, or combinations from the three services, to air. The other programs could be made available in the community through

a second station, by cable or other means.

While the formulation of these three program services and arrangements for multiple outlets in the community are in the early planning stages, the definite goal has been established by the stations. The multiple program services clearly would not have been practical due to cost and facilities constraints in a terrestrial-based distribution system. Thus, satellite interconnection is a prime example of technology development providing a means to improve and diversify program service to the public.

As is the case in many technical projects, there will be a considerable amount of follow-on work to the satellite project. Budget pressures usually limit the initial scope of a project, and, as the technology progresses, opportunities beyond the initial project scope become apparent.

Last Mile—Methods of delivery of multiple program services in the community, whether by cable, MDS, ITFS cable or other, must be developed.

Mobile Units—Whereas the fixed earth terminals provide the basic service for stations, mobile units should be considered for program origination at the site of an event and for quick restoration in case an earth terminal at a station is severely damaged. Regulatory issues for licensing satellite mobile units need to be addressed.

Technical Enhancements—Development work is taking place that may improve satellite systems such as (a) the torus antenna, which can operate with more than one satellite simultaneously, (b) radio interference cancellers to provide more flexibility in receive-only earth terminal siting, and (c) bandwidth compression which may enable the transmission of more than one television channel in the transponder bandwidth currently used for one channel.

Future Satellites—The public television satellite terminals can be adapted to operate at "K" band as well as the present "C" band. As future satellite systems operating at "K" band become available, their use should be explored, looking toward increasing the number of origination points. There are now six locations around the country where public television transmit terminals are located, and Western

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Union has another eight. To expand and diversify program sources and contribution capability, more points of origination may soon become necessary. As funding becomes available, a primary limitation could be the difficulty in locating transmit sites that are free of radio frequency interference from terrestrial radio relay systems. This limitation, however, would not exist at the "K" band because no terrestrial radio relay systems are authorized in that band. Therefore, there is a possibility of using one of the future "K" band satellites as a supplementary

service for origination from either fixed or mobile locations.

International Program Exchange—

As international program exchange opportunities increase, different techniques should be explored to improve operational procedures and bring the charge rates within manageable bounds. Some of the specific steps which might be taken include: (1) the persuasion of domestic satellite carriers to install uplink earth terminals at Intelsat earth terminals so that international television program traffic received

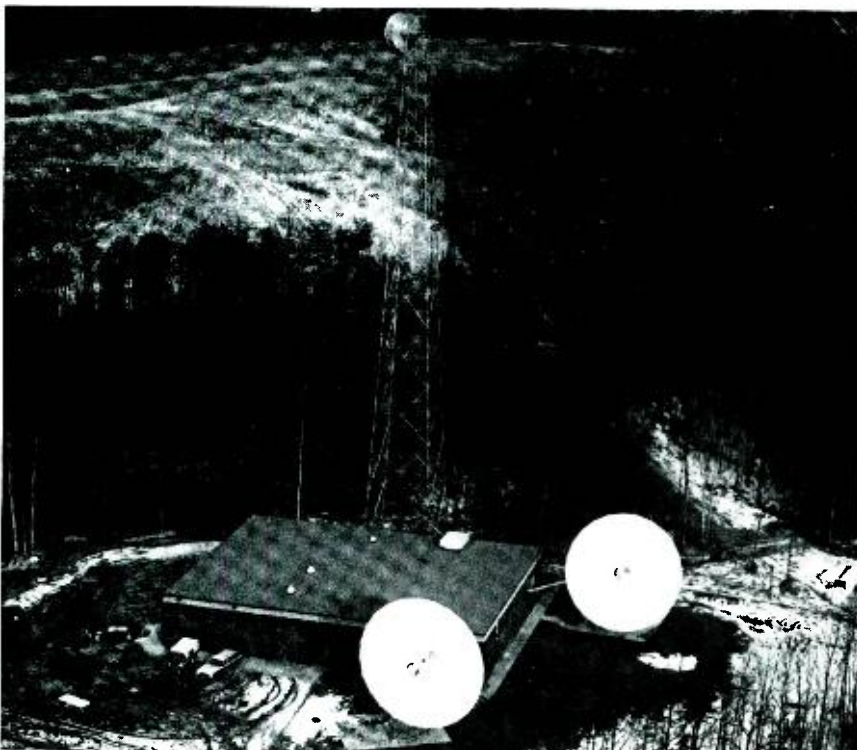
by Intelsat could be handed over to the domestic carrier directly without resorting to the present cumbersome routing; (2) solving technical and regulatory problems that would enable broadcasters to interface directly with the Intelsat system.

The public television satellite interconnection system provides distribution to present television stations, but those stations do not currently cover all the US population. Some areas do not have the economic base to sustain a full-power TV station. In these instances, the concept of low-powered TV stations coupled with a satellite earth terminal should be explored.

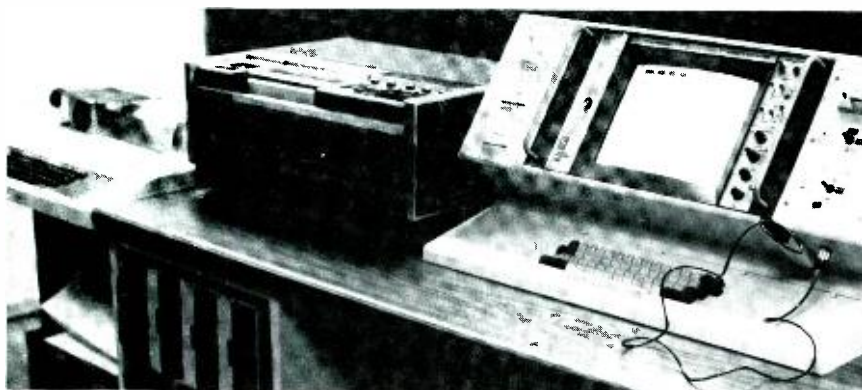
Many UHF stations, commercial and public, do not provide adequate service within their defined coverage area because of the present UHF disadvantage. Many efforts have been underway to make UHF reception comparable to VHF reception, but there still remains some unfinished work:

- The efficiency of UHF transmitters should be improved to reduce the escalating cost of utility company power which would encourage stations to operate at or near the authorized maximum radiated power.
- The public should be made aware of the importance of a proper home receive antenna installation for UHF. Better information is needed for the consumer at the point of sale in choosing an antenna for a particular location. A uniform labeling system is needed based on uniform measurement techniques.
- The lead-in from the receive antenna to the television set should be standardized (probably at 75 Ω) with an appropriate connector on the television set, and with more attention given to the quality of associated components (eg, baluns, splitters).
- An active UHF antenna (having a built-in amplifier) should be explored with the objective of achieving less expensive units.
- At the television set (a) the reduction of noise figure without compromising selectivity should be vigorously pursued, (b) random access digital tuning development work should continue in order to lower the cost and provide true comparability in the selection of UHF and VHF channels, and (c) ghost elimination should be explored.

The FCC established a UHF Comparability Task Force last year. Broadcasters should work with this Task Force where practical to



This aerial photo offers a bird's-eye view of the PBS Main Origination Terminal, hub of public television's new satellite program distribution system. Programs originating from PBS headquarters in nearby Washington, DC, arrive at the facility via microwave through the tower in the background. The dish-like structures in the foreground are the antennas through which programs are transmitted to and received from Western Union's WESTAR I communications satellite. Signals re-transmitted by WESTAR I are received by public television stations throughout the United States, Puerto Rico and the Virgin Islands.



PBS-developed caption-editing console used by editors to encode captions on line 21 of the vertical blanking interval.

hasten progress in the above list of needed improvements. It is also to be hoped that the UHF spectrum will not be eroded at WARC.

In addition to satellite-related work and UHF improvement, PBS is engaged in several technical development areas. Captioning for the deaf will become operational in early 1980, culminating a development effort that began in 1972 under funding of the Department of Health, Education and Welfare. The FCC authorized line 21 of the vertical blanking interval for captioning in December 1976. Since then, arrangements have been made with Sears, Roebuck and Company to produce the home decoders that will allow the viewer to choose whether to watch a program with captions or without captions. Sears will also handle the distribution, marketing and servicing of the home decoders. Texas Instruments has developed the customized ICs for the decoders. During 1980, ABC and NBC will broadcast a combined total of about 20 hours a week of captioned programs. The captioning operation will be performed by the National Captioning Institute formed for that purpose.

As in the satellite project, there will be follow-on work to captioning. The system must be made to work for film as well as videotape which will involve development of a standardized technique of putting time code on film. Real time captioning will be explored whereby captions can be aired as part of live event coverage.

Captioning for the deaf was developed in response to a definite need: to serve the hearing impaired community. Its objectives were to provide a low cost reliable service available at an early date. Other more generalized information services are under development that can be displayed on home television sets, namely Teletext, which is a

1-way, over-the-air system, and Viewdata, which is an interactive system using telephone lines. Different systems have been developed in Canada, the United Kingdom and France and will undoubtedly receive much attention in coming years in this country.

The development in this country of high quality sound in television has lagged behind the quality improvements in pictures. PBS developed the DATE system (Digital Audio for Television) in cooperation with the Digital Communications Corporation. The DATE system began operation in April 1979 and now provides a means for distributing high quality, multi-channel sound to television stations. The only means for multi-channel television sound to be aired, however, is by way of a TV-FM stereo simulcast. An all-industry committee has been formed under EIA/BTS (Electronic Industries Association/Broadcast Television Systems) to recommend a standard to the FCC for over-the-air multi-channel sound. The work of this committee is considered very important in public television. Stereo sound is expected to spur quality improvements in the production and distribution of television programs including the quality of sound systems in the television set.

AREAPOP is a project developed by PBS as a means of determining the viewer population and its demographic structure covered within Grade A and B service contours for over 280 public television stations. AREAPOP, unlike conventional contour measurements, takes into account the effect of topological differences on signal propagation. Population counts were produced for each station and once-covered, multiple-covered and non-covered areas for each state and the nation. Procedures are now being developed to expeditiously handle requests for variational studies which could in-

clude the prediction of an additional population-to-be-covered with changes in the transmitter site. This modeling technique will be a valuable aide in planning and justifying improved coverage, particularly in UHF, and in identifying cost-effective methods of extending public television service to remote areas.

There are other technical issues that will engage broadcasters in the next few years:

- Digital standards must be established that will maximize compatibility among equipment manufacturers, common carriers and to the extent possible, among manufacturers and carriers in different countries.
- Full utilization of automatic transmission systems (ATS) to realize substantial cost savings.
- Safe levels of electromagnetic radiation from television and FM transmitters and from microwave links is an issue in some communities that is impeding the establishment of new service. Broadcasters may have to become more involved in providing public information.

In public television there is an effort to encourage independent producers to have access to the system. For the independent producer, as well as stations, there is a need for continuing development of lightweight portable camera and recording equipment that will produce quality equivalent to studio quality. The current terminology of electronic field production (EFP) is meant to encompass the production of documentaries and on-location shooting of various types of production where higher quality is needed, as compared to electronic news gathering (ENG). Covering events in the community, rather than depending solely on studio productions, is becoming increasingly important as a local service.

With a full plate of technology development challenges readily apparent, how does the broadcaster decide where to invest limited resources? Priority setting in technology development is a difficult and important task. It is difficult because vision is required to see the potential of applying new solutions in light of the business risks. Priority setting is important because technology obviously should not be pursued for its own ends. Technology development, particularly in public television, must have as its goals improved quality, improved service and reduced costs. □



The commercial product version of a decoder which will enable hearing-impaired individuals to see captions on their home television set.

SMPTE Replay:

The 121st Technical

Conference and Equipment Exhibit

By Bill Rhodes, editorial director

-
- **Century Plaza Hotel, Los Angeles**
 - **October 21-26, 1979**
 - **9000 attendees**
 - **168 exhibitors/331 booths**
-

Although the hustle and bustle of the 121st SMPTE meeting was evident from set-up on Sunday, actual booth traffic lagged unexpectedly until Tuesday. This led to early anxieties by many exhibitors, but the grumbles turned to pleasant notes as traffic picked up and sales and quotations flourished.

As expected, this SMPTE meeting provided an exceptional program of papers and exhibits for broadcasters, filmmakers and videotape producers. There was speculation that something dramatic might spring up in digital video instrumentation, but no such event occurred. However, behind closed doors various SMPTE subcommittees plowed ahead on preparing digital standards. This effort is progressing, but nothing can be said about these dedicated efforts until SMPTE is ready to release its formal standards data.

Overall observations

As can be expected in a conference this size, there were many high points for all segments of the industry. A few of these, plus some conference overviews, are worth mentioning before covering the show.

- Captain Jacques-Yves Cousteau's

memorable luncheon speech may stand as the event of the decade not only because of his pioneering works in movies, television, and undersea explorations, but also because of his quest for preservation of the globe's aquatic life. His unabashed sharing of some of his early experiences in film and TV works was both touching and disarming. He shared moments of pain and ecstasy with SMPTE attendees, and the standing ovation following his remarks was testimony to the impact he made on a rapt audience.

- Many exhibitors unveiled new products or new production models at SMPTE to add zest to the show. Other exhibitors used this opportunity to intimate that exciting things can be expected in their booth at NAB'80/Las Vegas.

- As a fast follow-up to receiving an Emmy Award, Ampex presented a paper on its Auto Scan Tracking (AST) system.

- ABC presented an in-depth paper on plans for the 1980 Olympics at Lake Placid, NY.

- Joe Flaherty stressed again an inexpensive off-line videotape editing system for single camera production.

- During SMPTE it was announced that KCET/Channel 28 in Los Angeles was beginning tests on the Antiope teletext system, the first UHF station to do so.

Excerpts of SMPTE technical papers

Two papers were presented by Bosch on the design and development of the FDL-60 CCD Telecine System that was announced at NAB '79/Dallas but unveiled at Mon-

troux. The first paper was by Heinrich Zahn on mechanical and optical layout of the system and the second paper was by Dieter Poetsch on progress in film scanning with the system. Combined, these papers presented the challenge undertaken by Bosch to develop a system to handle 35mm and 16mm film, the challenge in developing motor drives and bearing mechanisms, the development of Capstan drives to yield 0.05% wow/flutter, and the perfection of 625/50 plus 525/60 versions to achieve international acceptance. The resulting system, as described by Bosch, yields the following prominent advantages: (1) a first-class picture quality with flicker-free color pictures, (2) an economy of modern design with service-free digital circuitry, and (3) easy operation with many automatic functions.

An NHK engineer from Japan, Jun-Ichiro Nakamura, presented a paper on high-quality pictures by soft chromakey. The system he described yields a composite picture without unnatural border color or jitters so perfect that it was difficult to distinguish whether the picture was combined or not. This method is claimed to have the advantages of (1) easy creation of scenes that are difficult to shoot with people in place, (2) reduced costs by eliminating the creation of expensive sets, and (3) an ease in scheduling prior to making composite scenes. The soft chromakey devices, which are currently installed in drama studios, are expected to be widely used in the near future.

A paper on Wednesday morning by R.A. Hathaway and R. Ravizza

from Ampex described the development and design of the Ampex Auto Scan Tracking System (AST). (Ampex' reception of an Emmy for this development was noted in **Broadcast Engineering**, October 1979, p. 32). Hathaway described the design objectives faced by Ampex in creating the AST System and covered the unique bi-morph bender element

configuration that was found ideal as a mount for the head transducer. The utilization of the bi-morph element for the playback head transducer prime mover required engineering considerations totally new to the VTR art. Some of these considerations include flexure, longevity and stability, maintenance of head to tape contact at large de-

flections, and the mounting methods to achieve predictable performance. Also, a unique servo and tracking system had to be concurrently developed along with the head structure. The AST system described is claimed to offer capabilities and features that previously were not attainable in a helical scan VTR, and the development of

SMPTE Exhibitor Data

Products by exhibitors at SMPTE included those never before shown, new production models of equipment previously introduced as prototypes, and standard products still meeting the market's needs. If you missed the show this year and want information from exhibitors, use the reader service card and the chart below. The number following the firm listing can be circled on the reader card to obtain that firm's data. (Firm names have been abbreviated to conserve space).

- | | | |
|--|--------------------------------------|---------------------------------------|
| AATON Cameras (150) | Fuji Photo Film/Magnetic Tape (206) | Norton Associates (263) |
| ADDA (151) | G & M Power Products (207) | Nurad (264) |
| Agfa-Gevaert (152) | General Electric (208) | O'Connor Engineering Labs (265) |
| Allen Products (153) | Goldberg Brothers (209) | Oldelft/KLM Associates (266) |
| Ampere Electronic (154) | Alan Gordon Enterprises (210) | Oxberry/Richmark Camera Service (267) |
| Ampex (155) | Grass Valley Group (211) | Pace International (268) |
| Arriflex (156) | Gray Engineering Labs (212) | Panasonic/Video Systems (269) |
| Arvin/Echo Science (157) | Harrison and Harrison (213) | Panoak Lighting (270) |
| ASACA (158) | Hazeltine (214) | PEP/Electronic Applications (271) |
| Audio Services/Sales Center (159) | Hitachi Denshi America (215) | Perf-Fix (272) |
| Bardwell & McAlister (160) | HM Electronics (216) | Peterson Enterprises (273) |
| Belden Communications (161) | Hollywood Film (217) | Phillips/Broadcast Equipment (274) |
| Bell & Howell/Professional Equip. (162) | Houston Fearless 76 (218) | Pioneer Marketing (275) |
| Bell & Howell/TeleMation (163) | Hudson Photographic Industries (219) | Plastic Reel (276) |
| Berkey Colortran (164) | Ikegami Electronics (220) | Pringle (277) |
| Birns & Sawyer (165) | Image Devices (221) | Q-TV/Telesync (278) |
| Bogen Photo (166) | Image Transform (222) | Rank Cintel (279) |
| Bolex (USA) (167) | Industrial Silver (223) | Rank Precision Industries (280) |
| Bosch Fernseh (168) | IVC (224) | RCA (281) |
| Brumac Industries (169) | J & R Film (225) | Recortec (282) |
| Canon USA (170) | Jamieson Film (226) | Research Technology (283) |
| Carter Equipment (171) | US JVC (227) | Rosco Laboratories (284) |
| Cases, Inc. (172) | K B Systems (228) | RTS Systems (285) |
| Central Dynamics (173) | KEM Editing Systems (229) | Skirpan Lighting Control (286) |
| Century Precision Cine/Optics (174) | Kliegl Brothers (230) | Smith-Victor (287) |
| Cetec Vega (175) | Lab Methods (231) | Sony (288) |
| Christy's Editorial Film Supply (176) | LaVezzi Machine Works (232) | Soremec Eclair (289) |
| Chyron (177) | Leitch Video (233) | Spectra/Simon Associates (290) |
| Cinecave (178) | Lenco/Electronics (234) | Spin Physics (291) |
| Cinema Products (*) | Lipsner-Smith (235) | Steenbeck (292) |
| Cine/Precision Engineering (179) | Listec Television Equipment (236) | Strand Century (293) |
| Cine 60 (180) | Lowel-Light Mfg. (237) | Super Eight Research Assoc. (294) |
| Ciro Equipment (181) | L.T.M. (238) | Super8 Sound (295) |
| CMX Systems/Orrox (182) | L-W International (239) | Swintek Enterprises (296) |
| Coherent Communications (183) | Macbeth Sales (240) | Sylvania Lighting/GTE (297) |
| Commercial Electronics (184) | Magnasync/Moviola (241) | System Concepts (298) |
| Compact Video Sales (185) | Magna-Tech/Quad Eight (242) | Tektronix (299) |
| CVS/Harris Video Systems (186) | Mayhew (243) | Tele-Cine (300) |
| Convergence (187) | Marco Scientific (244) | Telescript (301) |
| Cool Light (188) | Marconi Electronics (245) | Television Equipment Assoc. (302) |
| Corporate Communications Consultants (189) | Matthews Studio Equipment (246) | Tentel (303) |
| J. M. Cumming (190) | Merlin Engineering Works (247) | Video Tape (304) |
| Datatron (191) | Micro Consultants (248) | Thermodyne Int'l (305) |
| Digital Video Systems (192) | Microtime (249) | Thorn Lighting (306) |
| Di-Tech (193) | Microwave Associates (250) | 3M (307) |
| Dolby Laboratories (194) | Miller Professional Equipment (251) | Toshiba Int'l (308) |
| Durafilm (195) | Minolta (252) | Twenty-Fourth Frame (309) |
| Eastman Kodak (196) | Mitchell Camera (253) | Union Connector (310) |
| Ediquip (197) | Mole-Richardson (254) | Utah Scientific (311) |
| Eigen Video (198) | Motion Picture Enterprises (255) | Videomedia (312) |
| EPRAD (199) | Motorola C&E (256) | Vital Industries (313) |
| F&B/Ceco (200) | Moviecam (257) | VSC (314) |
| Ferco (201) | Multi-Track Magnetics (258) | Weathermation (315) |
| Film Equipment Service (202) | Nagra Magnetic Recorders (259) | Westrex (316) |
| Filmtechnik Alfred Chrosziel GmbH (203) | NEC America (260) | Wide Range Electronics (317) |
| Frezolini Electronics (204) | Network Production Music (261) | Winsted (318) |
| Fujinon Optical (205) | N L Film Products (262) | |

*Write exhibitor at: 2037 Granville Ave., Los Angeles, CA 90025.

new and unique engineering opportunities that never before had been applied to video recording technology.

The most entertaining paper of the Monday morning sessions was that presented by Joe DeBonis of ABC. He presented an up-to-date report on preparations for airing the 1980 Winter Olympics at Lake Placid, NY. His paper was given extemporaneously and provided a remarkable insight on the behind-the-scenes preparation for televising these events. He covered not only the enormous spectrum of equipment being purchased for the Lake

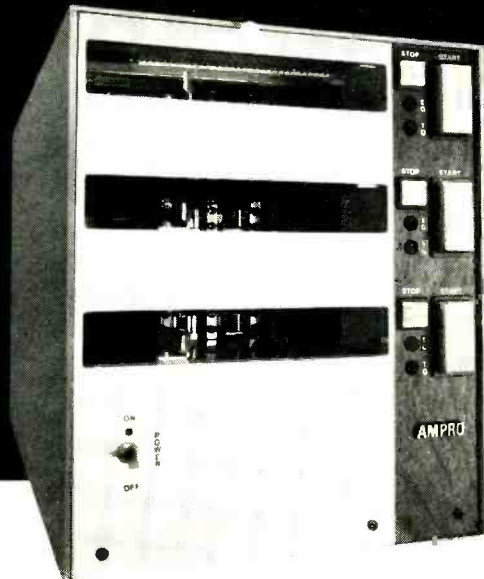
Placid site, but also described some of the engineering problems being faced by ABC in handling typical problems of operating in extreme environs, portage of critical cameras and other equipment, and the laying of lengthy cable connections—all to assure worldwide coverage of the Winter Olympics. The 47 miles of camera cable required will take six weeks of work to install, and a thermostat is needed to heat the camera lenses for perfect performance.

D. H. Cooper from Ampex presented a paper on recent advances in pickup tubes which have signifi-

cantly enhanced camera performance, particularly in the 18mm and 25mm formats. As described, the improved target layers have increased resolution and improved lag. The advent of the dioded gun has contributed significantly to improved resolution, higher beam currents and better handling of highlights. Cooper described the choices faced by the camera designer in selecting pickup tubes for optimum camera performance. In summarizing the performance of cameras with 18, 25 and 30mm pickup tubes, Cooper concludes that camera performance tends to converge, so that final picture quality may be determined more by the broadcast standard than the slight differences between tubes. Furthermore, in combination with future electronic improvements, these differences may approach insignificance.

The afternoon television production session on Monday turned out to be a field day for RCA: A paper by L. D. Miller described a new method of specifying the resolving power of television camera tubes; a paper by Al Month covered the newly developed 30mm pickup tubes for cameras; a paper by Sidney Bendell and Cyndey Johnson described matching high-performance color cameras to an innovative pickup tube design; a paper by B. Astele, R. A. Dischert, R. E. Flory and M. Lurie presented an automatic setup system for a broadcast color camera (the celebrated TK-47). Miller described the complex task of specifying the resolving power of a television camera tube and pointed out that the tube in itself cannot be evaluated except as part of a total TV camera system wherein each component may influence the final result. He described a new method of computing the geometrical shape of the resolving aperture developed using a new test pattern and computer programming. He presented measurements taken on various cameras to illustrate the value of this new method. Month described a new 30mm Saticon pickup tube (the C-81009E) which will be available commercially early in 1980. The tube incorporates a specially developed layer coupled with a low capacity tube construction to increase signal-to-noise (S/N) ratio, and to complement innovative camera designs. Johnson described a new pickup tube concept, uniquely applicable to the TK-47, which offers significant camera performance advantages. Recent camera pickup tube technology now makes practical, he pointed out, a novel mode of pickup tube operation which results in decreased lag,

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higher S/N ratio, improved geometry/registration, and more uniform resolution. The paper by Flory noted the exceptional performance of the digitally controlled TK-47 camera. He described a development of a special test pattern for the TK-47 which provides for geometry, registration and level measurements in nine locations, plus focus and alignment correction. The setup control unit described incorporates the automatic setup system and can be moved from camera to camera because the setup conditions are stored in the camera processor digital memory. This allows one automatic system to set up all cameras in a given location. As a result, the expense of the automatics can be distributed over a number of cameras, and uniformity set-up of those cameras is assured.

Following these direct RCA-presented papers, Steve deStanick of KCET/Channel 28 in Los Angeles described the use of the TK-47 camera at his facilities. Faced with a problem of an exceptional production department and its stringent requirements, plus the need to minimize setup time in production, Channel 28 selected the TK-47 RCA automatic color camera as the solution to their needs. His presentation was a marvelous testimonial for the quality and performance of the TK-47 in a production environment.

The staff of Gray Engineering Laboratories presented two papers. The first, by John Gray, discussed a method of converting video characters to time code. The time character reader discussed is designed to translate time characters into video to serial time code. This equipment provides stop-frame and slow motion time code, not obtainable from the audio cue track by conventional time code decoding. The reader is designed to bridge across the VTR video output and connect to any editing system utilizing the SMPTE time code. The second paper, by L. P. Reitz, reviewed the past, present and future applications of time and control user bits. One-half of the SMPTE time and control code has been allocated for time information; the other half for user information. These are 32 binary bits of code labeled user bits. Reitz reviewed the present methods for utilizing user bits and suggests further use of this information. He concludes that current knowledge of the application of user bits is quite limited and suggests that it may be well to establish a proposed standard for the multiplexing of user bit information.

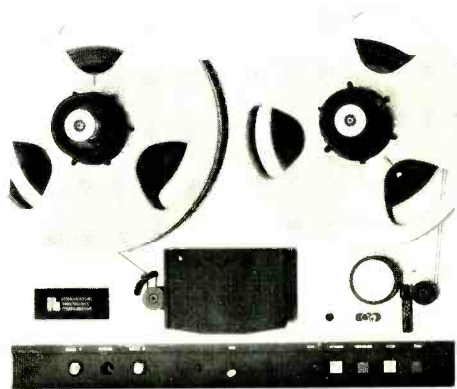
An early paper on Tuesday morning, given by Bruce Rayner of the Grass Valley Group, described the

300 series digitally controlled switcher for post production. He observed how digital video effects have opened up a new area of special effects that can be used in post production. Picture movement and size control, title manipulation, and new effects such as picture quantization can now be handled. These new requirements place additional demands on the post production switcher and on the ability of the switcher to be controlled by the edit computer. He described how built-in diagnostics use the microprocessor and logic circuitry. The

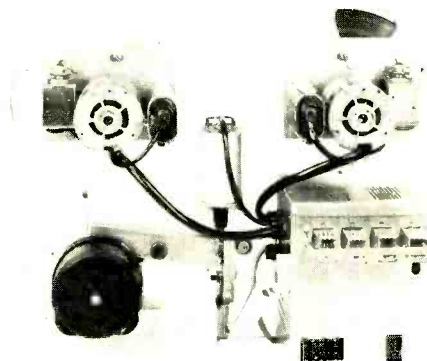
300 series switcher uses multi-microcomputers for control and incorporates many new ideas in both the video path and control logic. He followed up with a short tape segment that demonstrated some of the new effects possible in post production using this switcher. A question from the floor inquired about the availability of this switcher and a PAL version. Rayner responded that that might be possible following the NTSC version.

This paper was followed by one authored by Joe Flaherty and William Nicholls, CBS Television

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Network, on editing systems for single camera productions. His paper dealt with an innovative means of removing the last remaining barrier to the conversion of single camera film production to videotape—an inexpensive off-line videotape editing system. Flaherty pointed out that single camera photography can be done with electronic cameras on videotape, but until now an inexpensive off-line videotape editing system tailored to the specific requirements of single camera production has not been

available. He described the system developed by CBS that permits search among a wide variety of camera angles for any point in a given scene and that provides the first practical real time replay using videotape. He detailed the system configuration and reviewed the operational efficiencies realized by the use of a fast, efficient and practical technique for producing single camera television programs on videotape.

Charles Anderson of Ampex presented a paper on "Digital Television

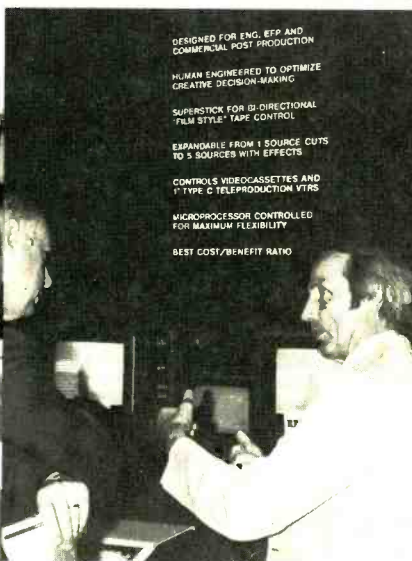
Recording, Questions Beyond Feasibility." He noted that manufacturers have already demonstrated that digital television signals can be recorded with good reliability on magnetic tape recorders consuming a reasonable area of tape per second. At the 1979 Montreux Television Symposium, three firms demonstrated digital video experimentally, using recorders conveniently at hand, with major efforts aimed at the fundamental task of recording and recovering digital signals on and off tape and not upon choice of format. Now he points out it is time to define and examine practical questions of operating features of digital VTRs. Many features (such as slow motion) now current on 1-inch helical machines pose technical questions that have a major influence on cost and complexity of the equipment as well as upon the selection of mechanical formats for digital VTRs. He hinted at a major breakthrough in the Ampex laboratory, built the audience to a fevered pitch, and showed a slide of a turn-of-the-century generator room in the most dilapidated condition. He brought the house down with a round of applause for this moment of humor, but in truth, without standardization, digital video recording may not be much further ahead than that antique generator was in its time.

Richard Ellis of Pye TVT presented a paper on fully automatic digital noise reduction. The system he described uses recursive low pass filters that recirculate the output signal. The device analyzes the input noise and picture movement element by element; then, fully adaptive detection circuits automatically adjust the operating threshold for input noise levels over a wide range. The Philips Dynamic Automatic Noise Reducer, shown separately on the floor, was developed initially by the BBC and is now manufactured by Pye. It is claimed to be the first fully automatic noise reducer adapting to input noise and signal conditions to produce clear noise reduced signals. It will cope equally well with electronic noise or film grain and identify creative video effects, fine detail and movement without degradation.

K. Blair Benson, Video Corporation of America, presented a paper on television frame store applications in post production. He reviewed how the reduced equipment costs for digital video signal memory have opened up a wide variety of new uses for this equipment and have greatly increased the flexibility of television production and post production. Thus, the latest digital



CEI—cameras hot topics



John Campbell (right) of Convergence discusses animation



Lyle Keys (right) of Utah Scientific describes a feature



Video Media—Z6 system versatile



Christopher Donoyan (seated) of Vital



Jerry Hoska of Winsted

Some moments at SMPTE

framestore systems provide electronic signal manipulation to achieve a full gamut of special effects that heretofore could be accomplished only in motion film. He showed videotaped excerpts of how application of these techniques in television post production is increasing in significance.

Charles Liu and Dale McNulty of Datatron presented still another paper on User Bits—a Useful Resource or Wasted? The authors reviewed how limitations have slowed the industry's innovation and acceptance of user bits and concluded that without proper standardization few people will take advantage of the user bit potential.

Hans Schmidt, ABC New York, opened the Wednesday afternoon session with a detailed analysis of the usage of peak program meters and VU meters in broadcasting. WABC-TV in New York uses some 50 PPMs. Their decision to do so is based on the clear and large advantages of the PPM over the VU meter in maintaining uniform audio programs. He demonstrated the relative merits of the two instruments using a wide variety of program material and showed that the PPM reads these sounds more consistently. He stressed that ABC firmly believes that the PPM is a necessary prerequisite for accurate program level measurements before the subjective loudness of programs can be tackled. However, his stress was upon the use of both PPM and VU meters in broadcasting, each to their relative advantage.

A paper by Carl Lindke of the Grass Valley Group discussed the promise and reality of the microcomputer. He pointed out that while microcomputers represent a revolution in component and circuit design they have not been accompanied by corresponding improvement in problem definition techniques or in programming methodology. In essence there has been no new innovation in programming technique for the past 10 years. Except for the simplest applications, the costs associated with programming far exceed all others in the application development cycle. Only with skillful use of various tools of computer systems application will the broadcasting industry be able to realize the potential benefits of microcomputer devices.

Eugene Leonard of DaVinci Systems Group presented an interesting paper on Putting Maintenance on Line: The Impact on In-Plant Communications. This paper covered field experience with a first group of devices specifically designed to

provide diagnostic on-line monitoring of videotape equipment. He had good news and bad news; the good news is that there has been a vast increase in instrumentation in all directions; the bad news was that there has also been a vast increase in headaches. Thus, on-line monitoring for diagnostic maintenance has become a necessity. He explored a microprocessor technique used to monitor economically the full range of ½-inch VCRs to quad carts. He also examined the extension of these techniques to other TV equipment.

Ray Unrath of System Concepts explored a maximized microcomputer for television as used in the Quantafont teleproduction generator. He described the advantages that the microcomputer offers broadcasters but pointed out that the equipment development is neither quick nor low cost. In fact, his organization found it necessary to develop a new strain of engineers to look at technology for a microcomputer with extensive on-board software that enables multiple processing services to be performed by a single microcomputer utilizing es-

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entially a single hardware design.

A paper on Worldwide Color TV Standards—Equalities and Differences was presented by D.H. Pritchard of the RCA Laboratories and co-authored by J. H. Gibson. This paper was an extensive evaluation and comparison of the PAL, SECAM, and NTSC Television Systems, one of the most detailed treatments of this type ever seen.

A paper by Charles Wood of England described historically the interchangeability between film and tape for worldwide distribution. Not long ago, he pointed out, film was the only way to create and store programs. Now the modern production house is required to take any media (videotape, film or videocassette) and convert that media to any output form required for standards any place in the world. He described new equipment that makes these transfers possible. What is needed now, he points out, is the general acceptance of the fact that film and electronic processes are capable of being merged, with advantage, into a single production operation in which either or both formats are made available to the producer for world distribution of programs.

This paper was followed by an interesting one by Richard Price on Television Pictures to the World. His paper dealt with the requirements of film and tape transfer equipment to provide television pictures around the globe, and provided an interesting insight to both the economics and difficulties involved in international distribution of communications material. This paper concluded with a strong appeal for freedom of program distribution worldwide.

Robert Ringer of Image Transform presented an interesting report titled Progress Report to the High

Definition Committee from Image Transform and Compact Video. This paper traced the history of quality picture recording in the form of videotaped excerpts from long ago to present-day production and showed the improved quality now available with high definition techniques. The interesting point in this paper was that the report was given visually to the High Definition Committee, but the details of how picture improvement was achieved had to be withheld until patent disclosures were completed. Thus, the audience saw the marked improvement in modern techniques without knowing how the image improvement was achieved.

Other interesting papers presented included advances in ENG/EG systems; digital television terminals; and PBS captioning for the deaf; fiber optics review; a 2GHz compact microwave; stereophonic sound and multilingual television; a review of teletext and Viewdata; high definition television; stereoscopic home television; newly developed 18mm Saticon color pickup tubes; and the future of the video-disc. All of these papers will be included in forthcoming issues of the SMPTE Journal.

SMPTE exhibits

Selected highlights of this year's SMPTE Exhibits will be touched upon here, organized alphabetically by the exhibitors. Information on exhibitor products may be obtained by using the directory at the end of this article.

While ADDA did not display any new equipment, their TBC has a new feature. Their system can now be switched to pass bad video, assuming that the user would prefer to pass one of five poor quality video rather than none at all.

AGFA-GEVAERT was evident in a big way at SMPTE, especially in the sponsoring of the awards luncheon at which Captain Cousteau spoke. At their booth, they displayed a wide variety of magnetic tape and film. Their highlight was a new PEM 428, a 1-mil, high-output, low-noise, mastering tape designed for use in audio-video SMPTE lockups where one hour of high quality audio can be achieved on a 12½-inch reel.

AMPEREX displayed its new diode gun and Plumbicon camera tubes, which provide improved camera system performance, quieter pictures, higher resolution, superior lag performance and improved highlight handling.

Although they displayed nothing new, AMPEX showed up with their normal impressive array of equip-

ment for broadcasters. They did draw quite a crowd with their display of the 1-inch portable VTR; their unit was mounted on a horizontal shake table to give the system an impressive oscillation with very little effect on the video display. People at the show referred to this as being a washing machine test, and if the trend catches on there may be appliances seen at other shows. AMPEX took this occasion to announce the move of their camera products group to new facilities, the appointment of Roger Watson to the position of national sales manager for the Audio-Video Systems Division, and their delivery of the 1000th VPR-2.

ARVIN/ECHO displayed their industry-accepted Slo-Mo and weather systems, but their highlight for the show was the SS-2 Slide-Stor system which was unveiled at SMPTE for the first time. This system provides a cost-effective alternative for the creation, display, storage and random access to over 400 on-line slides or still frames, with archival capability. Beautifully packaged, the system will be deliverable in 90 days at a basic price tag around \$38K.

ASACA displayed a new video sweep generator along with its digital noise meter, envelope delay measuring set, portable video switcher, portable video TV camera, digital pattern generator, and color monitors. Their color monitor brochure is beautifully done and worth requesting.

At the BELL & HOWELL/TELE-MATION booth the hottest news was the announced merger between Bell & Howell and Robert Bosch Corporation. (Details of this merger are covered in the Business News section). The main feature of their booth was the Mach One digital VTR editing system, but new for the show was expanded software for the Compositor I character generator and an increased format capability for their election reporting system. Prominent also was their TCS-1 machine control system for control of up to 100 VTRs/film chains and demonstrations on usage of the Compositor I graphic system to create fonts and other visuals. The basic Compositor I is priced around \$46K, and delivery is 30 to 60 days.

BERKEY COLORTAN presented their lighting systems, portable dimming equipment and computer controls and featured a mini-ellipse lamp, an all new multi-spread ellipsoid for short throw applications (6 to 40 feet).

At the BOSCH FERNSEH booth the



ADDA. Electronic still store a hot subject.



BELL & HOWELL. Excited about merger with Bosch, but displayed TeleMation equipment separately.

big news, again, was the merger of their organization with BELL & HOWELL/TELEMATION. On display at the Bosch Fernseh booth was their KCP-60 economical broadcast color camera and the full line of videotape editors, including the BCN 50 which features Dolby noise reduction and the optional slow motion digital store.

CANON demonstrated their line of television camera lenses, including the J13 x 9BIE broadcast TV zoom lens which was announced at NAB but introduced at SMPTE. Their 13X System lenses with built-in extender provide various operating modes for broadcasters.

CENTRAL DYNAMICS displayed their CD-480 Model 4 production switcher claimed to be surprisingly affordable, compact and powerful, and is suitable for mobile installations and production studios. Their new product announced at



CETEC. Features wireless mic systems at SMPTE.

SMPTE was the Model EEG-1980 extended effects generator designed to update any switcher and has a full complement of rotary wipes, including clock wipe. Delivery of this system began in August of this year, at a price around \$6500, and the system is compatible with NTSC, PAL and SECAM.

CETEC VEGA showed their line of professional wireless microphone systems, including the new Dynex (dynamically expanded) systems.

CHYRON displayed their impressive Chyron IV electronic graphic titling system, but with no new features. Price for the system is now \$43K+, and delivery is typically 90 days.

CINEMA PRODUCTS had an excellent position near a main entrance, and a booth packed with attendees and equipment. New for this show was their CP Co-Ax control, a cost efficient sophisticated digital co-ax control system to eliminate bulky and expensive multi-core camera cable. It allows reliable and remote control and camera setup functions from a distance up to 5000 feet. Introduced also was their CP camera prompter, a unique prompting system that is easy to mount, simple to operate and uses a clear glass set at 45° in front of the camera lens. The script copy can be

typed or hand-printed on a continuous role of 6-inch wide plastic which is advanced by a silent motor drive. The system is priced at \$1500 with 60-day delivery.

CMX/ORROX displayed their celebrated video editing system, but the big news was that they had just delivered an interface system to the Grass Valley Switcher/E-MEM effects system. Delivery for the interface is 60 to 90 days ARO, and price can be obtained by contacting CMX directly.

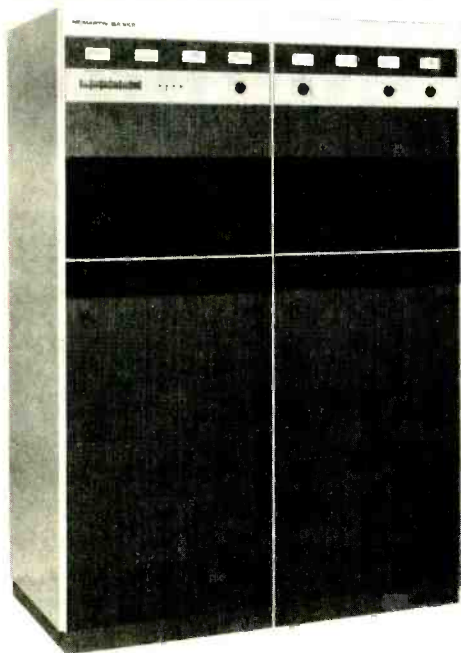
COHERENT COMMUNICATIONS displayed their radio mics, audio mixers, and their new time code equipment and new ENG mixer. Also discussed, but not on display, was their wireless microphone.

COMMERCIAL ELECTRONICS displayed their 310 modular field production color camera with the 330 digitally controlled camera which provides extended cable range without loss in video quality.

COMPACT VIDEO SALES had an impressive booth showing a videotape mobile unit and displayed graphics describing their mobile-unit manufacturing capabilities.

CVS/HARRIS VIDEO SYSTEMS showed their EPIC computer-assisted editing system and stressed the 630 series digital framestore

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synchronizer. Their big news since NAB was the purchase of their organization by Harris, announced in previous issues of **BE**. The EPIC is now running \$50K to \$75K for a typical VTR system with delivery 60 to 90 days and a healthy 6 month backlog in orders. Their digital frame synchronizer features a new cosmetic packaging that is very attractive, but the big news is that it now has interface capabilities for NTSC, PAL, SECAM and PAL-M.

CONVERGENCE showed their ECS-102 insert editor and ECS-103 multisource editing system, but their new equipment included an interface unit to the 1-inch VTRs and an ACR-100 animation system. The interface is priced at \$2500; delivery is 30 days. The animation system has some interesting features worthy of considering for production of electronic animation.

Perhaps the most important news to come from Convergence at this show was the strengthening of their marketing program for established customers and new accounts in Europe. John Campbell, vice president of marketing (world-wide) for Convergence, is beefing up the firm's total marketing program, with special emphasis on the European sector.

J.M. CUMMING displayed a new

energy-saving lamp imported from Sweden of interest to many in production lighting.

DATATRON exhibited its Tempo 76 three VTR SMPTE control track editing system, and its model 2000 SMPTE editor capable of controlling eight VTRs and a production switcher simultaneously. The 2000 features advanced design performance features claimed to be superior in its price class, and provides a number of innovative features that make it particularly powerful including: user bit capability, look-ahead continuous record VTR roll, multi-event preview and edit, scene storage of up to eight scenes per VTR, and interactive color CRT operator control station, and floppy disc edit list storage. Their colorful brochure is well worth requesting for a detailed systems study.

DIGITAL VIDEO SYSTEMS was very much in evidence, both with their display and with John Lowry flitting in and out of technical sessions and the digital standardization committee works. At their booth, DVS displayed its DPS-1 time base correctors and framestore for heterodyne and direct color, 3/4-inch and 1-inch VTRs. An all-digital processing system, the DPS-1 features a high performance SMART framestore TBC/synchronizer with

freeze frame for a SMPTE special price at \$17,990 with 60 day delivery ARO. A new feature added is image enhancement capabilities.

DI-TECH exhibited its audio, video, pulse distribution amplifiers, video detectors, equalizer, tone control routing switches, video routing switchers and featured its new PACE 1000 computerized event controller that automatically executes up to 935 events in a 7-day period. Its video terminal and keyboard are especially designed for simple English communications with the computer.

DOLBY LABORATORIES featured single and multi track A-Type noise reduction units. The NRU-10 brings benefits of A-Type Dolby noise reduction to the audio tracks of professional VTRs, providing 10dB of noise reduction from 20Hz upwards and rising to 15dB at 9kHz and above. Introduced at SMPTE is their No. 155 2-channel audio noise reduction unit providing A-Type noise reduction for the Sony BVH-1000 VTRs and the No. 255 incorporating A-Type noise reduction for Ampex VPR-2 VTRs. The 255 is priced at about \$1500 and will be available in the mid-80s. The 155 is available now.

EASTMAN KODAK displayed their television release print film



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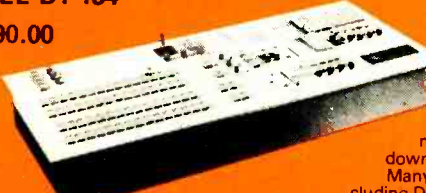
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and motion picture film, but displayed no equipment. A number of papers were also presented by the Kodak staff including one by James DeWitt which described Kodak's role as the official photographic consultant for the 1980 Olympics in Lake Placid to serve approximately 150 accredited TV news cinema photographers with rapid film processing at the broadcast center.

EIGEN VIDEO made an impressive splash at SMPTE with their video-disc recorder and new 600 electronic slide display system, but their emphasis was on quality equipment at an affordable price for broadcasters and other industries that wish to display slow motion and slide images. Their videodisc recorder features joy stick control with fast cue to 12 points, single field or single frame, record or replay. The 10 second version is priced at about \$26K with 60 day delivery; the 20 second unit is about \$40K. Eigen's major impact at SMPTE was made with the introduction of the 600 slide controller offering low cost, versatility, a 64 address memory, compact design, random access to 600 slides, providing TV stations an economical route to airing a bank of electronic stills. The complete unit (controller, disc chassis, and digital TBC/DOC) is priced at about \$27.5K. The system



FUJINON. New auto focus module an impressive accessory.



HITACHI. Both table and portable 1-inch VTRs plus cameras galore.

is plug-compatible with Eigen's slow motion facilities and has TTL interface as an optional feature. Available in January, the system displayed at SMPTE was already sold before the show closed, but the purchaser cannot be revealed. Eigen also announced at SMPTE the availability of 700MHz high resolution cassette VTRs now available in two models, but the systems were not displayed.

FREZZOLINI ELECTRONICS displayed their newest 16mm cameras and newly engineered power belt packs and portable lights for video filming.

FUJINON OPTICAL displayed a variety of their versatile, industry-accepted lenses but their pride and joy was the new auto focus module now available to quickly and automatically focus television camera zoom lenses. At \$9600 this accessory will be attractive to many, and the demonstration of switching the camera from a focused studio shot to a distant corner at SMPTE with virtually instantaneous refocusing on a new target was very impressive.

FUJI displayed their videotape for broadcasters, but made their biggest impact by providing coffee and rolls for attendees every morning. Combined, the two activities gave high visibility for Fuji.

GENERAL ELECTRIC displayed their various light sources for television and movies, but nothing new. However, their collection of colorful literature is well worth requesting.

GRASS VALLEY showed nothing new at SMPTE, but did make an impressive showing with their paper describing the series 300 switchers and the Mark II digital video effects unit utilizing the NEC model DVP-16 digital video processor. The Mark II was developed as a key component in a new electronic production system in conjunction with the 300 Series switcher. Their booth demonstration of the system paralleled the paper presentation for a strong impact at SMPTE.

GRAY ENGINEERING also made a 2-phase thrust at SMPTE, one through papers as previously noted and the second with demonstrations of new equipment in their booth. New equipment included the TBC-117 SMPTE edit code time base corrector (\$3595, 120 days delivery); the TCR-119 time character reader (\$3695, 90 days delivery); and the UBE-118 user-bit encoder (\$1595, 30 days delivery). Other equipment included edit code time base corrector, video time code reader and video reticle generator.

HITACHI's visibility at SMPTE

was high—an exceptionally attractive booth plus exciting broadcast equipment. Mike Monk of Hitachi was delighted with the products on display, including the following: the GP-5 and GP-7 Tri-Electrode single tube color cameras (the -5 won a celebrated IR100 award); the FF-40S, FP-60, FP-3060A, and the FP-1011B; the SK-70, the SK-90 and SK-96. The newly developed FP-40S is a completely self-contained portable color camera designed for ENG and other location shooting. It contains three 2/3-inch Saticon pickup tubes with prism optics to ensure optimum performance. Delivery is from stock at about \$23K without the lens. Hitachi's new FP-60S camera is claimed to be the most advanced development in professional studio cameras and features unexcelled performance in a medium priced camera plus an advanced optical prism system utilizing the new 1-inch Saticon tubes for high resolution and superior S/N and rich color rendition. Deliverable in December 1979 at about \$24.5K without lens. The FP-3060A is a completely self-contained portable color TV camera using a single tri-electrode Saticon pickup tube yielding 300 line resolution at a price of \$9.4K complete without lens. The FP-1011B consists of a camera head and camera control unit with a remote control panel which enables major camera operations from it. It is provided with 3 Saticon tubes, but Plumbicon or Vidicon versions are available. It is intermediately priced for professional or educational broadcasting, CATV, software production, or industry. Hitachi SK-70, -90 and -96 cameras were on hand for scanning scenes and pretty girls, but the big news was that Hitachi's SK-100 microprocessor controlled color TV camera will soon be available in this country for demonstrations.

Hitachi's HR-100 portable 1-inch Type-C VTR, prototyped at NAB, was demonstrated at SMPTE as a new production model. Claimed to be the smallest available commercially, it boasts lightweight, rugged construction with high video confidence, CCDs for low power consumption, longest tape path available. Furthermore, no parts except the head contact the magnetic surface of the tape—sharply reducing the possibility of dropouts. Its digital circuitry is claimed to be resistant to temperature and aging. Deliverable in January, it is priced at about \$39K. As demonstrated, the operating HR-100 can be turned upside down with virtually no effect on the video display. To go with

this. Hitachi introduced the new table model HR-200 1-inch helical VTR with impressive packaging and design features. This was prototyped at NAB, but the new production model was introduced at SMPTE. It is claimed to provide the economy of helical scan, the editing ease of film, and the advantages of quad. Its high performance conforms to broadcast standards in accordance with SMPTE Type-C format and features rugged construction, high reliability, ease of maintenance and service, and air tape guides at tape entrance and exits to assure steady tape travel. Additionally, the time necessary to get 50X-speed is reduced in shuttle mode. It has audio spot erase and its built-in editor is new. Also deliverable in January, it's priced at \$44.9K.

HM ELECTRONICS was a late comer to the show but managed to get a booth to display their models 22EF and 25EF wireless microphone systems and their model MX-40 four channel microphone mixer, the last instrument being completely new for SMPTE. All systems are available for immediate delivery at respectively \$1890, \$1980 and \$1080.

Not to be outdone, IKEGAMI made a big push for the SMPTE show. Bruce Ballantyne, who helped **BE** cover the NAB and authored an article in the June issue, and who has since joined Ikegami, was on hand to describe new equipment. The microprocessor controlled HK-312 was shown along with beautiful new descriptive literature, but it was accompanied by the all-new HK-357A microprocessor controlled field/studio color TV camera using new diode gun Plumbicons. The HK-357A is Ikegami's third microprocessor-controlled color TV camera and is claimed to handle broadcast field assignments with minimal setup time and costs and with studio grade picture quality. Deliverable in January, prices are available from the factory. It has a test pattern projector (diascope) built into the lens to eliminate the need of external registration and chip charts. The camera head can be separated from its compact base station using up to a mile of triax cable or up to 2000 feet of TV-81 mini-cable. Along with automatic registration and setup features, the camera includes auto-iris and auto-white balance. Also introduced was the new ITC-350 as the lowest priced 3-tube, prism-optic color TV camera on the market (at \$15K). Ikegami also displayed the HL-79A camera which included a new MA-79 remote base station, and discussed a triax station being available. The medium

priced HL-78 ENG/EFP camera introduced at NAB was shown at SMPTE as a production model, deliverable in January with considerable aesthetic improvements.

Also brand new for the show was the Ikegami HL-790A studio/portable color camera mountable with 1-inch zoom lenses holding all of the HL-79A performance features. By installing the HL-79A portable camera into the HL-790A special housing, the system becomes a full-scale studio camera operated in combination with the MA-79 bay station. For hand-held operation, the HL-97A can be removed within 10 minutes.

IMAGE TRANSFORM wanted to be certain of their visibility at SMPTE and occupied a total of nine booths to do so. They demonstrated tape-to-film and film-to-tape transfers and color correction and presented a paper plus demonstration tape at a Friday morning session on their progress in high definition image recording, a paper by Robert Ringer from Image Transform and Compact Video.

IVC was also on hand to show their model 1-11 high band color VTR, but some people may have missed them because they shared a booth with Dolby Laboratories. Also, some may have missed the system at SMPTE simply because IVC had to whisk the unit away to Washington for a private exhibition before SMPTE closed. The 1-11 is designed for high-quality mastering and editing applications, with provisions made for SMPTE code or control track editing. The reel-to-reel transport provides very high speed shuttle, up to 50 times play speed, for fast and accurate editing. The high band video signal system is derived directly from the IVC-9000 2-inch mastering VTR and the direct color high band signal system provides a bandwidth of 4.2MHz and 5.5MHz to accommodate NTSC/PAL/SECAM. The machine is expected to be demonstrated at NAB '80/Las Vegas in finalized form with first shipments predicted for September 1980. The price is expected to be \$32K (depending upon inflation).

US JVC displayed their ¾-inch editing system, ¾-inch portable recorder, and introduced their KY-2000U all-purpose color video camera. The system uses three ¾-inch Saticon (H 8933) tubes and is ruggedly designed for ENG/EFP work or for demanding studio applications. It is characterized by a high degree of sensitivity and an S/N of 52dB. In the portable version, the entire unit weighs about 15.2 pounds including zoom lens and viewfinder, with weight distribution for easy carrying. Accessories for

the system include remote control unit, 5-inch viewfinder, 1.5-inch viewfinder, cables, ac power adapter, and lenses—a wide assortment to provide portable or studio use.

KLIEGL demonstrated their memory lighting control system, portable power packs, and studio lighting equipment.

LEITCH VIDEO displayed their sync/subcarrier phase monitor, color bar generator, digital clocks and master clock system driver.

LENCO introduced the RS170A master sync generator and their PCM-500 series professional color master studio monitor to add to their line of video termination and test equipment.

LISTEC introduced their Type-78 post pan and tilt head now added to their line of camera mounting facilities. Also shown was their Digivision prompting systems and Richmond portable audio console.

L-W INTERNATIONAL displayed their model 4000 and 5000 slow-motion, freeze-frame, telecine projectors, ideal for film-to-tape transfers plus special effects in editing.

MAGNA-TECH/QUAD EIGHT used three booths to display their high speed dubbers and recorders, high speed projectors, electronic blupping, and the Vidi-Mag video film recorder/reproducer. A technical paper on the Vidi-Mag, a new system for television audio post production, was presented by C. Robert Fine of Magna-Tech in the Wednesday afternoon technical sessions. This machine records standard television signals directly onto 16 or 35mm sprocketed magnetic film at any of the industry standard film speeds and brings to television the various techniques of film sound production using separate elements that are necessary to create high quality release programs. The resulting film contains a color television recording, an audio track, and a SMPTE code track for synchronous playback to the original videotape master.

MARCONI had on hand their AWA Line of audio test instruments and their model TF 2920 Television Interval Timer and featured their new model B4624 Videotape Recorder Monitor. This monitoring unit combines TBC controls and monitoring selection in a single unit. A new waveform-on-picture facility shows field rate waveforms superimposed on the picture, providing a convenient single-view display to give an accurate assessment of waveform-to-picture relationship. Some users may consider this feature eliminates the need for a separate waveform monitor.

MERLIN ENGINEERING had on display one of the quad VTRs they had recently refurbished and discussed their capabilities in not only repairing equipment but also in designing new features into outdated systems.

MICRO CONSULTANTS displayed nothing new but demonstrated the Quantel DPE 5000 Digital Effects device (with autoflex and optical quality), their DFS 1550 Digital Synchronizer, and time base corrector.

MICROTIME exhibited their video signal synchronizers, time base correctors, video signal processors and video image processors.

MICROWAVE ASSOCIATES were on hand to display their line of microwave equipment for 13GHz,

2GHz transmitting and receiving equipment plus aircraft ENG/EJ systems, quad-horn and disc rod antenna systems, and ENG master controller. Their staff expressed delight at the way the broadcast industry has been accepting their microwave equipment for ENG and remote applications. A good deal of their equipment was new for SMPTE exhibition, and their exhibit theme was reinforced in a technical paper by E.J. Forbes on advances in ENG/EJ Systems concepts.

MOTOROLA was a late comer to the show and displayed their mobile communications system and video monitor with 800 line resolution.

NAGRA exhibited its world accepted tape recorders for sound track recording plus its scientific models as well. These recorders have been so well accepted in the industry that few remember that they were originally developed for the climbing of Mt. Everest.

NEC displayed its frame synchronizers with TBC, velocity compensation, freeze frame, and digital video compression; its digital video effects system and digital video processor; the digital strobe action system; and its teleconferencing system. (As noted elsewhere the NEC 1-inch VTR was on display in the 3M booth).

NORTON displayed its magnetic heads and amplifiers for professional motion picture and studio recorders.

At the NURAD booth, emphasis was given to the firm's extensive line of dual-band ENG/EJ antennas and the firm's capability for designing, supplying and installing complete microwave TV systems. On display were its CP Superquad dual band receiving antenna, plus other products, and photographs of striking installation shots with Chicago and the Lake as a backdrop.

O'CONNOR was delighted with the turnout at SMPTE and displayed its line of fluid pan and tilt camera head models for visitors to experiment with. Their newest addition is wooden legged tripods for those who prefer wood to metal.

PANASONIC exhibited its VCRs and editing systems plus portable video recorders, ENG/EFP color cameras, color video monitors, switchers and production equipment.

PEP announced a practical electronic ballast for gas discharged lamps such as HMI lamps used in location shooting. Produced by Cremer S.A. of France, this new device provides substantial advantages over previously-used magnetic inductive ballast. This system was also described in a paper given on

Wednesday afternoon.

PHILIPS had a nice location at SMPTE and put on an impressive equipment display for broadcasters. They included cameras for ENG/EFP/Studio—both dedicated and convertible models; 1-inch VTRs for stand alone and camera systems; test and measuring equipment; and modulators, demodulators, VITS, analyzers and signal generators. But the hit of the show for Philips was the introduction of their digital noise reducer and tape synchronizer. The DNR is an automatic, fully adaptive, PAL and NTSC system of compact design and with built-in diagnostics. As previously noted, it was described in a paper on Tuesday by Richard Ellis of Pye. Deliveries will be in first quarter 1980 at about \$42.5K. Their new television audio post production tape synchronizer controls master and two slave transports, has synchronizing accuracy of 1/100 of a TV frame, and is designed for SMPTE/EBU time code. Delivery is off the shelf at about \$14K.

RANK PRECISION exhibited their line of Varotal MRL (multi-role-lens) which offers quality optics for both standard broadcast TV cameras and mounted portables. The line now ensures that mounted portable cameras achieve full broadcast TV lens standards and operation, and quick change front units provide for different programs or locations. Their colorful brochure is well worth requesting. Rank features its new special effects lens developed for the Zoptic system, which received five 1978 Oscars.

RCA used four booths to display its line of film recording and telecine systems. Elsewhere, the FCA staff was busy presenting technical papers and serving as key members of standardization efforts in video.

RECORTEC displayed its new high-band portable ¾-inch VCR capable of recording 10 minutes of high-band video per each minicassette. This system is the acquisition machine for editing their model HRU-2860 VTR.

SONY, of course, was at SMPTE with its normally impressive display of video products for broadcasters and teleproduction. This included the 1-inch and ¾-inch video recorders and editors, video cameras, accessories, tape and related products. As with other broadcasters, their big impact was made with new products. For Sony this lineup included: (1) a new completely self-contained portable ¾-inch VCR model BVU-110 with full color playback; (2) a new DTR-1100 slow-motion controller that provides continuously variable playback speed



MICROWAVE ASSOCIATES. Displayed ENG/EJ equipment and antennas.



NEC. Digital—synchronizers, processors, and strobe action.



NURAD. Excited about microwave/ENG/EJ systems, with gorgeous photos of Chicago installation.

when used with the Sony BVH-1100 dynamic tracking VTR. The unit also includes four cue markers with automatic search and three separate and independent timing displays for maximum versatility. A simple control varies playback speed from two times normal through still-to-1/5 reversal with full broadcast quality, significantly enhancing the video presentation for sports and general post production special effects. The new slow-motion controller is priced at \$12.5K with delivery expected in February. (3) a new HT-500 chroma stabilizer as an accessory for the BVH-500; and (4) the CCU-300 camera control unit and the BV-5 high solution viewfinder designed to convert the BVP-300 from a hand-held field-production camera to a full-feature, studio-quality system.

SPIN-PHYSICS displayed their capabilities for refurbishment of quadruplex panels for Ampex, Mark X, and RCA high band panels. High performance ferrite cores are used to extend head life by 2 to 5 times normal life expectancy.

STRAND CENTURY displayed their complete line of television and film lighting and control equipment, including the new Fresnel systems.

SUPER 8 exhibited its crystal sync cassette recorder for all film formats and showed video and film programs produced with it.

SWINTECK displayed and demonstrated its all-new 3-pack, with mixer, for use by film or video sound recordist—offered in both a dBs and standard FM receiver package.

SYLVANIA/GTE displayed its line of incandescent and tungsten halogen lamps for production lighting.

SYSTEM CONCEPTS made an impressive showing at SMPTE with a paper by Ray Unrath, in the microprocessor session on Thursday afternoon, plus a vivid display of their Quantafont model Q-VII teleproduction graphic titler. This self-contained microprocessor-based teleproduction titler and microcomputer-based television information display system for automated weather, news service with keyboard entry was scheduled for its

production model debut with simultaneous showings at Video/Expo and SMPTE. The Q-VII features include: character refinement circuitry, shadow and full border edging, colorized characters with video matte and auto-fade, multi-resident fonts including true upper and lower case, random access to 192 positionable titles, inserts/delete and open/close editing, sync-lock and color phase lock, positionable crawl, partial page role to a positionable raster location, and much more. Delivery on the system is expected to be 120 days, but orders are backlogged until May. Prices available from the factory. System Concepts took this opportunity also to announce that Eugene Leonard, a pioneer in electronic graphics display, has joined their organization as vice-president of System Resources Corporation.

TELECINE displayed its line of Schneider broadcast zoom lenses, including the new 15X ENG/EFP lens for 2/3-inch cameras, new superwide lens attachment for ENG lenses, and various film lenses, plus its complete line of Schneider lenses for 1-inch and 1 1/4-inch cameras.

TELESCRIPT displayed its lightweight monitoring prompting system featuring 800 line MPs and other accessories for the broadcast industry.

TELEVISION EQUIPMENT ASSOCIATES displayed its tape cleaner/evaluator for both 2-inch and 1-inch tape; its two wire dynamic intercom system; and its new interphone switching system; plus video and pulse delay lines and headsets.

TENTEL displayed its T.U.S.H. gauge, a spindle height gauge for measuring the spindle heights on 3/4-inch recorders to 1 mil. Price, \$495. The Tentelometer tape tension gauge was also displayed at \$225.

3M displayed their product lines for professional tape plus Photogard, a unique coating system to protect film or printed materials. They also demonstrated the new 1-inch VTR system which they are licensed to sell for NEC.

TOSHIBA did not show anything new since NAB, but did display their PK-31A automatic studio color TV camera employing microprocessor control for automatic size, centering, linearity, white balance, black balance, gamma and flare. Also on display was the PK-39 modular self-contained portable broadcast TV camera and the FPC-10 audio/video field production console.

UTAH SCIENTIFIC displayed their AVS-1 and CAV-7 audio and video routing switchers and control panels.

TEKTRONIX displayed their automatic measuring systems, television demodulators, waveform monitors, vectorscopes, picture monitors, sync and test signal generators, spectrum and sideband analyzers, logic analyzers, time domain reflectometers and oscilloscopes. Their new entry for SMPTE was the model 1450 NTSC television demodulator for measuring the quality of the transmitted signal and the performance of the television transmitter. Delivery is 12 to 16 weeks at \$8750. The down converter for the system has a delivery of 20 weeks, for either UHF or VHF, at a price of \$4650.

The VIDEOMEDIA booth was an active place with people inquiring about the Z6-computerized microprocessor editing system. The Mini-Z control track editing version was shown with the micro-lock as an option. The micro-lock feature claims the advantages of SMPTE time-code editing without the disadvantages inherent in other systems. Bob Cezar of Cezar International was on hand to give a rundown on the features and capabilities of the Z-6 editors. The index button available on the Z-6 provides a powerful feature for text editing (sometimes referred to as list management).

VITAL displayed nothing new in terms of equipment but did display their "Squeezoom" digital video effects system, production switcher automation system (PSAS-1), and both production switchers and on-air switchers. Chris Donoyan was on hand to meet people from the industry and displayed an artists rendering of the new Vital Plant to be constructed. In addition, he invited selected members from the industry to partake of a celebration at his nearby home about which the attendees will be marvelling for years to come.

VSC/INTERGRATED SOUND SYSTEMS announced at SMPTE the fully operational broadcast quality time-compression system for processing commercials. This system allows original recorded material to be played at a faster or slower rate without loss of definition or bandwidth. Thus, commercials can be expanded or compressed into a selected time slot without producing noticeable distortion.

WEATHERMATION displayed their weather display equipment for broadcasters. Their color brochure for weather radar is well worth requesting.

WINSTED was on hand to display their editing and production consoles, space saving videotape and film storage systems, dubbing racks, tape and film trucks, and portable production consoles. □



VITAL. Featured famous Squeezoom and displayed artist's rendering of new facilities planned.

Time base corrector roundup

By John Wiliszowski, video editor

One of the major problems of videotape playback is that of time base errors resulting from instabilities in tape drives, friction, tape stretch, etc. These errors are measurable by comparing the playback signal to a stable reference. For monochrome broadcast, the arrival of the horizontal sync pulse should not deviate more than 30ns from this reference; for NTSC color, the burst should be within a few nanoseconds of the reference.

The Time Base Corrector (TBC) provides the circuitry to restore perfect picture sweep synchronization to videotape programming for broadcasting. This roundup summarizes features and special design considerations for currently-available TBCs and provides a detailed chart of data for side-by-side system comparisons.

The first section on features also includes reader service numbers on each model listed. For manufacturer's literature, circle the appropriate number on the reader service card.



VW-1

ADDA

VW-1 is a full-frame synchronizer and TBC. In the TBC configuration the unit is able to run free and requires no feedback to servo the VTR. As a frame synchronizer/freeze frame unit, it can delay non-synchronous video feeds by as much as a full color frame, permitting freeze frame and the ability of making them synchronous with a stable reference.

Circle (100) on Reply Card



TBC-2

Ampex

TBC-2 features dynamic correction signal processing incorporating line-by-line signal processing and averaging techniques to give the best possible picture. When used

with the VPR series, the unit will produce monochrome pictures in all shuttle speeds and color pictures from still frame to 10 times normal speed.

Circle (101) on Reply Card

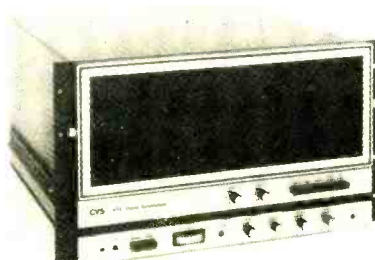


Tel-Tec 210

Automation Techniques

Tel-Tec 210 is designed for closed circuit and cable television applications. The unit can be used as an averaging system of correction for cleanup of videotape signals involving dubbing, CCTV or transmission over cable where genlocking is unnecessary.

Circle (102) on Reply Card



630

CVS

630 is a full-frame synchronizer

offering digital noise reduction and picture freeze as standard features. Video compression and positioning are available as options.

Circle (103) on Reply Card

520 features RF gain control permitting high and low-energy tapes to be intermixed without a need for any readjustment. Switching on the color interlace system permits a feed from a non-capstan servo recorder to be dubbed to a production recorder.

Circle (104) on Reply Card

516 includes gyrocomp memory organization allowing correction of large time base errors, such as gyroscopic errors, without breakup or hue shift, bypass record mode and frame locked vertical interval edits.

Circle (105) on Reply Card

510 contains a built-in EIA sync generator with normal horizontal and vertical drives, burst flag, 0.58 subcarrier composite blanking and composite sync. In the color interlace mode, the unit can create phased, interlaced color signals from heterodyne color VTRs.

Circle (106) on Reply Card

506 is specifically designed for heterodyne VTR users who don't need broadcast stable outputs. Incorporating CCD technology, the CVS 506 uses simple operation to reduce, or eliminate, skew, jitter, flagging and other distortions.

Circle (107) on Reply Card



DPS-1

Digital Video Systems

DPS-1 is based on the principle



eliminates the source of EMI noise.

"Extreme corrosion of steel guys and electromagnetic interference, due to arcing, were two very severe problems when we purchased WYFR.

"We installed PHILLYSTRAN on all nine broadcast antennas at Hatherly Beach, eliminating the source of EMI noise.

"We were pleasantly surprised by the ease of re-guying and the way PHILLYSTRAN reduced the labor involved to make our non-metallic guying systems competitive — on an installed-cost comparison — to conventional metal guys"

Art Thompson, Station Manager
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Circle (38) on Reply Card

that one mainframe can be adapted to a range of digital video processing or storage requirements. The unit is compatible with any VTR format and features optional 256 or 525 line memory making it a frame store TBC/synchronizer.

Circle (108) on Reply Card



ccd2h-1

Edutron

ccd1h uses charged-couple-device technology to remove skew and jitter distortions. It is designed for educational, industrial, cable and broadcast edit stations.

Circle (109) on Reply Card

ccd2h-1 has 4dB of chrominance and luminance noise reduction, horizontal enhancement and can be locked to system sync.

Circle (110) on Reply Card

ccd2h-2 is the same as the ccd2h-1 with the addition of an RS 170A sync generator.

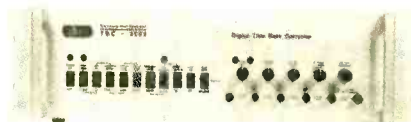
Circle (111) on Reply Card

ccd2h-3 is the same as the ccd2h-1 with the addition of a comb filter. The ccd2h-3 also features vertical enhancement.

Circle (112) on Reply Card

ccd2h-4 features RS 170A sync generator, comb filter and vertical and horizontal enhancement.

Circle (113) on Reply Card



IVC-2002

International Video

IVC-2002 (PAL/SECAM only) does not need any additional units to cope with non-capstan servo VTRs and features floating window drive circuit enabling the TBC to

cope with long term drifting in the VTR.

Circle (114) on Reply Card



DFS 1550

Micro Consultants

DFS 1550 is a synchronizer/TBC featuring automatic non-phase detection with the capability of handling wrong field edits. The optional engineering remote control permits every function to be controlled from any location in the studio or van.

Circle (115) on Reply Card

DTC 300 has a 3H static and infinite dynamic window. The sync generator driver option makes all sync outputs available at the rear of the unit and provides a free standing sync generator which meets broadcast standards.

Circle (116) on Reply Card



2525 VSS

Microtime

2525 VSS features RS 170A sync generator, field 1, field 2 or freeze frame for digital video effects and auto freeze. Selectable black burst or the last field of active video is possible in the case of interrupted video.

Circle (117) on Reply Card

2020 features VTR 3.58MHz subcarrier generator, white and black clip circuits, derived coherent subcarrier and automatic internal sync operation in the absence of external sync.

Circle (118) on Reply Card

Now You Can Afford To Do A-B Rolls With Your HET VTR'S.



Introducing the Edutron ccd2h-1. Full Time Base Correction For Only \$5,800.

The ccd2h-1, when used at your editing station or for post production, can solve many problems while it is correcting and enhancing your heterodyne VTR signal. You will be able to synchronize your VTR, allowing you to use it as a source to do mixing at your switcher. With two ccd2h-1's, you can now do A-B rolls between two VTR's.

By using the latest advancements in charge-coupled-device memory technology, we can give you superior performance at a realistic price. The ccd2h-1 has a signal-to-noise ratio of 58 db, $\frac{1}{2}^\circ$ of differential phase, and 1% differential gain. This will give you the best possible reproduction of the video from your VTR.

If you have bad tapes you would like to clean up or good tapes you would like to make look even better, the ccd2h-1 is ready. By using a unique noise coring that gives up to 4 db of noise reduction, all generations of tapes will look better. A horizontal

enhancement of up to 200% boost will sharpen your video. All of this is standard in the ccd2h-1 and available at no extra cost.

The two horizontal lines of window correction will handle typical distortions. The automatic steerable advanced sync will make the window appear much wider as it keeps your VTR centered in the window. This will give you maximum correction range and a zero time system delay.

For complete specifications and the name of your nearest Edutron dealer, please write or call us at: EDUTRON INC., 25 Oak Street, Suite I, Roswell, Georgia 30075. Phone (404) 992-1626.

The Video Electronics Company

Circle (39) on Reply Card



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

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Circle (40) on Reply Card

NTC-5000

NEC

NTC-5000 includes fast forward and rewind picture lock which provides a stable picture regardless of tape speed. Color lock is maintained up to 4X normal speed.

Circle (119) on Reply Card

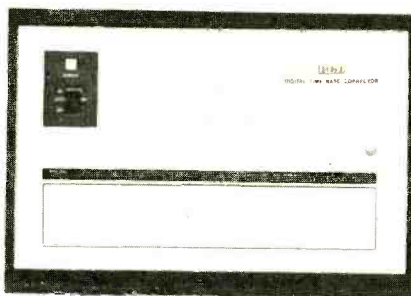


PVC-2

Philips Broadcast Equipment

PVC-2 applies averaging correction techniques when receiving severely degraded video information and switches automatically to line-by-line correction as the incoming signal improves. A non-capstan servo option enables the PVC-2 to be used with any VTR.

Circle (120) on Reply Card



TBC-200

RCA Broadcast Systems

TBC-200 operates at 9-bit quantization rate. When used with the TH-200 or TH-100 VTR with optional dynamic tracking, the TBC-200 will produce broadcastable video with tape speeds ranging from -1/5X, through still, to 2X normal speed.

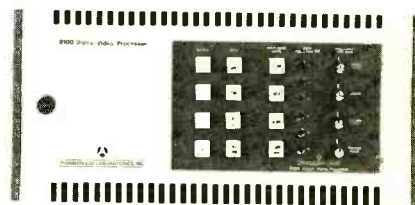
Circle (121) on Reply Card

BVT-2000

Sony

BVT-2000 features 9-bit quantization rate. The unit is equipped with an automatically-advanced sync generator. When used with the BVH-1100, the BVT-2000 provides color-locked, recognizable color pictures from still frame to 10X normal speed. If the BVH-1100s are equipped with optional dynamic tracking, the BVT-2000 can produce transmission-quality playback from -1/5, through still, to 2X normal speed.

Circle (122) on Reply Card



Thomson-CSF

DVP-9100 provides selectable sync, noise reduction, and TBC without the use of a conventional gen lock. The TBC stabilizes capstan servo, non-segmented, direct or heterodyne VTRs, including the 1-inch framestore, in conjunction with the TBC, provides an infinite window for the incoming video signal.

Circle (123) on Reply Card



V-Tec/1H

Video Data Systems

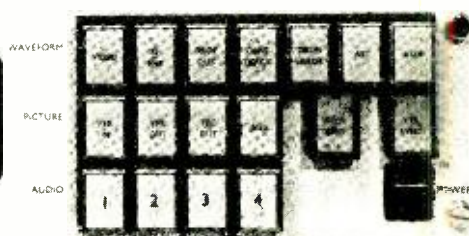
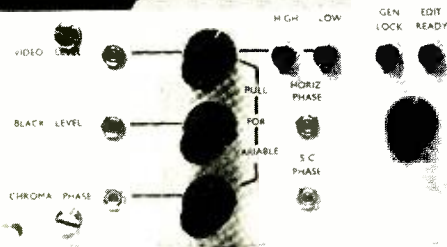
V-Tec/1H provides processing amplifier, video level monitoring, peak video AGC sensing, signal level and loss of video level monitoring, dual chroma AGC, pulse-cross of both corrected and uncorrected signals, adjustable added blanking width, corner insert split-screen display and automatic sensing of monochrome and color signals for burst and chroma channel kills.

Circle (124) on Reply Card

	Video Processing	Color Processing	Window (lines)	Signal-to-noise (dB)	Velocity Compensator	Drop-out Compensator	Remote Control	Differential Phase	Differential Gain	Adjustable Blanking	Digital Sampling Frequency
ADDA VW-1	digital	heterodyne	524H	56	yes	no	optional	2.0°	2%	V	4S
Ampex TBC-2	digital	direct-heterodyne optional	10H	60	optional	optional	optional	2.0°	2%	na	3S
Automation Techniques Tel-Tec 210	analog	heterodyne	1H	58	no	no	no	3.0°	3%	H,V	na
Consolidated Video Systems (CVS) 630	digital	heterodyne or direct	525H	57	yes	optional	yes	1.5°	1.5%	H,V	4S
520	digital	heterodyne or direct	3H	60	yes	yes	no	2.0°	2%	H,V	4S
516	digital	heterodyne	2H-16H optional	55	no	yes	no	1.5°	1.5%	H,V optional	4S
510	digital	heterodyne	1H	48	no	yes	no	3.0°	3.0%	no	4S
506	analog	heterodyne	1H	60	no	no	no	1.0°	2.0%	no	na

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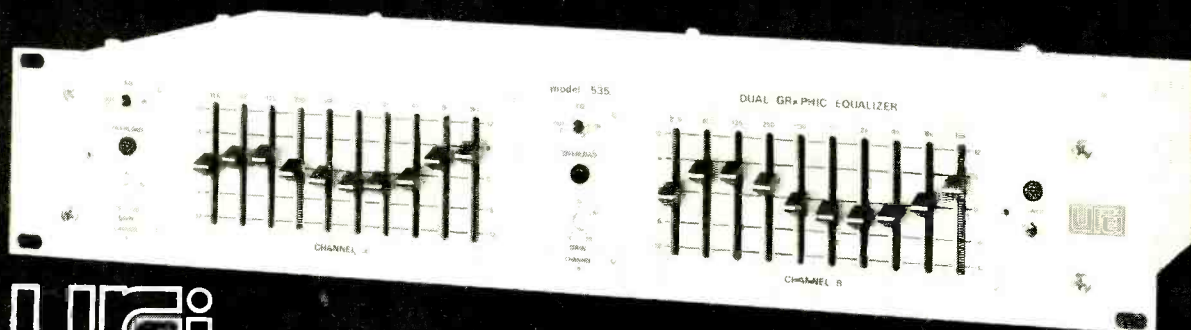
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	Video Processing	Color Processing	Window (lines)	Signal-to-noise (dB)	Velocity Compensator	Drop-out Compensator	Remote Control	Differential Phase	Differential Gain	Adjustable Blanking	Digital Sampling Frequency
Digital Video Systems											
DPS-1	digital	direct-heterodyne optional	32H-16H 262½H 525H optional	58	optional	optional	optional	1.8°	1.8%	programmable	4S
Edutron											
ccd-1h	analog	heterodyne	1H	60	no	no	no	1.0°	2.0%	no	na
ccd2h-1	analog	heterodyne	2H	58	no	no	no	0.5°	1.5%	no	na
ccd2h-2	analog	heterodyne	2H	58	no	no	no	0.5°	1.5%	yes	na
ccd2h-3	analog	heterodyne	2H	58	no	yes	no	0.5°	1.5%	no	na
ccd2h-4	analog	heterodyne	2H	58	no	yes	no	0.5°	1.5%	yes	na
ccd16h	analog processing digital memory	heterodyne	16H	57	no	yes	no	2.0°	2.0%	yes	na
International Video Corp. (IVC)											
IVC-2002 (Pal/Secam only)	digital	direct or heterodyne	4H 16H optional	55	yes	yes	no	3.0°	3.0%	no	3S

UREI's Dynamic Duo Two Graphic Equalizers in one package... Two for one price.

The UREI model 535 Dual Graphic Equalizer is two independent graphic equalizers with one common power supply. As a successor to the popular model 530, the 535 offers an additional filter section per channel, greater control range and more output. It provides 12dB of boost or cut at each of 10 preferred ISO one-octave frequencies from 31.5 Hz to 16 kHz. Filters have excellent combining action, minimum phase shift. Input: +20 dBm, output: +24 dBm, plus excellent S/N (110 dB, max. output) provides exceptional dynamic range. Front panel controls adjust gain from -10 dB to +20 dB. Get two equalizers in one, save space and money too. See it at your UREI dealer today!

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	Video Processing	Color Processing	Window (lines)	Signal-to-noise (dB)	Velocity Compensator	Drop-out Compensator	Remote Control	Differential Phase	Differential Gain	Adjustable Blanking	Digital Sampling Frequency
MCI/Quantel (Micro Consultants)											
DTC-300	digital	direct or heterodyne	3H	58	yes	yes	yes	3.0°	3.0%	no	3S
DFS-1550	digital	direct or heterodyne	265½	58	yes	yes	optional	1.0°	1.0%	no	3S
Microtime											
2020	digital	direct or heterodyne	4H-24H optional	58	optional	optional	no	2.0°	2.0%	V,H	3S
2525	digital	direct or heterodyne	525H	58	optional	yes	optional	2.0°	2.0%	V,H	3S
NEC											
NTC-5000	digital	direct or heterodyne optional	4H	55	yes	yes	no	1.0°	1.5%	no	3S

Microtime 2525 and 2100 Video Processing for any Format



The 2525 Video Signal Synchronizer time base stabilizes VTRs of all formats and synchronizes Network, Microwave, Satellite, and Studio feeds, correcting virtually any signal from any source.

The 2100 Video Image Processor sharpens the softness and substantially reduces the noise in pictures from VTRs, particularly the ¾" format.

Microtime's 2525/2100 combination. Outstanding performance at an unbeatable price, **\$28,900**. Limited time offer. Individually priced at \$24,995 and \$7,295 respectively. . . . Your best choice is MICROTIME.

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December 1979 **Broadcast Engineering** 67

	Video Processing	Color Processing	Window (lines)	Signal-to-noise (dB)	Velocity Compensator	Drop-out Compensator	Remote Control	Differential Phase	Differential Gain	Adjustable Blanking	Digital Sampling Frequency
Philips PVC-2	digital	direct or heterodyne optional	10H	56	optional	optional	no	3.0°	3.0%	no	3S
RCA TBC-200	digital	direct or heterodyne	12H	58	na	yes	yes	2.0°	2.0%	na	4S
Sony BVT-2000	digital	direct or heterodyne optional	4H-12H optional	58	yes	yes	no	2.0°	2.0%	na	4S
Thomson-CSF DVP-9100	digital	direct or heterodyne (automotive)	infinite	56	No	Yes* (from previous frame)	Yes	2°	2%	Yes	4S
Video Data Systems V-Tec/1H	analog	heterodyne	1H	58	no	no	no	1.0°	2.0%	V,H	na

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The BTX Corporation



.....

Consultant firm formed

Steve Smith, formerly director of TV engineering for Meredith, was busy at SMPTE communicating his entry into the consulting business. Providing a wide scope of consulting and technical services, he can be reached at: B-T-C (Broadcast Technology Consultants), 5801 Outlook, Suite 200, Mission, KS 66202, (913) 677-1483.

Fernseh Inc. formed

During the 121st SMPTE meeting in Los Angeles, Bell & Howell and Robert Bosch Corporation, a member of the Robert Bosch Group, announced the formation of a 50-to-50 owned joint venture to develop, manufacture and market broadcast video equipment in the US. The name of the new company will be "Fernseh Inc.," the Video Corporation of Bell & Howell and Robert Bosch.

Under the agreement Robert Bosch Corporation will acquire 50% of the Bell & Howell TeleMation Division, a Salt Lake City based manufacturer of video equipment, which will become part of the joint venture. The Fernseh Division of Robert Bosch Corporation, Broadview, IL will merge its marketing operation into the joint venture to strengthen its position in the North American market.

Technical expertise, research and development from Robert Bosch, Bell & Howell and TeleMation will be pooled to develop new products to be manufactured at TeleMation's Salt Lake City plant. The Fernseh Division of Robert Bosch GmbH, located in Darmstadt, W. Gr., will continue the overseas manufacture of their existing product lines which will be sold and distributed in North America by the new company.

Donald N. Frey, chairman and chief executive officer of Bell & Howell, said, "This agreement provides an additional impetus to Bell & Howell's increasing thrust in the rapidly growing video field."

Robert B. Pfannkuch, president of Bell & Howell's Video group, and newly-appointed chairman of the board of Fernseh, Inc., stated, "This is an opportunity to provide a wide variety of exciting new prod-

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Circle (44) on Reply Card

New Tape Head & Pressure Roller Maintenance Kit Makes Cleaning Easier... And More Efficient

Texwipe's new Audio Tape Head Cleaning Kit TX250 contains everything a broadcast maintenance engineer needs to keep heads clean — to ensure peak sound fidelity and low incidence of failure.

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

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

Order your Texwipe kit today and start cleaning your reel-to-reel and tape cartridge machines the professional way. Or write for literature to Texwipe, Hillsdale, New Jersey 07642. (201) 664-0555.

TEXWIPE



Complete Kit includes:

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

Circle (45) on Reply Card

Dielectric: Supplier of quality components to the communications industry

For 40 years Dielectric has supplied various segments of the communications industry with high quality, durable components and systems.

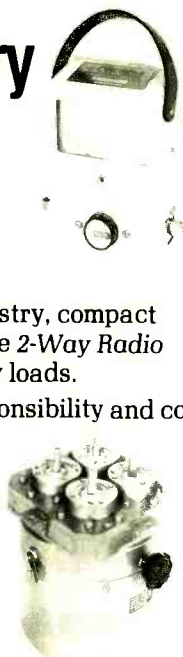


For the *Broadcast* industry, motor driven coaxial switches, transmission lines, high power loads, and waveguides. For the *Telephone* industry, compact dehydrators for cable drying. For the *2-Way Radio* industry, RF wattmeters and dummy loads.

Today, Dielectric recognizes its responsibility and continues producing high quality components for this important communications industry. For more

information on Dielectric's products and services, circle the appropriate reader service number:

- Broadcast Industry - circle 47
- Telephone Industry - circle 48
- 2-Way Radio Industry - circle 49



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ucts based on the technical resources of the three companies, and I look forward to working with this fine technically-based German organization."

Paul Warnock, president of Bell & Howell's TeleMation Division, will be president of the new joint venture company.

Dr. Otto R. Oechsner, managing director of the Fernseh Division of Robert Bosch GmbH, said, "This new facility for research, development and manufacturing of our products in the US will improve our commitment and position in the North American market".

Motorola is technical communications supplier

The United States Olympic Committee (USOC) has selected Motorola as its technical communications supplier. Motorola is providing a complete communications system for the USOC for use at the competitions. The system includes a number of pagers, FM mobile and portable 2-way radios. The use of such equipment means that the USOC does not have to depend upon loudspeakers or local telephone systems to reach key personnel at a moment's notice.

"MCA versus Sony Decision"

The complete text of the "MCA versus Sony Decision" has been published by ITA in the current issue of the ITA News Digest. Because of the tremendous interest in this much publicized decision, ITA has published extra copies of the digest, which will be mailed without charge to interested parties. No telephone orders will be accepted and requests must be made on an organization letterhead. This offer is restricted to the US, Canada and Mexico. Requests from other countries must be accompanied with \$3 US for handling and airmail charges. To obtain a complimentary issue, write ITA, 10 West 66 Street, New York, NY 10023.

Ampex camera group moves

The camera products group of Ampex Corporation's audio-video systems division has consolidated its operations in a 103,000-square-foot facility in the Valco Industrial Park, Cupertino, CA. The facility will consolidate the camera group's product management and engineering departments, formerly located at corporate headquarters in Redwood City, and manufacturing, formerly in Sunnyvale.



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ITA directors named

Irwin "Skip" Tarr, Matsushita, was elected chairman of the ITA board of directors. He succeeds Dick O'Brien, US JVC, who completed a 2-year tenure as chairman. O'Brien remains on the ITA board of directors. Other appointments include: Ed Khourey, Capitol Magnetics, president; Sam Burger, CBS Columbia Records, executive vice president; Jon Povolny, 3M, vice president, planning; George Ziadeh, Ampex Magnetic Tape, vice president, finance; Ted Cutler, Memorex, West Coast vice president; Tony Mirabelli, Quasar, Midwest vice president; Morton Fink, Warner Communications Home Video, East Coast vice president; Dick Kelly, Video Corporation of America, vice president, consumer relations; Larry Finley, ITA, vice president membership/events; Jack Dreyer, BASF Systems, secretary; and Gerald Citron, Intercontinental Televideo, treasurer.

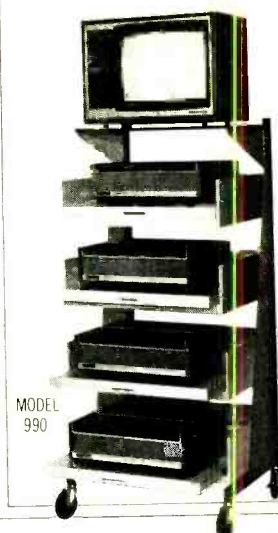
Two new members were elected to the board: Steve Roberts, Twentieth Century Fox and William Gort, American Hoechst.

Additional board members are: Frank Day, American Sound; Isadore Philosophie, Audio Magnetics; Robert Pfannkuch, Bell & Howell; Edwin Gamson, Certron Corporation; Louis F. Savelli, DuPont; John Dale, Fuji Photo Film; Roger Sammon, ICI Americas; Charles Dolk, Magnavox; Tadao Okada, Maxell; William Orr, Orrox/CMX; TDK Electronics; and Richard F. O'Brien, US JVC.

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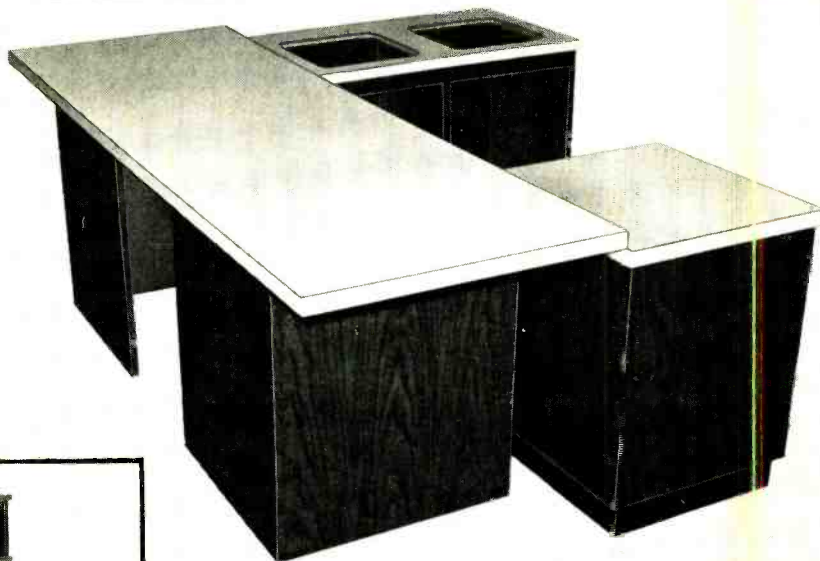
The console holds all sizes of 3/4" VTR equipment. An ideal setup for videotape duplicating. Shelves adjust on 1" increments. Sliding pullout shelves plus caster-mounted mobility for easy maintenance and total access to VTRs. Stack up to 5 VTR drawers on a single console. **For full-line catalog of video consoles, tape and film trucks, film and videotape storage systems, call toll-free or write:**

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December 1979 **Broadcast Engineering** 71

SALES/CONTRACTS

Harris

The broadcast products division received numerous orders for the Harris 9000 Program Control System during August. The orders, totaling \$500,000, were placed by AM and FM stations in nine states across

the country.

The most recently shipped Harris TAC-6H antenna is up and proving the improvements in signal provided by circular polarization. WAST, Albany, NY, switched to its new antenna September 16. At the same

time, the station ran newspaper ads in local papers asking viewers, "If you can see us better, write us a letter." A flood of responses were received with an overwhelming majority reporting improved reception. □



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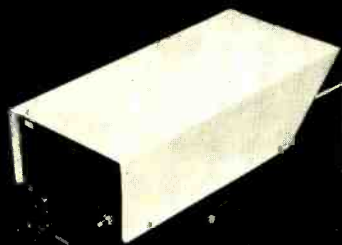
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people in the news

Manufacturers/Distributors

Eugene Leonard has joined System Concepts as vice president. Leonard was previously president of System Resources.

Kenneth M. Leondar has been named vice president and general manager of Cetec Broadcast Group.

R. Roger Watson has been appointed national sales manager of Ampex Corporation's Audio Video Systems Division. Watson was vice president and general manager of Video Magnetics as well as a co-founder and principal of the video head refurbishing firm.

Don Diesner, has been named to western regional manager, of Toshiba Broadcast Electronic Systems. Diesner comes from CEI Inc.

Telex Communications has announced the appointment of **Michael L. Olinger** to manager, Latin American Sales. Olinger was previously international sales manager for Astatic Corporation.

Richard F. Naughton has been appointed manager of proposal management for GTE Lenkurt. Naughton joined Lenkurt in June of 1963 as a field engineer serving Europe and Asia. ☐

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

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

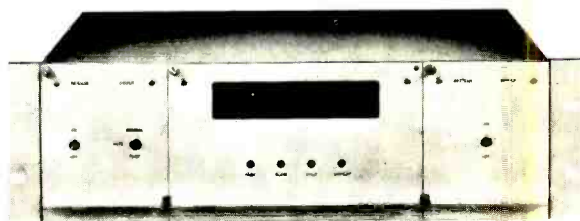
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Or National Bureau of Standards accuracy! **ES 190** is synchronized to Radio Station WWV to provide a Master with unquestioned accuracy. \$1134 with receiver and antenna.

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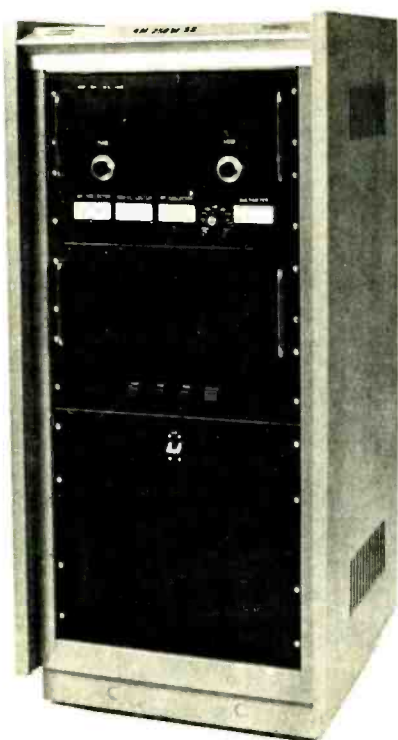


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The Wilkinson Electronics AM-250SS is an all solid state 250 watt Am transmitter housed in an attractive 24 inch cabinet, 52 inches in height. All components are mounted in two drawers for maximum accessibility and ease of maintenance. Space is available in the cabinet for a second transmitter making it possible to combine two 250 watt units to obtain 500 watts. It is also available at any power below 250 watts at a reduced price.

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new literature

TV product catalog

Dynair Electronics—A short-form catalog describes the company's current line of TV products. Several new products are included.

Circle (75) on Reply Card

Recording equipment maintenance

Nortronics—Regular preventive maintenance of recording equipment has not been adequately emphasized. This brochure is available to describe the care of cassettes, reel-to-reel, carts and VCRs; price \$1.00.

Circle (76) on Reply Card

Analog dialogue

Analog Devices—A 20-page issue includes application articles on very high speed data acquisition, statistics methods using rms to dc, checking A/D converter linearity, a 300kHz continuous 12-bit conversion system and high-resolution measurement.

Circle (77) on Reply Card

Electrical performance standards

Electronic Industries Association—The release of standard RS-462, which has been in preparation for four years, marks the first time that a standard has become available for a television demodulator operating on international system M standards, as employed by all television broadcast stations in the US.

Circle (78) on Reply Card

NASA tapes/film for broadcasters

NASA—Educational a/v materials are available at no charge to broadcasters. NASA's Lewis Research Center in Cleveland, OH, has 18 of these in tape formats, 2-inch quad and U-Matic cassette.

The latest 1979 additions to this collection include: *Aeronautics and Space Report* (on aircraft spin tests); *The Voyagers* (on the 10-year Voyager mission to the planets); *Electric Car Tests* (assessing electric cars); *Astronaut Candidate Anna L. Fisher*; *Space Shuttle Columbia*; *Voyager I, Early Results* (includes photos of Jupiter and its moons); and *REDOX Story* (energy storage systems).

Broadcasters may obtain materials through regional NASA centers or by contacting: NASA Lewis Research Center, Dept. BE, Film Service Dept. 22, Cleveland, OH 44135.

Circle (79) on Reply Card

Audio connectors bulletin

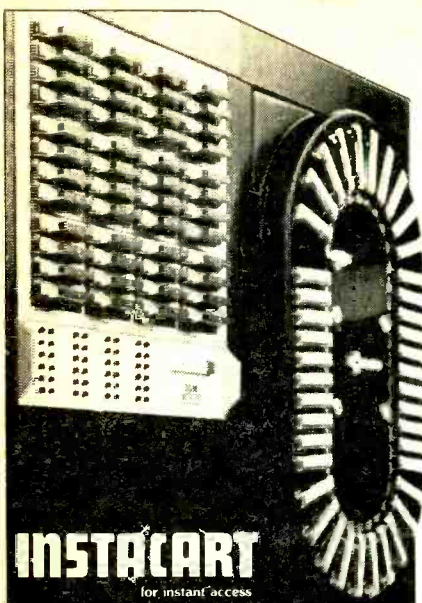
Switchcraft—A 4-page product bulletin on a new generation of Tini Q-G miniature audio connectors is available. Engineering drawings of each part, design features, ordering information and suggested list prices are included. Also available is a 28-page audio accessories catalog. The catalog describes jacks, plugs, switches, audio and phono connectors, adapters, audio accessory kits, molded cable assemblies, and microphone mixers and amplifiers for audio applications.

Circle (80) on Reply Card

Stock footage

Video Stockshots—A source of inexpensive, immediately available, stock footage can be obtained from this division of Thomas J. Valentino. Some stockshots are from original film sources and others from original videotapes.

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B-2

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new products

Phono cartridge

Shure Brothers has announced the addition of the V15 Type III-HE to its series of V15 Type III phono cartridges. The new model features

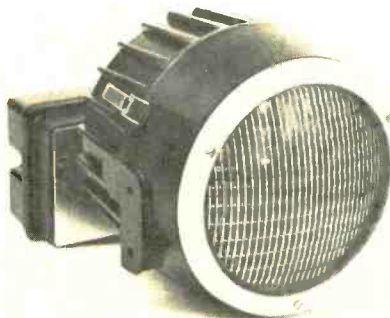


a hyperelliptical nude diamond tip, which may be purchased separately and used in any V15 Type III cartridge.

Circle (90) on Reply Card

CID lamp

CID, an indoor/outdoor television, stage, studio lamp, developed by Thorn Lighting, features an Ra color rendering index of 85, 90% lumen



maintenance, and a hot lamp re-start. The compact unit is also available in a Par 64 dichroic coated cool beam version.

Circle (91) on Reply Card

Video graphics system

Dynasciences has introduced ACE, a program feature, to its model 9408 video graphics system. ACE allows storage and recall or pre-programmed events, including roll, crawl, flash and title. Other features in the system include an instruction channel, zoom on one font, colorizer, edger and digitizer.

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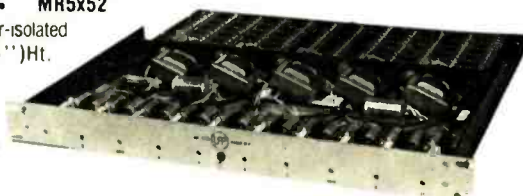
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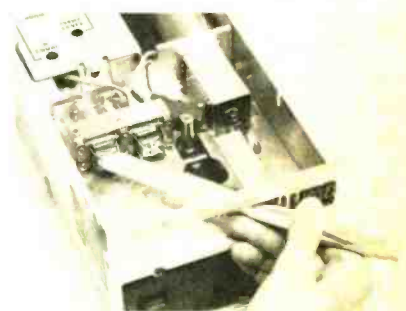
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selectivity preselectors has been introduced by **Phelps Dodge**. The three VHF models operate in the 150 to 174MHz range, and the three UHF models operate in the 450 to 512MHz range. UHF models PD-1169, PD-1170 and PD-1171 utilize quarterwave, 4 1/4-inch low loss copper cavities which are temperature compensated over the range -40° to +160° F. VHF models PD-1173, PD-114 and PD-1175 use six 1/8-inch low loss copper cavities compensated over the same temperature range.

Circle (93) on Reply Card

Cleaning kit

An audio tape head cleaning kit is available from **Texwipe**. The TX250 features audio cleaning pens which

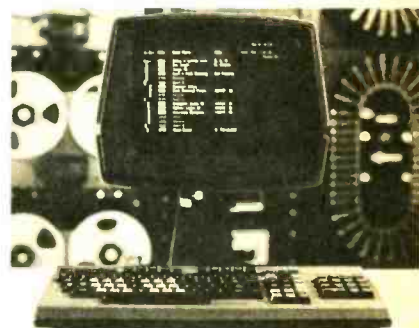


contain a lint-free clean-wick. The kit also includes cleaning solvent, replacement wicks and a wick cutter.

Circle (94) on Reply Card

Program automation system

The **Harris 9000** series, model H-9003, program automation system features its Multi-File program memory. The H-9003 provides separate files for each schedule, specifies names of music selections, and



stores song running times and chart positions. Up to three lines of copy may be used for live insertions. The unit also features a countdown timer and dual-intensity video. Dual-drive flexible-disc storage is used for user and system operating programs.

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TOWER SERVICE: Erection, Sales, Service, Painting, Inspections, Maintenance contracts. Pioneer Tower Service, P.O. Box 253, Carrollton, Missouri 64633. (816) 542-0840. 8-78-tf

SECRET T.V. CHANNELS IN YOUR HOME without set modification. Latest Movies, Sports, Night Club Acts, Religion, its all in your neighborhood, but kept secret from most people. Complete detailed plans on how you can start receiving these SECRET ch. for \$100.00 or less. Send \$25.00 cash, check, or money order, or \$4.50 for more information. To TELE-TEC, Dept. SATT, 8688 Royal Drive, Noblesville, IN 46060. 12-75-1t

LOUISIANA TOWER SERVICE, INC., serving the industry with exacting & guaranteed workmanship, reasonable pricing, & dependability. All maintenance operations. TV, AM, FM, microwave, inspections, erection, maintenance contracts. LOUISIANA TOWER SERVICE, INC., 1730 St. Ferdinand St., New Orleans, La. 70117. (804) 947-1499. 12-75-1t

EQUIPMENT FOR SALE

USED TAPE CARTRIDGES, \$35.00 PER HUNDRED. Freight Paid. Check with order. Also used cartridge parts. CART MART, BOX 3066, FORT WORTH, TEXAS 76105. (817) 536-6437. 12-79-3t

RCA VTY MODIFICATIONS KITS for TR4/22/50/60/61/70. Splicer (single-frame), TEP Interface, Time Code Edit Interface Kit, Audio Splice Timing Mod (Audio Insert Editor), Wideband Audio Amplifiers, most mod kits, some modules available. LAWHED, LTD., 388 Reed Road, Broomall, Pa. 19008. (215) 543-7600. 4-78-tf

ANDREW LINE & CONNECTORS READY FOR EMERGENCY SHIPMENT ANYWHERE BY AIR. Broadcast Consultants Corp., (703) 777-8660, Box 590, Leesburg, VA 22075. 10-79-tfn

SONY BVU-50 VTR's (New). Convergence ECS-1B Editing System with TT-6, PC-3, 3-VO-2860, 2-9 B&W Monitors and Cases. Mr. Schlansky, (212) 594-8700. 12-79-tfn

TELESTRATOR (instant animated graphics) Model 450 with a 12 symbol generator and key option. Perfect condition. Catholic Television Network of Chicago. 312-332-3860, Dick Petrash, Production Manager. 12-79-11

EQUIPMENT FOR SALE: G.E. transmitter with attendant equipment Model TT 59 on Channel 17. 50 KW very good condition. Available immediately. Bargain if you move. Reasonable if I move. For details contact: E.B. Wright, 1018 West Peachtree St., Atlanta, Georgia 30309. 404-875-7317. 12-79-2t

SAVE .. SAVE .. SAVE .. SAVE .. SALE .. SALE .. SALE .. SALE! WE HAVE A SALE ON DA's. 3602-4 VIDEO or AUDIO, each unit has 4 inputs and 24 outputs. 2.75" X 19" rack mount. FULL BROADCAST SPECS. Send CK. or PO# VIDEO 3602-VDA-4. AUDIO 3602-ADA-4. \$395.00 each. Free catalog on request. TELE-TEC, 8688 ROYAL DRIVE, NOBLESVILLE, INDIANA 46060. 9-79-6t

EQUIPMENT FOR SALE: 2 TV PRODUCTION TRUCKS—40' 3 Ampex BCC-1 Plumbicon cameras. RCA TR600 2". American Dta 558-3 Switcher (quad split, rotary, soft wipes). 20 channel audio board. \$350,000.00. 24": 2 Ikegami cameras, RCA TR61 2". 12 channel audio. 3/4 2800 Sony w/microtime TBC, built-in generator. \$140,000.00. (213) 397-5922 (Morn.-Eve.). 12-79-11

2" - 3" - 4" COPPER STRAP #10 wire. BCA, (404) 487-9559. 9-79-tfn

GE PE-400 COLOR CAMERAS—Pedestals, Scopes, Racks, Like New. ea. \$14,000

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GE PE-240 FILM CAMERA—Automatic Gain & Blanking. \$8,000

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RCA TK-27A FILM CAMERA—Good Condition, TP 15 Available. \$12,000

RCA TP-66 PROJECTORS—Optical & Magnetic Sound. ea. \$10,000

RCA TP-6 PROJECTORS—"Oldie But Goodie". ea. \$1,500

COLLINS MW408D MICROWAVES—7GHZ, Audio Channel, 2 Available. ea. \$4,500

RCA TR-50 VTR's = CAVE and DOC. 1 with editor. ea. \$22,500

RCA TR-4 VTR's—Hi-Band, New Heads. ea. \$16,000

AMPEX VPR 7800 VTR's—1" Format, 5 available. ea. \$1,000

AMPEX 1200A VTR's—Loaded with Options. ea. \$24,000

RCA TT-10AL VHF TELEVISION TRANSMITTER—Low Band, Spares. \$8,000

We will buy your used TV equipment. To buy or sell, call Toll Free 800-241-7878, Bill Kitchen, Quality Media Corporation, In GA call 404-324-1271. 9-79-tfn

IKEGAMI HL-77A w/9-118mm Canon Auto-Zoom, Genlock, AC power supply, cable & case. M. Schlansky, (212) 594-8700. 12-79-tfn

VIDEO EQUIPMENT: Conrac 5522 12" Rack Mount Color Monitor; 3M 1114 SEG with Chroma Key, like new; 418-439-7614, ask for Bob or Ted. 11-79-2t

EQUIPMENT FOR SALE (CONT.)

BROADCAST CRYSTALS for AM, FM or TV transmitters, frequency change, repair or replacement of oven types. Also vacuum types for RCA, Gates, Collins, etc. transmitters. Quality products, reasonable prices and better delivery! Don't be without a spare crystal. Frequency change and service for AM and FM monitors. Over 30 years in the business. Eidson Electronic Co., Box 96, Temple, Texas 76501. Phone (817) 773-3901. 12-74-tf

COMPLETE MOBILE PRODUCTION VAN: 2 cameras (Hitachi SK-70), JVC CR8500 3/4" recorders, RM85 editor, 3M 1114 switcher, TBC, character generator, 8 ch. audio board, full tech. monitoring, 6.5kw built-in generator, plus much more in like new cond. Call (205) 933-8893, 1228 21st Pl. So., Birmingham, AL 35205. 12-79-11

TWO EFP VANS fully equipped for every need. Your choice 3/4" Editing or quad tape capability. Contact Dave, 209-957-1761. 12-79-3t

TWO TELEMET 7945 Vertical Interval Switchers \$4800.00 each. One DYNALR 5100 Series. (40X10) Routing Switchers \$2400.00. Two DYNALR 15X10C Routing Switchers \$1200.00 each. Four Grass Valley Image Enhancers \$400.00 each. Two Collins 732-A 1kw fm transmitters \$2600.00 each. All Guaranteed. Capital Broadcast Exchange, 209-957-1761. 12-79-3t

O.K., who put the used prices on the new equipment?

It's no mistake. Here's your chance to buy brand-new 3M video gear at prices you may never see again. And each of these surplus pieces comes with full manufacturer's warranty.

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PRE-1960 BROADCAST audio & recording equipment, catalogs, 16" transcriptions, Robert Van Dyke, Squires Ave., East Quogue, NY 11942. 11-79-4t

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

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

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

WANTED—USED WIRELESS LAVALIER MICROPHONE in good working condition for use in project to record church services for shut-ins. Gregory Shorb, 1326 East Walnut Street, Hanover, PA 17331. 12-79-11

SITUATION WANTED

FIRST CLASS MAINTENANCE ENGINEER: Heavy AM-FM, transmitter and studio, good TV transmitter, microwave, and associated test equipment, VTR's, cassettes, digital and solid state. Mature family man. Southern states only and prefer smaller city. Write Dept. 481, Broadcast Engineering, P.O. Box 12901, Overland Park, KS 66212. 11-79-2t

NOTICE TO BIDDER

NOTICE TO BIDDERS: Sealed bids will be received by the City of Columbia, Missouri, at the Office of the Purchasing Agent, until 2:00 P.M., December 19, 1979, for furnishing the City of Columbia, Consulting Services for a Technical Evaluation of the Columbia Cable Television System. Bid blanks and specifications may be secured in the Purchasing Office, First Floor, Daniel Boone Bldg., 701 East Broadway, Columbia, Missouri 65201. 12-79-11

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CHIEF ENGINEER FOR TELEVISION SERVICES—INDIANA STATE UNIVERSITY. This position requires the supervision of three full-time engineers and four or five part-time student engineers. It includes tube-to-digital electronics, making trouble-shooting experience essential. Television Services facilities include a color studio, a black and white studio, a 11,700 watt radio station, a campus cable system, three electronic field production color cameras, two EFP editing carts, and a considerable number of black and white portable cameras and VTRs. Exceptional fringe benefits package with a salary commensurate with experience and qualifications. Direct letters of application, three letters of recommendation and a resume to: Dr. Arvin Workman, Indiana State University, Terre Haute, Indiana 47809, by January 15, 1980. Indiana State University is an Equal Opportunity Employer. 12-79-11

FIELD ENGINEER: Unique opportunity for an individual seeking new career with a rapidly growing and competitive manufacturer of broadcasting videotape editing equipment. Individuals with experience in U-matic and one-inch VTRs preferable; knowledge of state-of-the-art microprocessor systems also helpful. A.A. degree or equivalent required. Excellent salary and benefits for qualified engineer. Send resume in confidence to: Doug Tao, Manager Field Engineering, Convergence Corporation, 1641 McGaw, Irvine, California 92714. Phone (714) 549-3146. 12-79-2t

TECHNICIANS: Washington-based PBS station is seeking technicians with experience in videotape editing or maintenance and 1st class FCC license. Salary commensurate with experience. Send resume to: O&E Dept., WETA-TV, Box 2626, Washington, DC 20013. 12-79-11

EXPERIENCED TV ENGINEER needed for NBC Affiliate in sunny south. Must have thorough knowledge of all aspects of engineering maintenance and operation. Send resume to WESH-TV, P.O. Box 1551, Daytona Beach, FL 32015. 12-79-11

HELP WANTED (CONT.)

MAINTENANCE ENGINEER: Immediate opening in AM, FM, and TV station. RCA film, tape, and transmitter experience required. ENG experience helpful. First class FCC license required. Salary open. E.O.E. Contact James Martin, C.E. Thomas Broadcasting Co., P.O. Box 251, Oak Hill, WV 25901. Phone (304) 469-3361. 12-79-11

TV CHIEF ENGINEER for Northwest VHF commercial station. 150+ market. Must be strong maintenance engineer with transmitter, VTR and studio equipment experience. Small staff requires personal attention to maintenance. Equal opportunity employer. Send Resume and salary requirements to Dept. 482, Broadcast Engineering, P.O. Box 12901, Overland Park, KS 66212. 12-79-21

TELEVISION MAINTENANCE ENGINEER: 100 plus market, located in the Black Hills of South Dakota. Transmitters, microwave and studio. You will work on equipment and supervise two other people. Send resume to: KEVN-TV, P.O. Box 677, Rapid City, S.D. 57709. Attn.: Chief Engineer. 12-79-11

PRODUCTION TECHNICAL DIRECTOR WANTED—WWBT Jefferson Pilot Broadcasting, Richmond, Virginia. Must have experience in studio production operations. Leadership abilities and experience using Vital and/or Grass Valley video switchers required. Call or write, Bill James (804) 233-5461, P.O. Box 12, Richmond, Virginia 23201. 12-79-11

MAINTENANCE ENGINEER: Experienced Operator/Maintenance Engineer for 1", RCA RE600 tape machines, Grass Valley Switcher, computer editor, studio and portable cameras, digital equipment. Excellent salary and benefits. Please send resume to North American Video Tape, Inc., 423 East 90 Street, New York, New York 10028. 12-79-11

ENGINEERING MANAGER: Wanted for production oriented PBS affiliate. Previous TV production and supervisory experience and 1st class license required. Thorough knowledge of audio/video production techniques. Salary commensurate with experience. Send resume to: O&E Dept., WETA-TV, Box 2626, Washington, DC 20013. 12-79-11

DESIGN ENGINEER: A leading manufacturer of broadcast and industrial systems seeking qualified engineer with professional broadcast experience and preferred working knowledge of Digital Circuitry. All replies to: 1708 Belvedere Blvd., Silver Spring, Md. 20902. 12-79-11

NOW: Midwest broadcast group needs 2 Chief Engineers. Substantial experience required. Two excellent markets and fringe benefits. Apply by mail only. Send resume with at least three references to: Philip T. Kelly, Communications Properties, Inc., 1170 Iowa, Dubuque, Iowa 52001. An Equal Opportunity and Affirmative Action Employer. 11-79-21

TELEVISION CHIEF ENGINEER for growing station in 195th market. Management experience necessary. All fringe benefits, station located in beautiful southern Idaho. An Equal Opportunity Employer. Reply to Dept. 484, Broadcast Engineering, P.O. Box 12901, Overland Park, KS 66212. 12-79-11

TELEVISION MAINTENANCE ENGINEER: ABC Network Affiliate needs an engineer with strong background in all areas of commercial TV Engineering. TCR 100 cartridge tape equipment, ENG experience and First Phone required. Salary commensurate with experience/excellent benefits. E.O.E. Contact Lewis Gordon, WTVU, Inc., Chattanooga, TN 615-756-5500. 11-79-21

TV BROADCAST TECHNICIANS. Established public television station moving to new color facility. West Virginia University and WWVU-TV has vacancies for technicians experienced in master control and studio maintenance and operations, or all phases of transmitter and/or microwave transmission systems. Send resume of qualifications and salary history to: Jack Podesszwa, Personnel Officer, West Virginia University, Morgantown, WV 26506. An Equal Opportunity/Affirmative Action Employer, M/F. 11-79-21

HELP WANTED (CONT.)

STUDIO MAINTENANCE SUPERVISOR—for one of the finest production facilities in the Chicago area. Familiarity with station engineering operation, strong in equipment maintenance. Salary commensurate with experience. Jerry Wehland, Director of Engineering, Catholic Television Network of Chicago. 213-332-3860. 12-79-11

BROADCAST ENGINEER III—The University of Missouri-Columbia, School of Journalism has an opening for a Broadcast Engineer III. Chosen applicant must be willing to work in a university environment involving a lot of student contact. Additional qualifications include an Associate's degree including course work in electronics, radio and television. Four to five years experience in the operation and maintenance of a television and/or radio facility. First class radiotelephone license. Competitive salary and good benefits. For more information send resume and/or contact: PERSONNEL SERVICES, UNIVERSITY OF MISSOURI-COLUMBIA, 309 Hitt Street, Columbia, Missouri 65211. 314-882-4221. AN AFFIRMATIVE ACTION/EQUAL OPPORTUNITY EMPLOYER. 12-79-11

TV MAINTENANCE ENGINEER—3 years experience in maintenance of portable color camera, BVU 34" cassette recorders, TV receivers, studio and remote equipment required. Associate degree or equal. FCC license and digital background preferred. Starting date: January 1980. Salary commensurate with experience. \$12,250-16,000 subject to budgetary approval. Excellent fringe benefits, including 21-days earned vacation. EOE: Send resume to: Mr. Edward Wright, Learning Resources Center, State University College, Oswego, New York 13126. 12-79-11

CHIEF ENGINEER—for University telecommunications center. To manage technical operations of TV, FM and CCTV facility, including a major facilities upgrade project. Requires BS in related field. FCC first, two to five years' experience in engineering management, and demonstrated leadership ability. Salary to \$25,000 depending on qualifications and experience. Send application to Dept. 483, Broadcast Engineering, P.O. Box 12901, Overland Park, KS 66212. An Affirmative Action/Equal Opportunity Employer. 12-79-21

MAINTENANCE ENGINEER: Must be 1st Class FCC licensed for full or part time evangelical christian television productions. Knowledge of microwave. Send unbroken resume with references and copy of license. All correspondence held in confidence. B. Treitler, TYJ Telemedia, 5395 'B' Industrial Dr., Huntington Beach, CA 92649. 12-79-21

ASSISTANT DESIGN ENGINEER: Immediate opening. Secure employment opportunity with good benefits. Develop programs for special systems control: two years experience needed with knowledge of BASIC, Fortran, and Assembly languages. Degree in Computer Science. Computer Programming, or Electrical Engineering highly desirable. FCC 1st phone license helpful. Salary \$15,500 to \$16,500. Send resume to: James Potter, Indiana Higher Education Telecommunications System, 1100 West Michigan, Indianapolis, Indiana 46223. EE/AA employer. 12-79-11

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

STUDIO MAINTENANCE SUPERVISOR: for one of the finest production facilities in the Chicago area. Familiarity with station engineering operation, strong in equipment maintenance. Salary commensurate with experience. Director of Engineering, Catholic Television Network of Chicago, 213-332-3860. 12-79-11

TV ENGINEER: supervise installation and maintenance of sophisticated production/CCTV and ITFS distribution system. Experience and first class license required. Salary \$18,000-\$21,500 plus University benefits. Send resume to: Mr. Antol Herskovitz, Director Media Services, SUNY at Stony Brook, Long Island, N.Y. 11794. EEO/AA Employer. 12-79-11

HELP WANTED (CONT.)

TM PRODUCTIONS SEEKS ADDITIONAL MAINTENANCE ENGINEER, extremely capable, familiar with multi-track gear. Send resume to Ken Justiss, VP/Operations, TM Productions, 1349 Regal Row, Dallas, TX 75247. No calls. 11-79-21

CHIEF ENGINEER, new public FM. Experience in studio, FM transmitter, STL maintenance and production, will train and supervise employees and volunteers. FCC 1st-Class license, flexible education and experience. Salary \$15,000-\$18,000. Resume and three letters of reference. Contact Lamar Marchese, KNPR-FM, Box 43177, Las Vegas, Nevada 89104, (702) 739-6256. 12-79-11

VIDEO TAPE MAINTENANCE ENGINEER: Large, medically-oriented corporation based in Nashville, Tennessee, needs highly qualified videotape maintenance engineer for color teleproduction facility. Requirements include five to eight years broadcast television experience. FCC first class license, experience with VTR's, color cameras, video terminal equipment, audio equipment, and digital control circuitry. Production experience is a plus. Salary in high teens. Please submit resume to: Hospital Corporation of America, H.R.D., One Park Plaza, Nashville, TN 37203. 12-79-11

CHIEF ENGINEER FOR WCCF/WOLM, Punta Gorda, Florida. Must be capable technician in AM/FM and automation. Good references required. Immediate opening. Permanent. Call (813) 639-1188. 11-79-21

TELEVISION MAINTENANCE/REMOTE ENGINEER: Expanding Commercial production company needs a unique person to maintain and operate their Quad and 1" remote production units. Equipment includes RCA TR-600, TKP-45, TH-50 and CEI-310. Component-level repair and maintenance abilities with analog and digital systems is a must. Film-style commercial production experience is desirable. Some on-house maintenance as well. Negotiable salary, company-paid insurance program, profit-sharing and Florida living. Call or send resume with salary history to Tony Kennedy, Ted Johnson Productions, 150 Riverside Avenue, Jacksonville, Florida 32202. (904) 354-7000. 12-79-21

CHIEF ENGINEER for South Florida group owned TV station. Must be a hands-on man knowledgeable in RCA equipment and SONG ENG. Resume to Box Dept. 468, Broadcast Engineering, P.O. Box 12901, Overland Park, KS 66212. 8-79-41n

CHIEF ENGINEER: New UHF network affiliated station needs Chief Engineer with minimum of 5-10 years broadcast experience. Send resume to Dave Peschau, Vice President/General Manager, WXOW-TV, P.O. Box 128, La Crosse, WI 54601. 12-79-11

SUPERVISOR BROADCAST TV ENGINEER

Chautauqua BOCES has an immediate opening for a Broadcast TV Engineer to maintain television translation system, microwave, 2", 1", 3/4" videotape recorders, R. F. Distribution Systems, color cameras. Successful applicant should have an Associates' Degree in Electronics, four to five years' experience in TV engineering and a first class radio-telephone license. Excellent salary and benefits. Send resume to:

KENNETH M. WASMUND
CHAUTAUQUA COUNTY BOCES
9520 Fredonia Stockton Road
Fredonia, New York 14063

HELP WANTED (CONT.)

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Unlimited Growth Opportunity... with Broadcast Division of major company for ambitious Number Two qualified to be Number One. Positions offer complete sales and marketing responsibility for AM/FM transmission and audio equipment. Excellent salary and bonus plan; full benefits.

If you have broad sales engineering experience in Radio Broadcast, and are ready to assume a top managerial position, send detailed resume, including salary history, to Dept. 485, Broadcast Engineering, P.O. Box 12901, Overland Park, Ks 66212. Complete confidentiality assured.
12-79-11

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Phone: (913) 888-4664

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Phone: 2968-6226

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These positions are located in Bethesda, Maryland, and offer competitive starting salaries, relocation assistance, and a comprehensive fringe benefits program.

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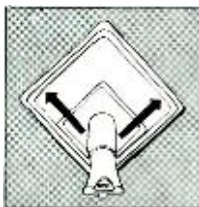
The SC39 Solution: The Shure-designed shank structure and bearing assembly gives trackability up to and beyond the theoretical cutting velocities of today's recordings. Frequency response is essentially flat across the audio spectrum, optimized for professional applications

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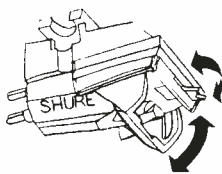
SIDE-GUARD Stylus Deflector

A unique lateral deflection assembly prevents the most common stylus damage by withdrawing the entire stylus shank and tip safely into the stylus housing before it can be bent



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The exclusive lever-operated locking stylus guard gives the stylus tip positive protection when not in use. With the flip of a lever, it snaps out of the way and positions a highly visible cueing aid



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

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