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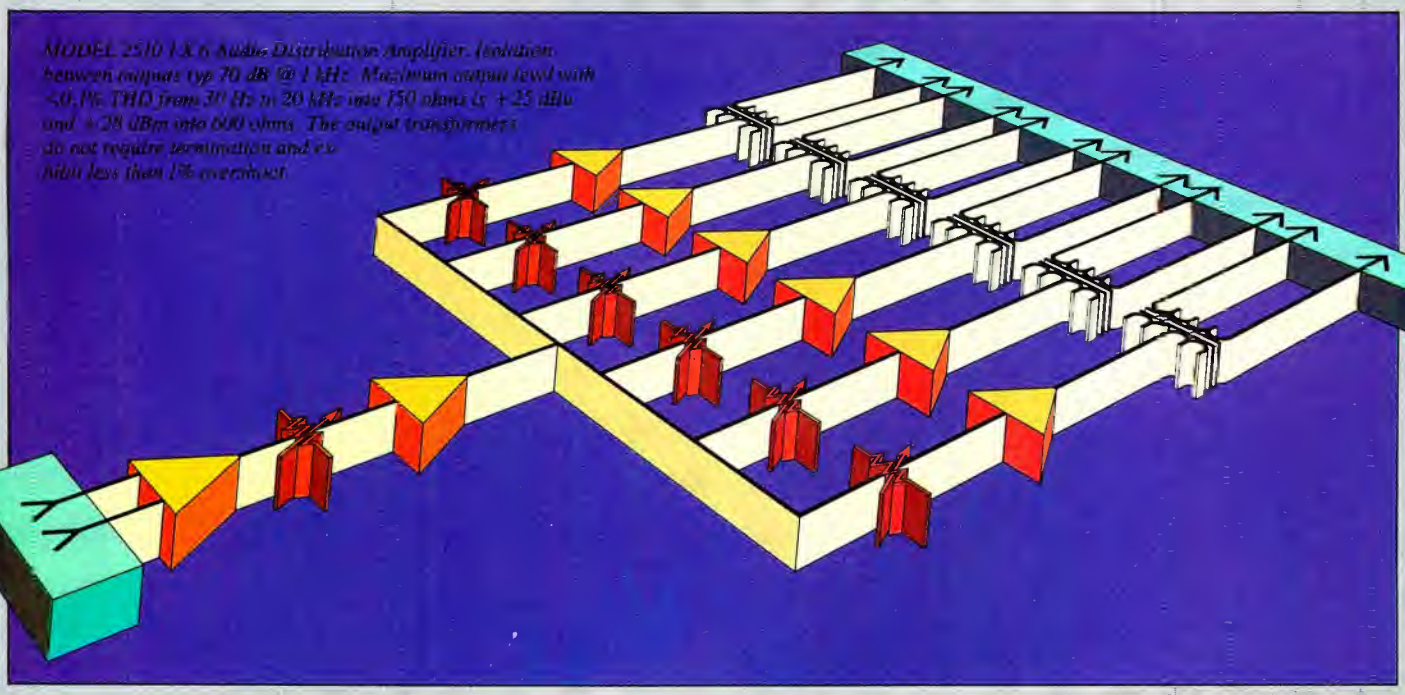

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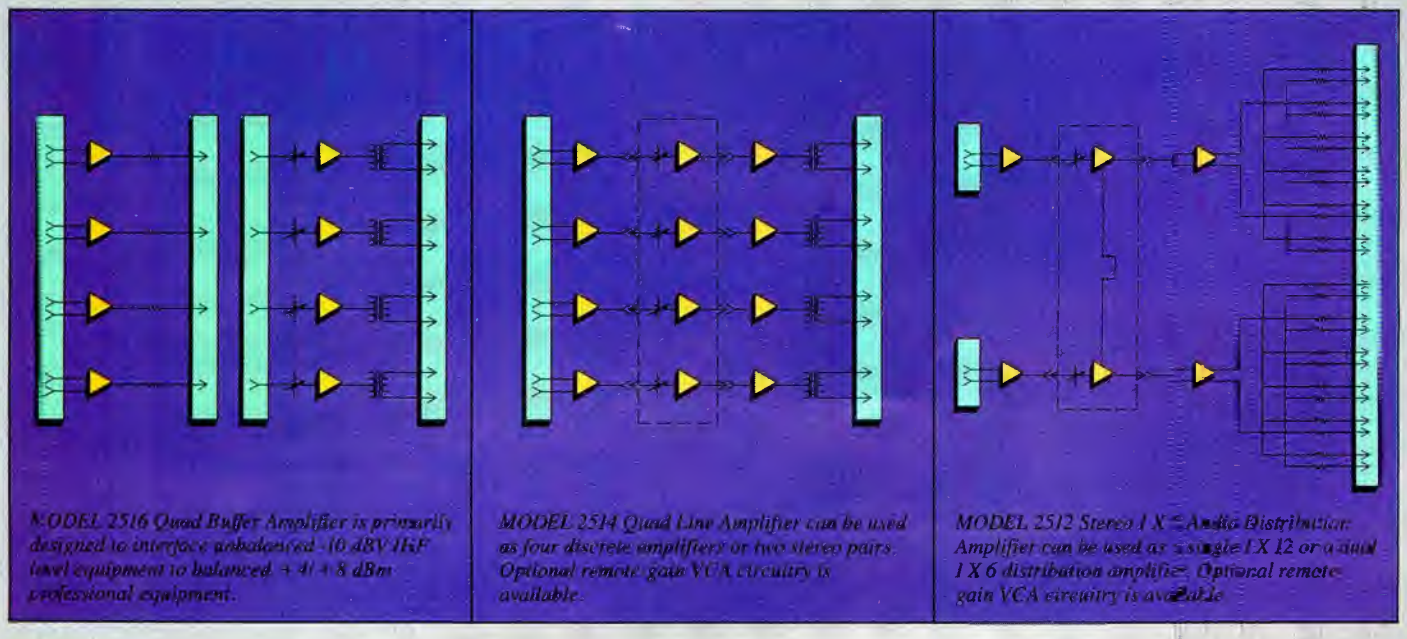

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BROADCAST engineering

The journal of broadcast technology

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THE COVER this month commemorates **BE's** 25 years of continuous coverage of advancing technologies in broadcasting. We are proud of having provided this industry leadership, and we are even more proud of the many friendships we have developed over the years. This issue is dedicated to our readers, a salute to the industry's growth during the past quarter-century.

Coming events

May 30-June 2
American Women in Radio and Television 33rd Annual Convention, Chicago, IL

June 3-6
National Cable Television Association (NCTA) Annual Convention, Las Vegas, NV

June 10-15
Broadcasters Promotion Association (BPA) 27th Annual Seminar and Broadcast Association, Las Vegas, NV

June 24-27
CCBA Convention

Aug. 26-29
NAB Radio Programming Conference, Atlanta, GA

September/October
LPTV East

Sept. 6-8
Southern Cable TV Association, Atlanta, GA

Sept. 16-19
NRBA Annual Convention, Los Angeles, CA

NEXT MONTH:

- New equipment trends: NAB-'84
- Broadcast transmitter maintenance
- Buying the ultimate editor
- Video editing systems update

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Responses given to legislation

Reacting to changes in federal broadcasting legislation announced by communications minister Francis Fox, Canada's private broadcasters welcomed a broader definition of "broadcasting," which they say brings new technologies like satellite-fed master antenna TV systems (MATV) under the same basic rules as broadcasting and cable.

Donald Brinton, CAB chairman, and president of CanWest Broadcasting Ltd., Winnipeg, said the CAB has pressed for this long-needed amendment to ensure that all segments of the Canadian broadcasting system will be regulated on an equitable basis.

Responding to other elements of Bill C-20, Brinton said the CAB favors the CRTC having a wider power to exempt certain classes of broadcasting undertakings from licensing, provided that such exemptions are discussed first at a public hearing.

Brinton also said it is reasonable for the government to have the power to issue broad policy directives to the CRTC, because this will ensure that elected representatives will be responsible for initiating major changes in the industry. He said, however, that stronger safeguards are needed, particularly regarding directives concerning specific licensing decisions of the commission.

CAB members have expressed disappointment that the revised broadcasting legislation has not provided for longer broadcasting license terms to replace the current 5-year terms. "Not only would the security of a longer license period be more attractive to private investors," Brinton said, "but also the CRTC's administrative workload would be reduced significantly."

NRBA
National Radio Broadcasters' Association
2033 M St., NW, Suite 506
Washington, DC 20036
202-466-2030

AM SCA supported

In a formal filing of comments with the FCC, NRBA has urged expanding the permitted use of the AM carrier signal to any broadcast and non-broadcast purpose. Although NRBA acknowledges that there may be technical reasons why the AM SCA does not perform in the same manner as FM and television, it said in its comments that by removing the restrictions currently imposed upon the use of AM carrier signals, the commission would at least be giving AM stations the opportunity to compete with FM and TV facilities for the services that can be provided by AM subcarrier operations. 25

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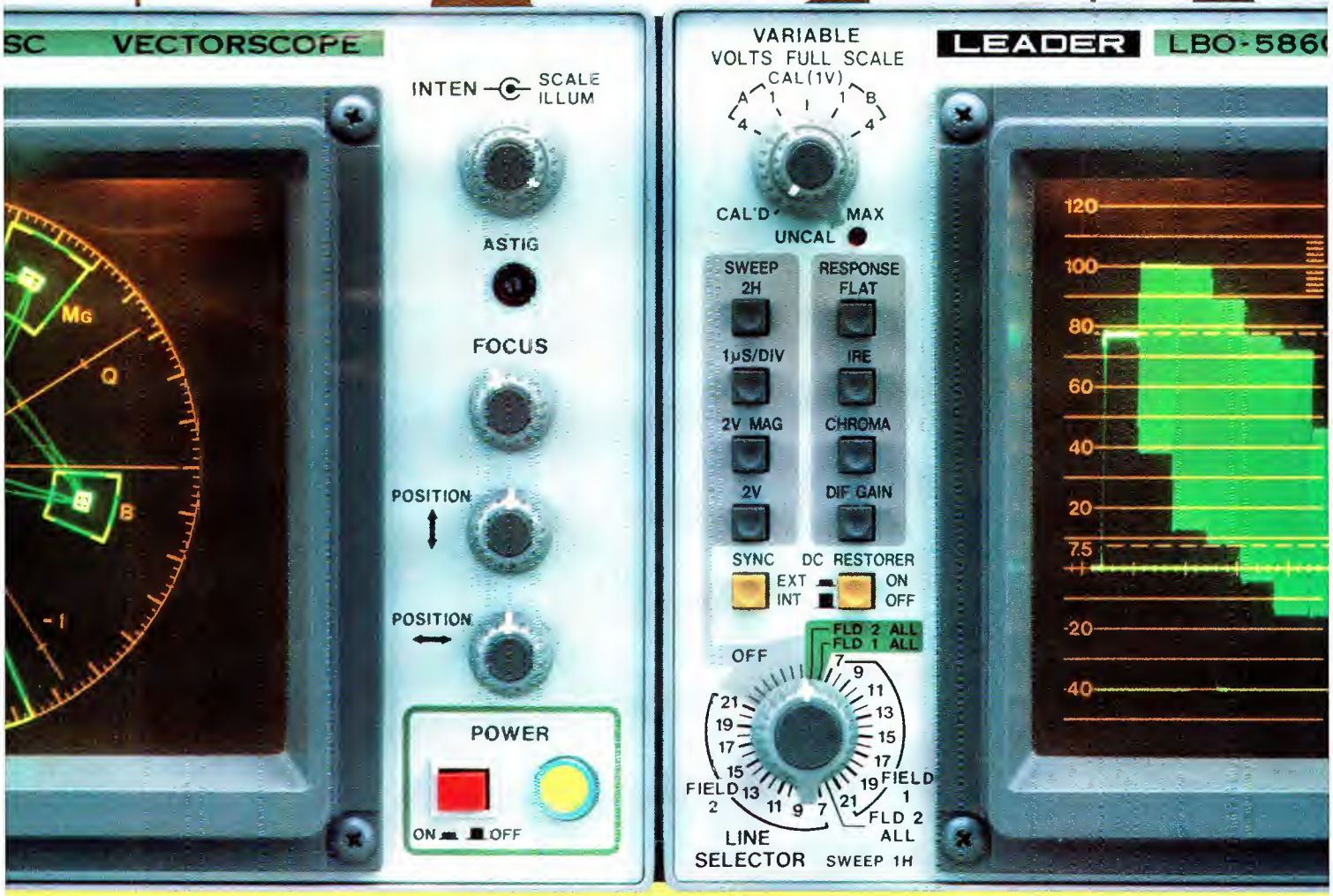

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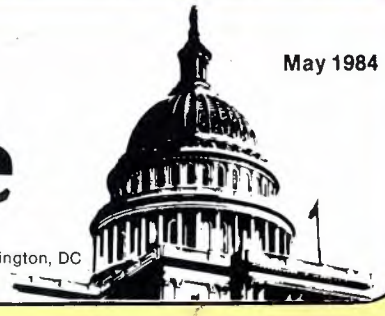
FCC update

May 1984

Harry C. Martin, partner, Reddy, Begley & Martin, Washington, DC



New FM assignments proposed

In May 1983, the commission adopted rules establishing new separation requirements for FM stations (Docket 80-90). The rules permit the assignment of Class A allocations on the 60 Class B and Class C channels, and increase the number of station classes from three to six.

In an *omnibus* rulemaking notice issued in mid-March, the FCC proposed FM assignments to 684 specific locations to implement its Docket 80-90 ruling. The proposed locations are ones where the commission believes service is needed and where allocations are feasible under the new separation standards.

Parties interested in communities not on the list may submit counterproposals during a 60-day comment period ending May 14, 1984. A counterproposal must demonstrate a conflict with one or more proposals on the FCC's list, comply with all other current allotments and include a statement of interest in applying for the channel. Also, the counterproposal must indicate the category of need (in other words, first local service, first full-time local service, minority service or public radio service).

Applications for the new assignments will not be accepted until completion of the rulemaking in late 1984 or early 1985. The commission announced that applications for newly assigned frequencies will be accepted on a staggered basis to avoid a mass filing, and has requested comments on how such a procedure should be implemented. Alternatives include accepting applications by geographic region, alphabetical listings, community size or channel number. Comments also have been requested on giving daytimers preferences for the new assignments, or at least removing the diversity demerit they normally would suffer should they apply for FM facilities in their own communities. Comments on these issues are due May 14, 1984.

Also, the commission has advised all Class B and Class C stations that they must file applications by March 1, 1987, proposing facilities that meet or exceed minimum requirements for their classes or be downgraded to lower classes with less separation protection. The commission has amended its FM allocation rules by establishing a 3-year, 10-mile protective buffer zone around existing Class C stations currently operating with antenna heights of less than 300 meters (984 feet) above average terrain. The buffer zone will be provided only during the 3-year period ending March 1, 1987, and will enable affected Class C stations to have a sufficient area within which to relocate, if necessary, to upgrade facilities and avoid downgrading to a lower class.

Station totals released

The commission has announced the following totals for broadcast stations licensed as of Feb. 29, 1984:

AM radio	4740
FM radio	3551
FM educational radio	1140
UHF commercial TV	340
VHF commercial TV	535
UHF educational TV	173
VHF educational TV	111
UHF low power	71
VHF low power	192
Total radio	9431
Total TV	1422

Class IV power increase approved

On March 15, 1984, the FCC amended its rules to permit an increase in the maximum nighttime power of Class IV stations from 250W to 1000W in most cases.

To implement the change, the commission will use an Order to Show Cause procedure requiring the majority of stations that operate nondirectionally with a power of 1kW daytime to show cause why their licenses should not be modified to specify nighttime operation with 1kW. Unless a station objects, its license will automatically be so modified. Stations opposing the modification will continue to operate with their present powers and the Show Cause Order will be dismissed on the commission's own motion.

For stations operating with less than 1kW daytime or operating directionally, the normal 2-step application procedure will be followed. Applications for power increases will be considered minor changes to allow more expeditious processing.

The new rules will not be effective until necessary agreements are finalized with Canada and Mexico. In the meantime, the Show Cause Orders will be sent to affected licensees, and applications can be filed by directional and underpowered Class IVs.

Deregulation of remote control proposed

The FCC has proposed amending its rules governing remote-control operations of AM, FM and TV broadcast transmitters. The new rules would retain only those minimal requirements necessary to ensure that stations comply with certain statutory requirements, operate efficiently within the terms of their authorizations and avoid interference to other stations.

The revised rules also would delete all references to the type of control and telemetry circuitry for remote-control systems. Any type of communications circuit, including wire lines, microwave, optical fiber, laser beam, infrared light or broadcast subcarriers, could be employed under the proposed rules. Stations also would be able to incorporate their regular program STL circuits into their remote-control systems.

The proposed rule amendments include the following specific changes:

- Program or other dedicated circuits to the transmitter site can be incorporated into the remote-control system to prevent loss of service if the normal remote-control on/off circuit fails.
- The requirement that TV stations operating by remote control have devices that automatically turn off the transmitter within one hour of an uncorrected telemetry failure would be deleted. Instead, the use of remote control would have to be discontinued if a telemetry failure were not corrected within three hours.
- Remote-control functions will be required only for transmitter adjustments that must be made manually on a daily basis to maintain the transmitter operating power or modulation characteristics, unless automatic means are provided to maintain these operating parameters at the transmitter site. If automatic controls are not provided, remote-control operation would have to terminate when an operator cannot adjust the transmitter to operate within the required maximum power or modulation limitations.
- AM stations required to change their operating power or directional antenna patterns must terminate remote-control operations immediate-

Continued on page 175

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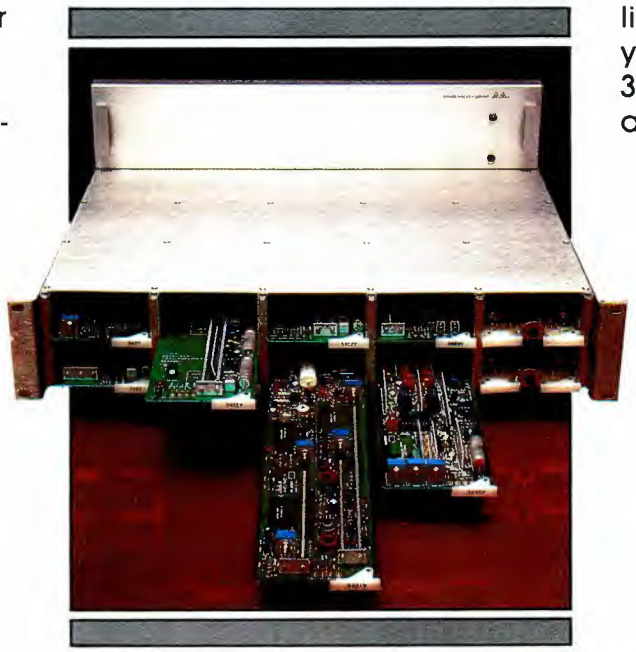

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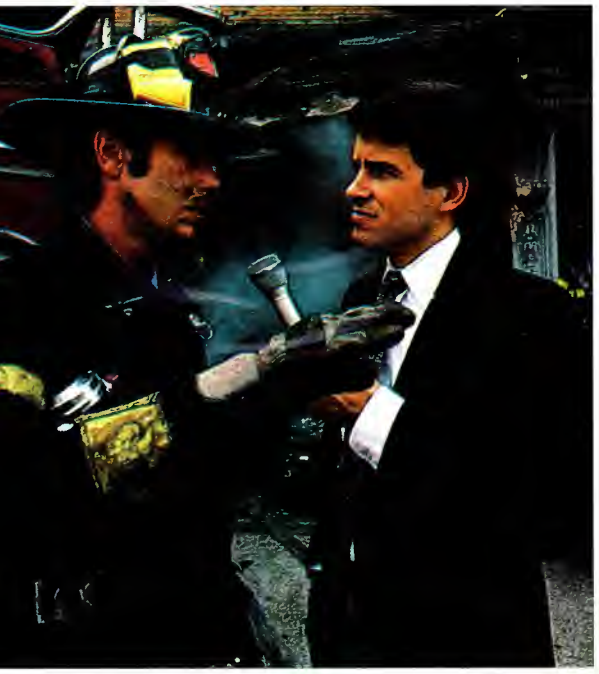

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*U.S. list price (includes camera head with tubes and viewfinder).

Satellite update

By John Kinik, satellite correspondent

Fairfax County dilemma

Fairfax County, VA, an affluent suburb of Washington, DC, will be the focus of attention over the next few years because of an interesting situation developing with regard to how its residents will receive expanded TV services. Three delivery modes will be competing in this case for the first time in the United States: cable and two direct broadcasting satellite (DBS) modes—C-Band and medium power Ku-Band.

Fairfax County has awarded a CATV construction contract with a schedule for projected completion of installation for the majority of households by 1987. The first test milestone was missed last month by such a large margin that serious questions have been raised about the probability that the project will be completed even close to schedule. This pattern is similar to the slow pace of construction of cable systems in recent years in other major urban areas, and may be a valid indicator of cable's incapability for competing in the future against satellite delivery, which does not require major construction projects.

The situation presents a unique opportunity for satellite delivery to demonstrate its capabilities to a major Eastern test market. Cable has flourished in the past eight years, primarily in the Sun Belt and Western regions of the country, where TV services were inadequate. The cable industry grew rapidly because of the availability of high quality distant signals from satellites. Construction was not a major problem, because most of the Sun Belt and Western urban areas were eager to have cable installed, and presented few impediments to the cable companies' construction practices.

Eastern urban areas can be a much more difficult arena for cable, however, because of established zoning laws concerning aesthetics, construction limitations, and access to private property. Fairfax County is a particularly tough case on all counts. Residents that have been serviced are complaining about sloppy construction work in their yards and ugly junction boxes on the streets, while the remaining residents wonder when they will receive service, based on the current pace of construction. The situation is ripe for some form of direct satellite delivery to provide the signals, at least in the interim period until cable construction is completed.

Satellite delivery options

All cable signals currently are carried on C-Band satellites, but there are indications that the major cable signals may be switched over to medium power Ku-Band satellites in approximately two years. There are compelling technical and business reasons for this change that are based on two primary facts:

- the reduction in size of receiving antennas to the 1m diameter range, making roof-top installations feasible; and
- the capability for bypassing all terrestrial delivery modes.

The first prototype medium power Ku-Band DBS contender, the United Satellite Communications Inc. (USCI) system, went on the air in November 1983, and was introduced to the Washington, DC, area in February. USCI offers five channels, including two movie channels, a sports channel and two variety channels. USCI is well-positioned to capture part of the 1.5 million TV households in the uncabled Washington area market, which includes Fairfax County.

As the first DBS service, USCI's package is expensive for individual households. Basic service involves a $300 installation fee plus a $40 monthly charge for the service. Other options include outright purchase of the receiving antenna and electronics, with a corresponding reduction in the monthly service charge. Either way, the cost of the USCI service is high enough that only the most dedicated videophiles are being attracted.

The costs associated with starting up a DBS company are enormous, even for a company similar to USCI, which is using existing satellites, rather than launching its own satellites. A large number of subscribers are required before a DBS service can break even, and the high cost of initial service works against reaching that point. USCI recently has tried to secure an additional $40 million in financing, indicating that its survival through 1984 is by no means assured.

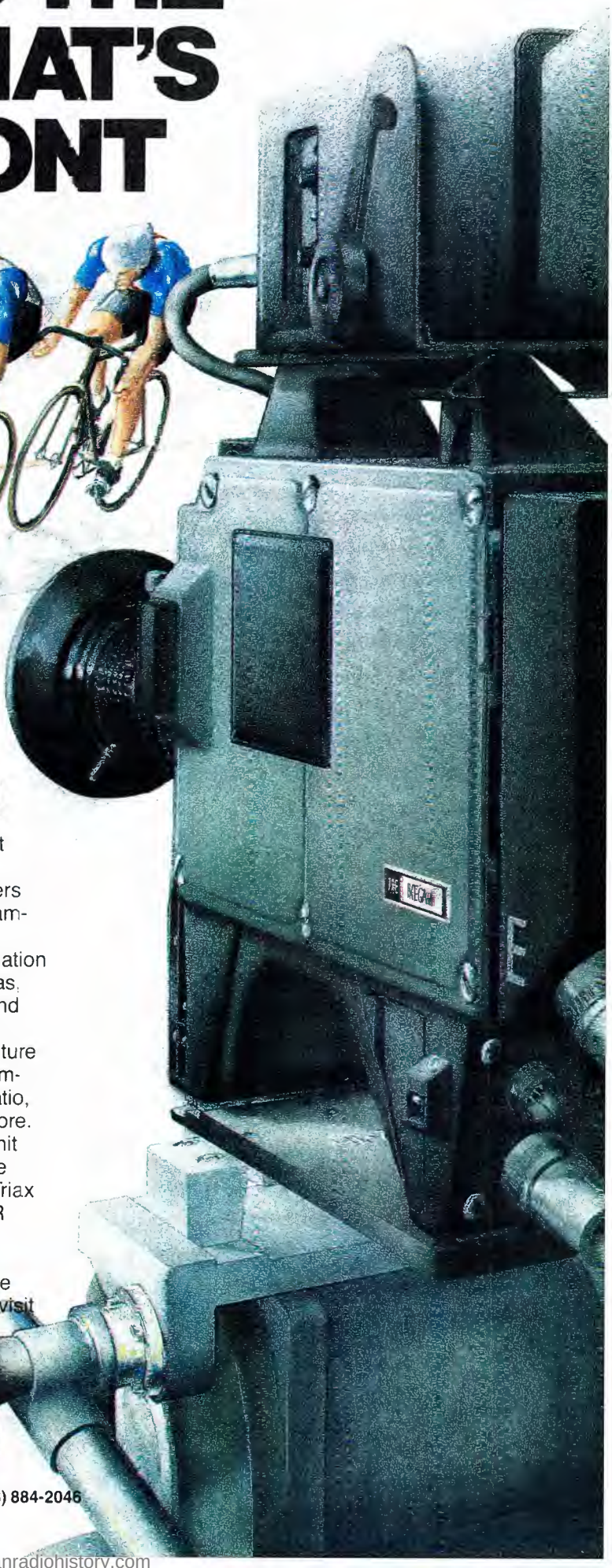
USCI is in itself an important test case for DBS, and it is being watched carefully by Home Box Office (HBO), Satellite Television Corporation, and all of the other proposed DBS system players. How well, or how poorly, USCI does in the Washington marketplace will determine much of the strategy to be followed in the future by the new DBS networks as they plan to compete with cable and the major broadcasters. Because Fairfax County is one of the most affluent suburbs in the region, with high standards for aesthetics, it may well be a pacesetter for future concepts in TV delivery to homes in major metropolitan areas that presently are not cabled, and perhaps even to areas that are cabled but must accommodate the new competitive delivery modes. In fact, the situation in Fairfax County may create the need for a type of hybrid system that uses a combination of satellite delivery and minicable systems, perhaps even down to the level of groups of several homes, to satisfy all of the requirements. These requirements are as follows:

- availability of service;
- low cost of service per household; and
- neighborhood aesthetic considerations.

One can readily visualize the possibility of well-camouflaged antenna installations feeding small groups of homes, with a complete range of channels available from all satellites, both C-Band and Ku-Band (medium power and high power). In Fairfax County an alternative to cable is needed, but the average backyard C-Band antenna (so popular in the Sun Belt

Continued on page 175

GET BEHIND THE CAMERA THAT'S OUT IN FRONT



THE IKEGAMI HL-79E

The HL-79E, Ikegami's crowning technological achievement ntinues to run ahead of all other cameras in its class.

That's why more and more top-of-the-line EFP camera buyers e getting behind the winner. Only by seeing this remarkable cam- a in action can it be fully appreciated.

Just how great is this camera? To begin with, it is the culmination all that has gone into creating the legendary 79 Series cameras, e reference standard of the broadcast industry for both ENG and FP applications.

HL-79E features – Dynamic Detail Correction, Chroma Aperture orrection, Highlight Aperture Correction and Auto Contrast Com- ession. Plus the HL-79E offers superior contrast range, S/N ratio, gistration accuracy, resolution, viewfinder performance and more.

Available accessories include the ADC-79E Auto Set-Up Unit nd the RDC-79E Remote Control – both digitally interfaced. The L-79E is compatible for use with existing HL-79A and HL-79D Triax nd Multi-core cable base stations, lenses, power supplies, VTR ables, and other accessories.

The HL-79E is part of the great and proud family of Ikegami oducts serving many satisfied users worldwide. For a complete emonstration of Ikegami Cameras and Monitors, contact us or visit our local dealer.

Ikegami HL-79E

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By Jerry Whitaker, radio editor

Researchers release marketplace study

A recently completed survey of the AM stereo marketplace showed that the Harris transmission system was the favorite choice of responding broadcasters. The survey, conducted by the New York City representative firm of McGavren Guild Radio, polled the 79 stations on the National Radio Broadcasters Association's list of AM stereo facilities (as of last fall, when the survey began) for a view of how the "marketplace decision" was being implemented.

Of the 36 stations responding to the McGavren questionnaire (45% return), half reported installation of the Harris AM stereo system. Second on the list was the Kahn Communications system, with 33%. (See Table I.)

Responding stations reported no significant changes in format when converting to AM stereo. Little change also was reported for the stations' target demographics and programming. The survey showed that 39% of the responding stations heavily promoted their change to stereo operation through on-air announcements, contests, giveaways or outside-media advertising. An average of 47% of the stations said they used AM stereo radios for giveaway promotions.

Virtually all (93%) of the stations returning the questionnaire cited the low availability of AM stereo radios in the marketplace as a problem.

Survey data was based on information gathered in late 1983, and therefore may not accurately reflect the current state of the industry. The number of AM stations that have converted to stereo operation, or that have announced plans to do so, has increased substantially in recent months.

McGavren Guild Radio is now conducting a national study on the impact of AM stereo. The first phase of the project—involving 900 persons aged 12-54 in nine markets across the country—will consist of interviews with radio listeners. In the second phase, AM stereo receivers will be placed in selected households across the country, and the subjects' listening habits will be monitored.

Table I.
AM stereo transmission system results from the McGavren Guild Radio survey.

Company	% Systems Reported Installed
Harris	50
Kahn Communications	33
Motorola	15
Magnavox	3

Sherwood announces new receiver

Sherwood Electronics has introduced a new AM stereo automobile receiver keyed to the Motorola C-QUAM transmission system. The radio features scan tuning with digital read-out, up to 10 preset tuning positions, a local/distant sensitivity switch, an MOSFET front end, separate bass and trebel controls, and audio preamplifier output ports.

A company spokesman said the decision to build a single-mode receiver was based on the performance, compatibility, availability of cost-effective decoder ICs, and the entry of General Motors and Chrysler into the market with the same (C-QUAM) system.

In addition to the AM stereo section, the new Sherwood receiver includes FM stereo and cassette systems with switch-selectable front-panel Dolby B noise reduction.

Delco radios available

Motorola has reported that Delco AM stereo radios (designed to receive Motorola's C-QUAM transmission method) can be purchased from all GM dealers and from AC-Delco sales and service centers, for installation at the dealerships or AC-Delco shops. For persons who already have GM cars (certain models apply) with 1983 or 1984 radios, dealers or service centers can participate in a Delco upgrade program that allows trade-in compensation on the standard radios.

Various models of 1982-1984 GM cars can be retrofitted with the C-QUAM Delco receiver, if desired. The radios can be purchased directly from dealers or AC-Delco shops and will fit in the automobiles.

The new Delco 2000 series AM stereo/FM stereo radio features all-electronic tuning with two bandwidths, four AM and four FM preset positions, a digital clock, extended AM band high frequency response and improved audio output stages. 25

LETTERS...WE GET LETTERS.
Our AM Stereo Customers Are Talking.

Recently, CRL sent a questionnaire to all of our AM stereo customers. They were not asked to include their call letters, and a return envelope was provided to maintain confidentiality. We asked them to comment on features that they especially liked. Here's what our customers had to say:

"Simple to use; does what it promises"

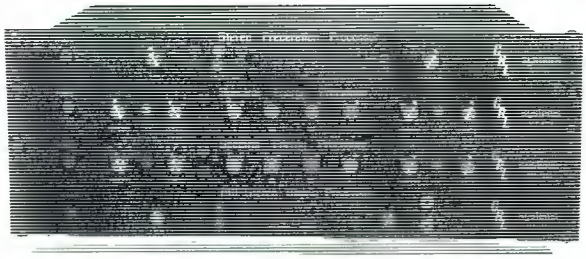
"Mono loudness control and easy stereo set-up. Wide range of settings for fine tweaking."

"Easy to set up and adjust. Doesn't need constant care."

"Like asymmetry and stereo enhance controls."

"Matrix and stereo enhance."

"Four band limiters, optional L + R, L − R output, low pass filters, stereo enhance. Hi frequency E.O."



"Especially like the sound, limiting, and stereo enhancement controls."

"Four band compression, easy set-up, limiting."

"Very low distortion and noise. Very flat response."

"like the light-handed control and unprocessed sound."

Improve your mono signal now and be ready for stereo with the CRL AM2S or AM4S. Prices start at $3700. You're invited to hear this great new unit for yourself on our **FREE** two week trial plan. Call **BOB RICHARDS** for complete information at **800-535-7648.**

DON'T JUST OPTIMIZE . . . MAXIMIZE WITH CRL AUDIO PRODUCTS.

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THE PROCESSING SPECIALISTS

Circuit Research Labs, Inc.

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*These customers have asked us not to publish their call letters because they consider CRL Processors a competitive advantage.

Circle (8) on Reply Card

According to Ed Williams, NAB staff engineer, the FCC is saying that if you put a signal at 15,734Hz, then you must put stereo information in the format that will be spelled out in an FCC OST technical document to be released soon. The remaining baseband is open for whatever other purposes broadcasters may wish. In effect the FCC has protected receivers that look for a pilot subcarrier at 15,734Hz, and that will then open up and expect to find a stereo signal in conformance with the EIA recommendations and FCC specifications.

The second audio program (SAP) channel is unspecified at this time, Williams said. It does not seem that protection has been afforded, per se. But, Williams said he believes that once receivers are in use and stations are operating with the recommended system, the SAP will become, as such, a defacto standard. Current subcarrier rules state that interference with a properly operating receiver is to be avoided. If a "properly operating receiver" means one designed to pick up a subcarrier at frequency X, then those working with other transmissions that result in an interference on frequency X would be requested to cease and desist.

The decision does not preclude the use of other stereo systems in the marketplace, as well as other TV subcarrier activities. Because the industry-involved EIA recommendation resulted from several years of intense industry studies and tests, one would expect the majority of receiver manufacturers to proceed with the Zenith/dbx plan. If predicted timetables are correct, high end receivers with stereo decoding circuitry should be available by mid- to late-summer. Adapter systems probably will be on the market in the fall. Stereo transmissions can be expected to be available when the receivers are marketed.

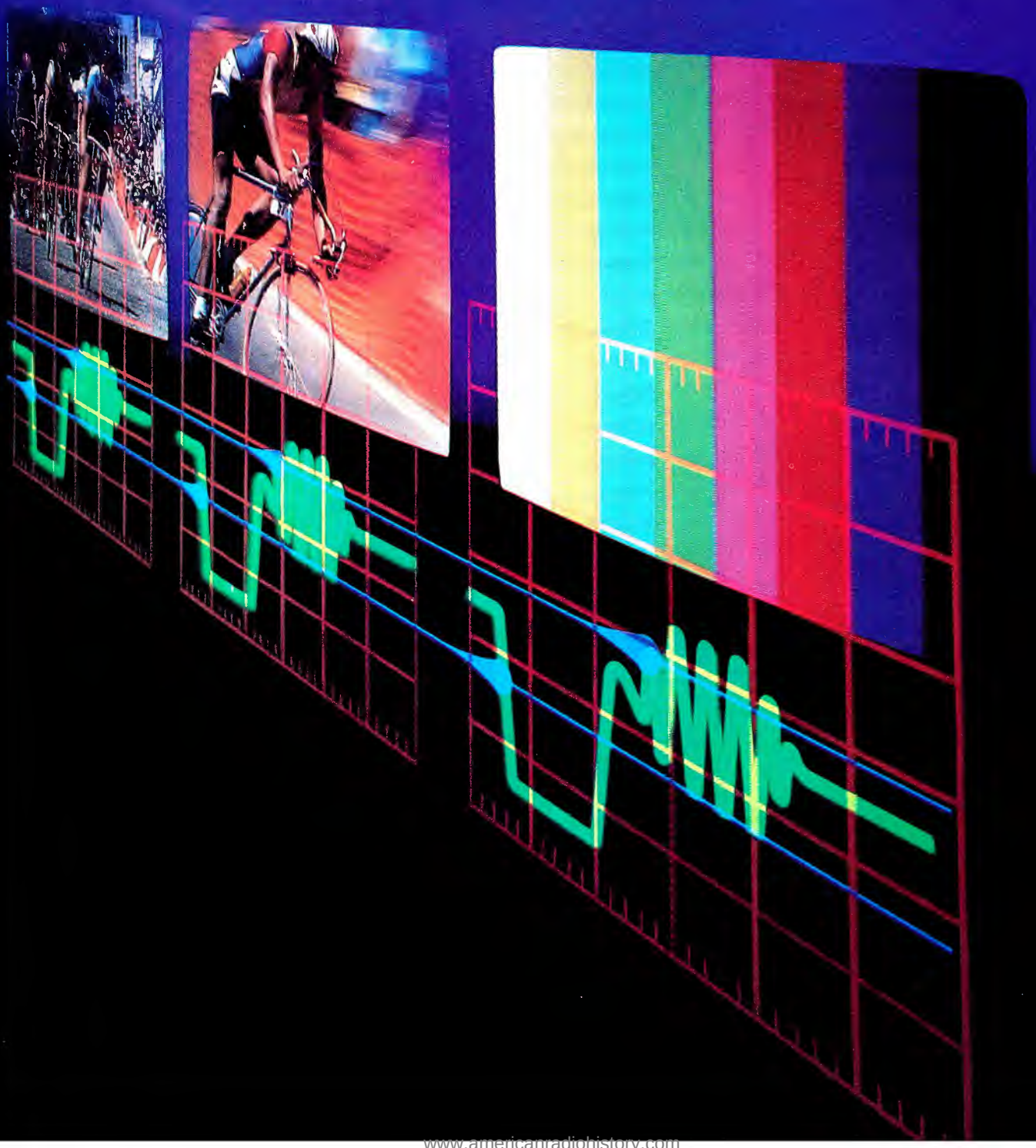
Williams said that stations considering multichannel transmissions should be aware of several items involved in the conversion to stereo. Among these, a different aural exciter will be required. Although many stations probably could benefit by replacing current exciters, they should remember that not only the second audio channel, but also a third SAP capability should be included. Speculations are that second-language broadcasts will be of interest, which most likely will use the SAP facility.

Also involved with the transmitter is the need to make sure that ICPM levels are within the required range that will be announced in the FCC documentation. In general, a good tuneup job on the transmitter is in order, if one expects the new mode of operation to be a success.

STL considerations also must be kept in mind. Stereo and SAP will require two additional microwave subcarriers. Appropriate monitoring equipment is needed, as well as the extra switching capability at master control. Production plans may require additional audio distribution equipment and cabling within the studio facility.

During the announcement session, the commission also discussed the must-carry issue. It was decided that the must-carry arguments should be remanded to a new NPRM, which has yet to be written. Must-carry is to be considered separately. 25

NO ONE WATCHES TELEVISION CLOSER THAN TEKTRONIX.



TEK TELEVISION PRODUCTS

SEE IT, SYNC IT, SAVE IT, TEST IT...GET A CLEARER

1740 Waveform/ Vector Monitor (Right) Tek's new waveform/vector monitor saves space, power consumption and cost. Both dc power and battery pack options are ava lable. It's ideal for mobile vans and field applications.

110-S Frame Synchronizer (Above) Now joined by Tek's new 118-AS Audio Synchronizer that eliminates lip sync problems! It provides a practical solution to the audio-to-video delay caused by four-field memory video synchronizers. The 118-AS features wide dynamic range, low distortion and automatic and manual delay correction.

1980 Automatic Video Measurement Set (Top center) Tek's Answer System permits continuous, unattended monitoring of all your incoming and outgoing video feeds. It generates complete reports automatically, alerts you when measurements exceed specified limits, and can be programmed to meet your changing needs.

Tek's newest product for television: — new measurement capabilities detailed on the following page. Take a look!

PICTURE OF YOUR SIGNAL WITH TEKTRONIX!

2445 Portable Oscilloscope TV System (Left) Tek's state-of-the-art 150 MHz, 4-channel portable scope now offers a TV option with backporch clamp, display and readout of any line or field. Also available: a fully-programmable GPIB option.

494/494P Spectrum Analyzer (Above) An unprecedented value! Counter frequency accuracy, baseband through microwave coverage are unique HELP mode to guide less experienced users. Store up to nine displays and ten set-ups in non-volatile memory. Portable and rugged, the 494 is backed by a three-year warranty!

Behind the sets, the programming, the glamor of television, success still depends on signal quality.

No one gives you better tools for measuring and maintaining video signal quality—quickly, consistently, confidently—than Tektronix.

For more than 30 years, Tektronix technology has stayed a step ahead to help you solve problems in color television. Whether you're broadcasting live feeds from a bike race in northern California...or sending signals via satellite to thousands of television stations around the world—our products are helping you get a clearer picture of the video signal.

Tek instruments give you broad test and measurement capabilities. They are accurate, easy to operate, and compatible with other broadcast equipment. Above all, Tektronix television products continue to meet the broadcast industry's needs. Take it from us: no one watches television closer than Tektronix.

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Circle (12) for Literature for 494
Circle (13) for Literature for 2445
Circle (14) for Literature for 1740
Circle (15) for Literature for 118-AS

THE NEW TEKTRONIX 1750: HEADS OFF PROBLEMS YOU DIDN'T KNOW YOU HAD...UNTIL IT WAS TOO LATE!

Our new 1750 signal monitor gives you a unique, dynamic display of SCH phase relationships.

You can see at a glance if a video signal is properly SCH phased... or just as easily, compare two signals for color frame matching.

Hit-or-miss SCH phasing may have been tolerated in the past—but now it's costing you time and money every day.

The Tektronix 1750 can help you regain control. By maintaining consistent SCH phase ...or by seeing potential problems *before* a glitch occurs, you'll avoid the frustration of multiple passes and enjoy getting it right the first time. Saving time saves you money and makes the best use of your valuable resources.

SCH phase, of course, isn't the only parameter you need to keep on track, and SCH display is only part of the 1750's comprehensive signal monitoring capabilities. At the push of a button it also displays vector mode... or waveform mode, enhanced by digital line selection through the vertical interval ...or R-Y/sweep mode for easy interpretation of differential phase distortions.

Whether used for monitoring video in production and editing environments, or for making fast and accurate measurements during equipment maintenance, the 1750 Series is a new benchmark for comprehensive performance in both NTSC (1750) and PAL (1751) standards.

A compact 5.25 inch package, mechanically interchangeable with many other "half-rack" packages, allows easy installation in new or existing facilities.

Correct SCH phase relationship is clearly displayed on the 1750 when dot on the calibration circle is aligned with the vector on the −x axis.

Dot placement on the +x axis indicates an error in the color frame matching of two signals.

This 17-degree offset, indicating a 17-degree SCH timing error, would be impossible to perceive on an ordinary waveform monitor display.

If you see the advantages of comprehensive signal monitoring, you'll like what you see in the 1750.

For more information on this or other Tek television products, or for the number of your nearest Tek sales office, call our toll-free information service today: (800) 547-1512.
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Circle (16) for Literature

AM STEREO is smart for your station ...and good for your bottom line

C-QUAM® Stereo Exciter and Monitor from Delta Electronics

AM Radio is the foundation the broadcast industry was built on. It made radio broadcasting a major media force only to lose listeners to the high fidelity sound of stereo.

NOW is the time to regain those listeners.

NOW is the time for AM STEREO from Delta Electronics.

Delta's ASE-1 EXCITER (top) and ASM-1 Modulation Monitor. FCC Laboratory tested and type-accepted.

It's the sound

Delta's C-QUAM Stereo System gives you the full-fidelity AM Stereo sound your station must have to compete on the airwaves. With our AM Stereo System, the advantage FM enjoyed is gone. Your AM Stereo signal has the clear, clean, high-quality sound rivaling FM.

It's to your advantage

Now, the advantage belongs to you. Your AM signal travels farther, reaching more listeners than comparable FM transmitters. You already know how far your signal carries. Just think how many more listeners you can have with AM Stereo.

And more listeners means a greater market share, and that means more advertising revenues and profits. Not to mention an enhanced station value.

Get the Delta advantage

The Delta advantage puts you in a leadership position. Our C-QUAM Stereo System has been FCC laboratory tested and type-accepted. Our C-QUAM Stereo System works the way it should so you know it will work trouble-free.

What you get from our C-QUAM Stereo System is the superior AM Stereo technique. Your AM Stereo signal is 100% compatible with *all* existing AM receivers and multimode technology stereo receivers.

All listeners hear clear, clean, low distortion AM. And your AM Stereo signal sounds better to your monaural AM listeners too!

Where are the receivers?

The receivers are ready now! The C-QUAM decoder is now being built into receivers of leading manufacturers industry-wide.

Delco Electronics is building and installing its AM Stereo receiver in new Buicks. Names like MacIntosh Labs, Sherwood Electronics, Chrysler Corporation, Concord Electronics and SamSung Electronics are just a few of the manufacturers committed to C-QUAM Stereo receivers.

The listeners are there and ready to listen to your AM Stereo station. Don't disappoint them.

Should I go Stereo?

In a recent study on radio into the 1990's, AM Stereo was identified ". . . as a critical technological factor" and its "... potential to reduce current fragmentation tendencies" can play a significant role in the future of radio broadcasting.*

Do it now!

Don't wait. Get your share of the market as C-QUAM AM Stereo from Delta Electronics sets new standards for AM broadcasting.

Delco Electronics' C-QUAM receiver.

Delta is ready *now* to put *you* on-the-air with AM Stereo.

*Ted Bolton Associates, **The Critical Issues Report Radio From 1984-1990**, February 1984, Philadelphia, PA. Audience fragmentation tendencies were overwhelmingly identified as the number one critical issue facing today's radio broadcaster.

C-QUAM is a registered trademark of Motorola, Inc. Manufactured under license from Motorola, Inc.

DELTA ELECTRONICS

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Circle (17) on Reply Card

25 and still growing

When the presses turned out the May 1959 issue of **Broadcast Engineering,** the broadcast industry already was firmly established. From its infancy, **BE** pledged to monitor and report the technical side of broadcasting. Through the ensuing 25 years, **BE** has continued its vigil of radio and TV technological achievements. As the industry has grown, so has **Broadcast Engineering,** both toward a common goal: improved communications.

There have been few dull moments in 25 years, for keeping up with legislative changes and technological advancements has been exciting and challenging. The foundation of radio broadcasting, AM, after being pressured by FM and then FM stereo, is poised for a possible resurgence, if the marketplace decides on the matter of stereo. Even data transmissions are proposed on AM carriers.

FM and FM stereo have advanced steadily, pausing only slightly to consider and reject the concept of 4-channel sound. Continuing design efforts have led to higher quality sound capabilities, but not all broadcasters agree on how to implement these advances. Subsidiary services, both aural and data, offer additional activities for FMers, including reading services, background music, paging, utility management and even text services.

Changes in television range from the camera through the transmission system to the receiver, with recent thoughts devoted to an all-digital operation. Improved pickup devices, integrated circuitry and miniaturization now allow TV cameras to go anywhere at any time. Computer-age techniques applied to video processing have arrived at a new studio picture quality and unprecedented visual effects. Component video from the camera through processing to playback develops cleaner color and noise-free images. Combined with new recording techniques, new head designs, reduced particle sizes of magnetic oxides and resulting higher data packing densities, today's magnetic medium lends itself to a variety of applications. Optical recording also has become a reality for video and audio with laser technology. For the home viewing screen, an assortment of approaches for improved images are being demonstrated and critically examined.

Terrestrial transmission methods have become less ac-power consumptive for given output levels, and new frequencies for land-based systems have been assigned to broadcast communication purposes. ENG, STL, MDS, LPTV, ITFS, STV, SMATV and CATV are acronyms that have sprung up to describe new services battling for a share of the lucrative communications market. Satellite relays, now common daily occurrences, come not only from our nation's capital and major trade centers, but also from around the world. And viewers watched in awe as the ultimate ENG coverage recorded man's assault on outer space. Even our solar system has been shrunk in size by the pictures, experiments and knowledge gained by probes to the planets and their satellite moons.

Soon we may expect even more changes in TV viewing. Stereo audio, or multiple language sound for TV transmissions, coupled with improved definition images on a wider screen, relayed directly to homes via satellite, could be only a year or two away. We face becoming more familiar with terms such as DBS, MAC, HDTV, 3-D TV, EDTV and Ku-Band, to fully understand what awaits us just around the technological corner.

For the staff at **BE,** tracking and reporting on broadcast industry technical advances has been exciting and challenging. Throughout the past 25 years, we have witnessed and reported dynamic changes as they reshaped broadcasting, and many of the technical highlights from those years are recaptured in this issue.

During the next decade and beyond, as broadcasting continues its thrust into an all-digital operation, **BE** will be there to report the industry's advances. The transitions will not be without difficulties or hardships, but if we work diligently toward common goals, the way of the future can be smoothed considerably.

From a modest beginning in 1959, **BE** has grown steadily in the scope of its service, with distribution now into 110 countries. Also, **BE** has a version translated into Spanish, *Radio y Televisión,* that is published six times annually, and a version translated into Chinese that is published annually. When you consider that these magazines all go to qualified readers, we have a lot of friends around the world.

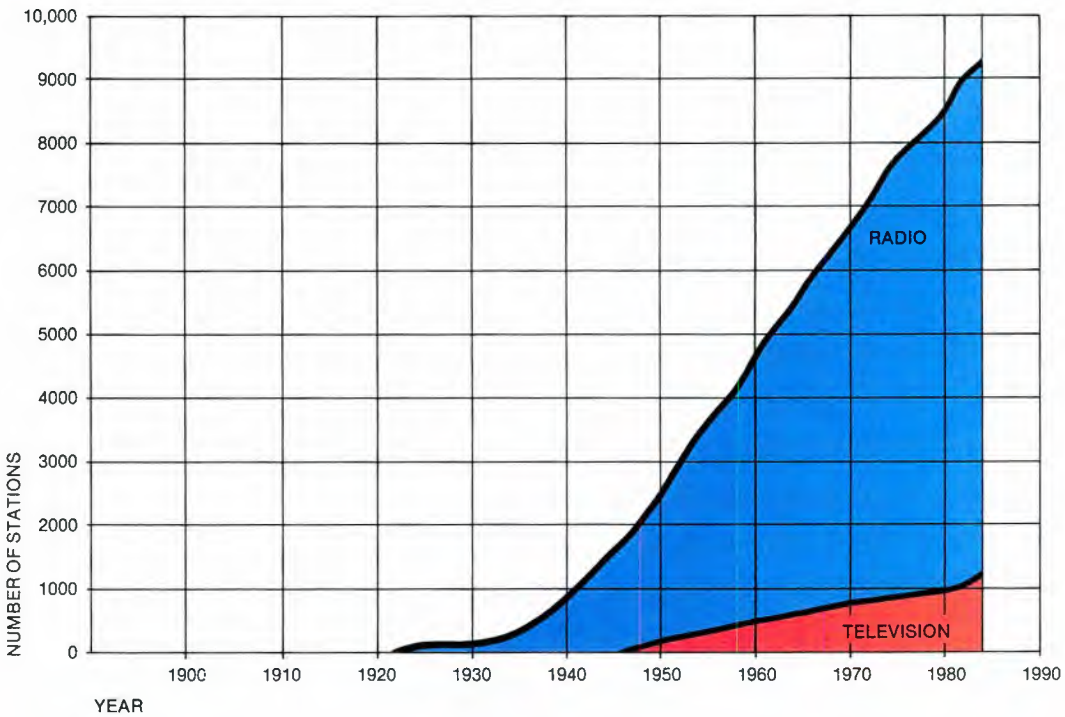
It is to these hosts of friends, many of whom have contributed to our pages over the years, that we dedicate this special *Anniversary Issue.* We could not have achieved our goals without you. And, we look forward to facing the challenges of the future with you. 25

25th ANNIVERSARY

Applying technology

From the 1890s, when Heinrich Hertz first sent and received radio waves, to the present, an amazing amount of progress has been made by radio and TV engineers and scientists. We take for granted today what was considered science fiction just a decade or two ago. The route from the primitive spark-gap transmitters to the present state-of-the-art has been charted by the pioneering efforts of many, as shown by the timetables. Industry growth is illustrated by the graph.

In the following section on *Applying Technology*, we look at the more recent progress made by several radio and TV stations across the country. These broadcasters signed on in 1959, the same year **BE** began publication. Their history is a summary of the broadcast industry's growth and development in the last quarter of a century. From the early days of make-do equipment lashups to the present high technology, computer-controlled wonders, their story is the story of our industry.



Major industry milestones

Radio

1887 Heinrich Hertz sends and receives radio waves.

1901 Marconi receives first trans-Atlantic radio signals.

1909 Doc Herrold makes first successful radio broadcast at San Jose, CA.

1915 First practical radio telephone communications system constructed by Bell Labs.

1920 KDKA-AM airs the world's first scheduled broadcast from Pittsburgh.

1927 Farnsworth transmits first electronic TV picture.

1928 WGY-TV, Schenectady, NY, transmits 40-minute stage production.
Federal Radio Commission established.

1934 FCC established as a permanent regulatory agency.

1935 Armstrong begins 50kW experimental FM station at Alpine, NJ.

1939 GE demonstrates FM broadcasting for mobile communications.
GE inaugurates FM broadcasting in Schenectady, NY.

1945 FM broadcast band moved to 88-108MHz.
Arthur C. Clarke suggests geosynchronous satellites for communications.

1947 First taped US radio network program airs, featuring Bing Crosby.

1953 AM transmitter remote control authorized by FCC.

1959 **Broadcast Engineering** founded.
Audio cartridge recording system introduced at NAB by Collins Radio.

1960 GE pioneers stereophonic FM transmission.

1961 FM stereo transmission system approved by FCC.

1962 Telstar I, first communications satellite, begins operation.

1969 Instant random-access cartridge machine introduced at NAB by IGM.

1974 First microprocessor used in broadcast equipment.

1975 TEAC introduces reel-to-reel audio recorder with dbx noise reduction.

1976 TEAC introduces cassette audio deck with dbx noise reduction.

1977 TEAC introduces PCM digital audiodisc.

1979 Mutual Radio Network and National Public Radio begin operation by satellite (analog).

1982 FCC issues the "marketplace" decision on AM stereo.

1983 FCC issues 80-90 decision on FM radio.
Use of FM subcarriers deregulated by FCC.
Network radio distribution (ABC, CBS, NBC, RKO) via satellite using digital encoding.

Major industry milestones

Television

1942 FCC authorizes commercial TV stations.

1950 Installation of first CATV system begins.

1956 Videotape recorder introduced by Ampex.
Broadcast-quality all solid-state TV camera developed.

1959 **Broadcast Engineering** founded.

1961 Ampex SloMo Disc developed.
Color TV VTR demonstrated at NAB/Washington.
First Western viewing of live television from USSR on BBC (Moscow welcome for Yuri Gagarin).

1962 First trans-Atlantic telecast by satellite (Telstar I).

1963 TV transmitter remote control begins.
ITFS service established by FCC.
Electronics line-store (625-405 and 405-625) standards converter developed (BBC).

1964 Character generator system introduced.
RCA videotape cartridge developed.
Intelsat organization formed.
TV camera placed on board Ranger 7 explorer to moon.
TEAC provides slow-motion color video playback system for NHK coverage of 1964 Olympics.
First TV program automation system installed.

1965 "Early Bird" (Intelsat I) launched, first international communications satellite.

1968 CBS uses a portable minicam for political convention coverage.

1970 PBS network established.

1971 U Format introduced by Sony/TEAC and JVC.

1972 Time base corrector introduced by Consolidated Video Systems.
Teletext experiments begin in United Kingdom.
BBC develops "Sound-in-Syncs" digital encoding system for audio-video combining.

1973 A Format 1-inch VTR shown by Ampex.

1974 First microprocessor used in broadcast equipment.

1975 B Format 1-inch VTR shown by Bosch.

1976 C Format 1-inch VTR shown by Sony at NAB/Chicago.
World's first digital PAL TV transmission by satellite (Intelsat IV).

1977 PBS begins operation by satellite.

1978 Teletext experiments begin at KSL-TV in Salt Lake City.
NHK experiments with HDTV via satellite relay.
NHK begins multiple audio channel television in Tokyo.
Digital VTR demonstrated.

1979 B Format and C Format portable VTRs with battery power shown.
B Format and C Format for VTRs accepted by SMPTE and ANSI.

1981 Beta Format (Sony) and M Format (Matsushita, Panasonic, RCA and Ikegami) introduced for ½-inch VTRs.
½-inch Plumbicon (Philips) and Saticon (NHK) introduced.
HDTV demonstrated in United States at SMPTE/Los Angeles by Compact Video/Imagevision.
Digital video sampling frequency selected as 13.5MHz for worldwide use.
ZDF, Rohde & Schwarz and Siemens introduce multiple audio channel television in Berlin.
TEAC develops optical laser write/read disc system.

1982 Low power TV service established by FCC.
First LPTV station begins operation in Bemidji, MN.

1983 Digital TV receiver shown by ITT-Intermetall in Germany.
Multiple audio channel TV system selected by EIA for United States; FCC approval pending.
Ku-Band satellite transmissions for broadcast tested at NAB and during space shuttle launch.

Station profile 1959 - 1984:

WNED-TV, Buffalo, NY

By Jon Herrington, director of engineering, WNED-TV, Buffalo, NY

On March 30, 1959, WNED-TV/Channel 17 went on the air from a small building located behind the studios of WIVB-TV, Buffalo, NY. Operated by the community-based Western New York Educational Television Association WNED-TV's sign-on marked the beginning of public broadcasting in New York state.

After a few months' operation in the makeshift facilities adjacent to WIVB-TV, WNED-TV moved to the top of the Hotel Lafayette in downtown Buffalo. A General Electric 12.5kW transmitter supplied the signal to viewers of western New York state and southern Ontario, Canada.

A look at the master control room of 25 years ago would reveal a DuMont frequency monitor, tube-type sync generators (which needed adjustment daily), a GE audio board and switcher, and an assortment of monitoring equipment. Source equipment included two black-and-white film chains, which consisted of an RCA 33mm projector and an Eastman Kodak 16mm projector that sent their images through a prism block to the black-and-white camera. At that time, all television was black-and-white, so SCH-phasing and color-phasing were not of concern to the operating engineer. Instead, the engineer on duty's main concern was to stay on the air and make certain that the vacuum tubes on older equipment did not fall out of their vertically mounted sockets.

The 1960 WNED-TV master control room, which contained the transmitter and switching equipment, is shown. Note the video monitors mounted above the transmitter.

Shown is a portion of the WNED-TV master control room as it was in 1960 with the original film chains. The station's Ampex 1000B tape machine can be seen in the background.

In the WNED-TV studio in 1959 were two General Electric 3-inch orthicon cameras with turret lenses. These black-and-white cameras were a big challenge, not only to the engineers, but also to camera operators and directors. If the camera operator did not keep the camera moving, the image would burn itself into the orthicon tube—even after just a few seconds on a fixed shot. This problem later was remedied by orbitors mounted on the side of the camera. The turret lenses also were replaced with Varatol zoom lenses.

In 1960, WNED-TV acquired its first videotape machine, an Ampex 1000B. This was an exciting moment because the station then had a means of recording programs for playback at a later date or time.

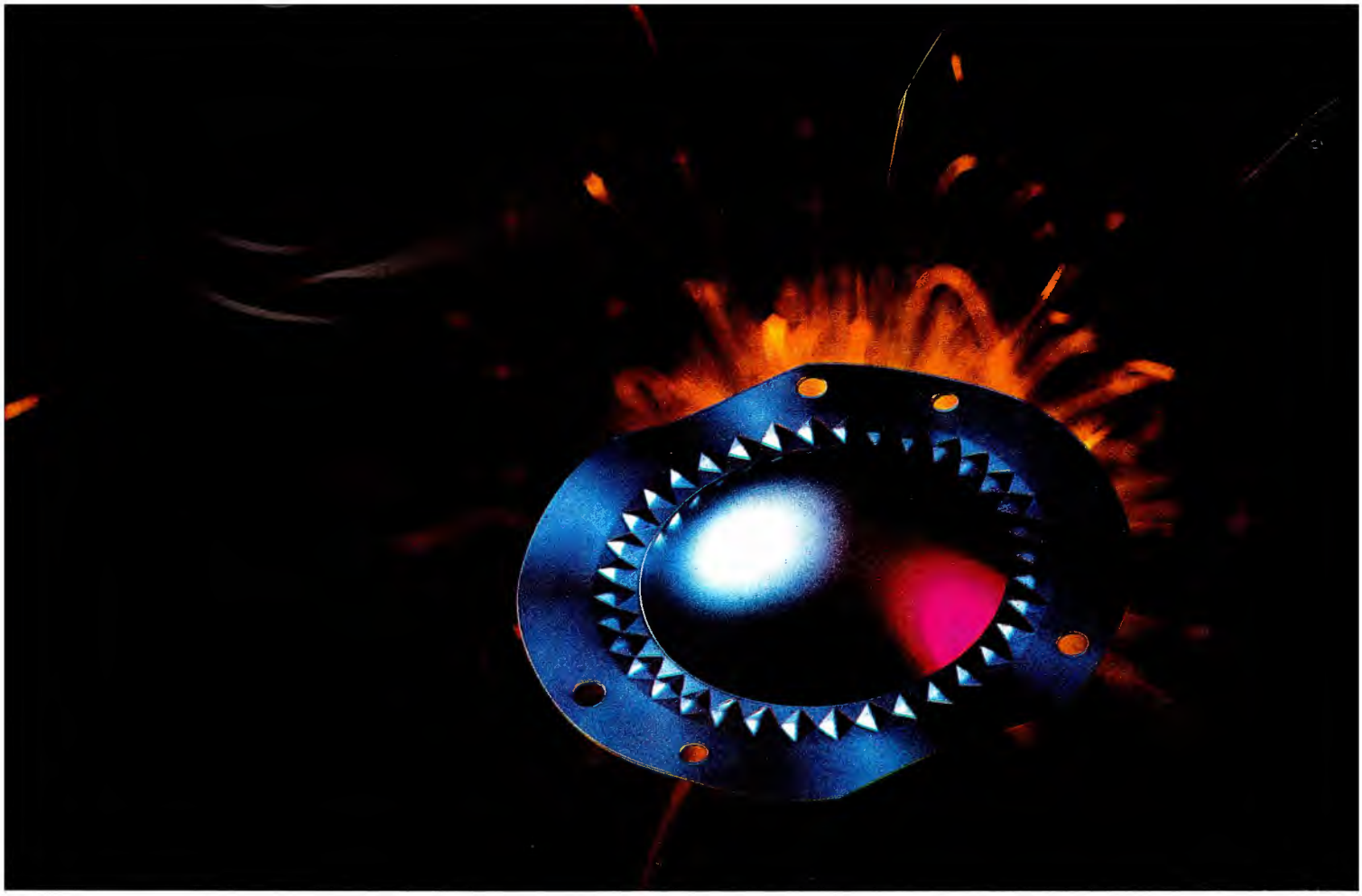
As the station grew, so did local taping. This created a new problem for engineers: back-to-back airing of prerecorded videotape programming. Because WNED-TV had only one videotape machine, engineers had to pre-cue and physically mark the tape, pull the reels off the machine and stack the programs in the proper order to be played. Operators then would make a "quick change" of tape reels during a program break. At the end of the night, there would be large piles of program tapes on the floor, all needing to be rewound and returned to their respective tape boxes.

Editing of videotape, when required, was done physically—not electronically. Physical splicing was accomplished by using a solution called Edivue Diluent, which when applied

Photos: Diane Bush

WNED-TV's master control room is shown as it is today.

The interior of WNED-TV's remote truck, built by the station's engineering staff, is shown.



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to the videotape enabled the editor to see the frame pulses and vertical pulses (which had to be matched for proper splicing).

In 1969 the station began broadcasting in color with a new 55kW GE transmitter and a GE TY-106B helical antenna. By this time, WNED-TV had retired the Ampex 1000B deck and acquired two Ampex 1200 quad machines. This gave the station the capability for recording and playing back color videotape. Because the station had no color cameras, however, it still was not capable of originating local programming in color. In 1969 WNED-TV acquired its first remote broadcast truck, which contained four Visual black-and-white cameras and one Ampex 1100 tape machine.

The '70s saw rapid growth for WNED. In 1973 the station moved into renovated studios, and a year later went all-color with five Fernseh color cameras, two RCA TK-28 film chains, five Ampex AVR-2 tape machines and an all-colorized remote van.

In 1976 WNED-TV's board of trustees approved the purchase of two radio stations, WEBR-AM and WNED-FM, which began operating as news and public broadcasting outlets.

1978 brought another major change, as WNED-TV switched to satellite operation with its own receive-only earth station, allowing the reception of PBS programming via satellite. During the same year, WNED-FM went to stereo operation and aired the first simulcast with WNED-TV of a live concert with full stereo sound. WNED-TV/FM continues to simulcast locally produced stereo programs and stereo programs received by satellite via a Digital Audio for Television (DATE) system.

In 1979, WNED-TV entered the era of 1-inch videotape machines with the purchase of five Ampex VPR-2 video recorders.

1980-1982 were busy years at the station. The parent corporation changed its name to the Western New York Public Broadcasting Association, reflecting the organization's involvement in both radio and television. WNED-TV built a CMX video editing suite consisting of a CMX-340X computer editor interfaced to a Grass Valley 1600-1X switcher, a Ward-Beck audio board, an Ampex MM-1200 multitrack audio deck, several Sony BVU-800 ¾-inch tape machines and three Ampex VPR-2 tape machines. The studio cameras were replaced with three Ampex BCC-10 color cameras with teleprompters.

During this time, WNED-TV also built a custom 29-foot remote truck equipped with five Fernseh KCU-40B cameras, one Ikegami HL-79 handheld camera, a Grass Valley 1600-7G switcher, a Chyron RGU-2 character generator, a McCurdy audio board and three Ampex 1-inch tape machines. One of the things that made the editing suite and remote truck unique was that all design and construction was done by the station's own engineering staff.

Today, WNED-TV owns eight translators in Cattaraugus County that improve Channel 17's signal in the southern tier of New York state. A plan is in the works to increase the station's transmitter power from 55kW to 110kW and to build a new tower and transmission facility. The tower will be 1278 feet tall (pending FAA approval) and will support the transmitting antenna for Channel 17 and the newly acquired Channel 23. The FCC awarded WNED-TV the Channel 23 license in December 1983, and plans call for the new facility to be operational by mid-1985. The parent corporation also has applied for instructional TV fixed service (ITFS) channels.

As technology continues to change, so will WNED-TV. The next quarter-century promises to bring as much challenge and growth as the first. 25

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Station profile 1959 - 1984:

KTHI-TV, Fargo, ND

By Roger Johnson, chief engineer, and Kathy McAllister, public relations director, KTHI-TV, Fargo, ND

KTHI-TV began operation in the fall of 1959 from a 400-foot transmitting tower near Sabin, MN. In the early days, KTHI's studio and control room facilities were shared with another local TV station. This dual operation severely limited competitive live programming between the stations. And, because most of the control room equipment was shared, live programming on each station had to be aired at different times during the day.

KTHI's early equipment included a 5kW DuMont transmitter, a 6-bay RCA superturnstile antenna (30kW ERP), and a variety of DuMont, RCA and Sarkes Tarzian products.

In 1962, new investors bought KTHI, then known as KXGO, along with a Grand Forks, ND, TV station. Their plan was someday to build one full-power station that could serve Fargo, ND, Grand Forks and most of eastern North Dakota and northwestern Minnesota. In 1963, the new owners separated from the dual-station facility and moved all equipment to the transmitter site. There, space was so tight that the announce booth and restroom were the same room! Plans quickly were made to construct a studio complex in Fargo and a transmitting facility in Blanchard, ND.

Shown is KTHI-TV's master control/production control room as it was in 1968.

KTHI's master control room is shown as it is today. An American Data 3111 switcher is the heart of the system.

Growing up

The station's improvement program included the construction of a 2063-foot transmitting tower. The huge structure, built by Kline Iron and Steel, began to take shape in the summer of 1963. When completed, KTHI's tower was the tallest manmade structure in the world—a record the station held until 1975. It was common in those days for a steady stream of visitors to stop by the transmitting site on weekends. When riding on the tower's 2-man elevator, you can view thousands of acres of the richest farmland in the world.

The tower project was completed in the spring of 1964, when a new General Electric TT-51B transmitter and a 3-bay helical antenna were installed at the site.

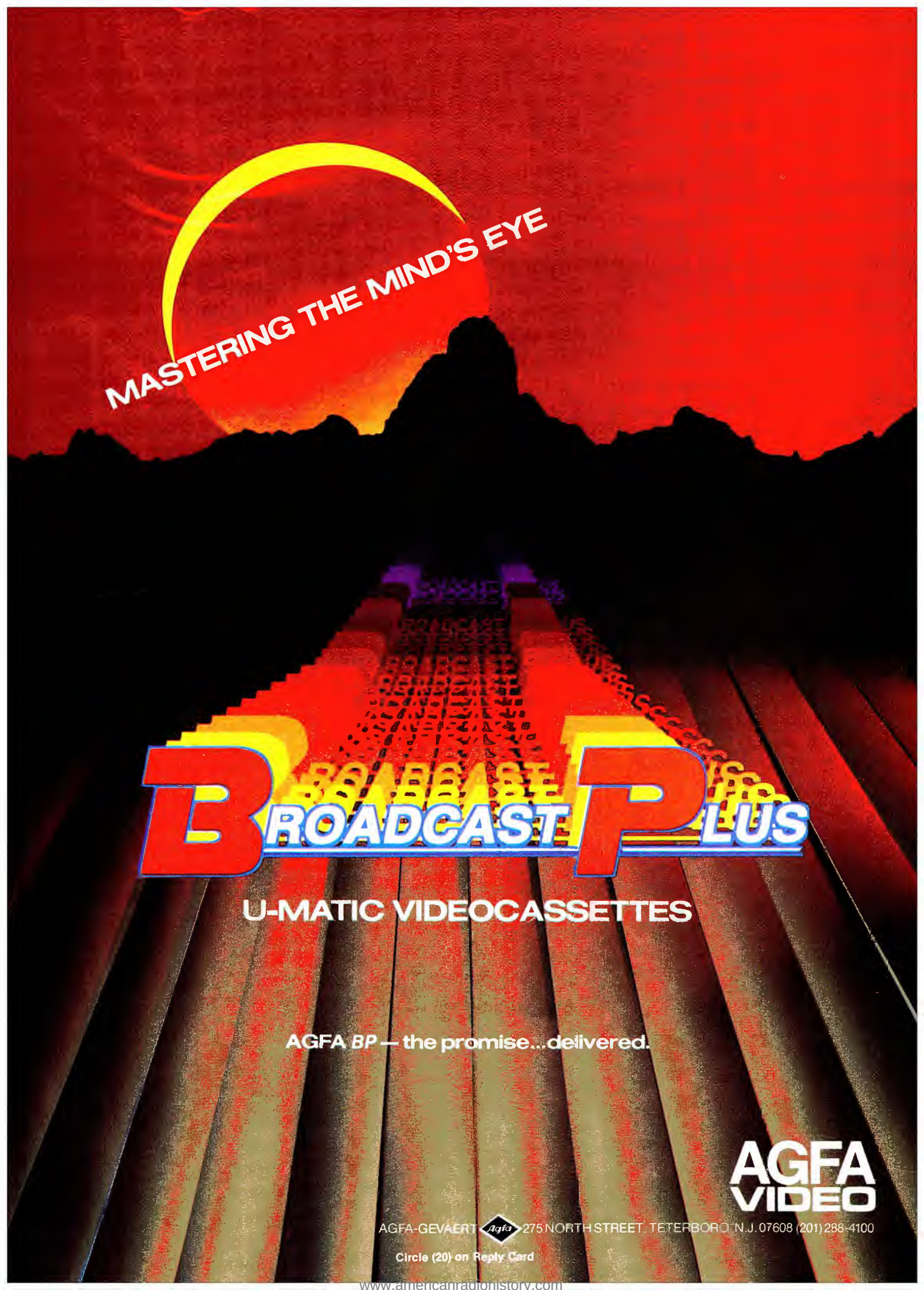
The Fargo studio center was equipped with an EMI production/master control switcher and an Ampex VR-1100 videotape recorder. The VTR was all solid-state, but the rest of the equipment still used vacuum tubes, requiring daily setup (and weekly visits from an electronic parts supplier for bags full of tubes).

Although the network provided programming in color for some time, local color did not arrive at KTHI until the late '60s—first in film, then tape, and finally, live studio cameras. The equipment used included an RCA TK-26 film chain, an RCA TR-1 videotape recorder and Norelco PC-60 studio cameras.

Modernizing

By 1979, the time had come to rebuild the station's equipment inventory. KTHI first added 1-inch tape to the 2-inch open-reel and cart

KTHI's production control room is where most live programs and specialized productions are done.



KTHI-TV's tape room houses the station's 1-inch, 2-inch cartridge and cassette tape recording equipment. Machines in this room can be accessed by the master control room or the production control room.

machines used for years in the industry. A second 1-inch machine followed in 1980. The next year brought a Thomson-CSF Mark IV A character generator and Thomson-CSF 7 F studio cameras. A third Ampex VPR-80 1-inch machine was added to the equipment inventory in 1982, in addition to a CDL 6-S production switcher and an American Data 3111 master control switcher. A Dynair routing switcher also was added, which meant no more fighting at the patch panel for routing priority. RADAC weather radar was installed as well, along with a weather room and complete color graphics.

1982 also saw revolutionary changes at the Blanchard transmitting site. Late in the year, a new RCA TTG-35H transmitter was installed and new air conditioning equipment was added to the facility. With the change came a reduction in vacuum tube use at the transmitter from 100 to just two, and only one tuned stage.

Something to celebrate

This year KTHI celebrates 25 years in the TV industry. Through years of development and hard work, the station has grown into a competitive force in its market. Along with advanced technical equipment and expanded production facilities, the station has aggressively sought out quality programming. Remote broadcasts have become increasingly important to the station. Local sports remotes have included complex pickups for the network and coverage of the NCAA Hockey Championships at Lake Placid, NY.

Numerous accomplishments throughout the last 25 years have made KTHI a highly regarded station today, with an on-air appearance that is something to celebrate. 25

Station profile 1959 - 1984:

KNDO-TV, Yakima, WA

By Hugh Davis, president, KNDO-TV, Yakima, WA*

KNDO-TV/Channel 23 began operation in October 1959 in Yakima, WA. Since then, an amazing amount of progress has been made in the industry as a whole, and at this station in particular. Compared with today's standards, the equipment and programming in the early days were primitive.

During the late 1950s and early 1960s, many UHF TV pioneers that had invested millions of dollars in facilities lost it all in the unpredictable and risky broadcasting band above Channel 13. With comparatively smaller coverage patterns, many UHF stations could not compete for advertising revenues and were forced into bankruptcy after only a few months of operation.

In 1959 equipment from TV stations that had *gone dark* (as they said in those days) was available from manufacturers through repossession at a fraction of the original cost. It was through a repossession sale, in fact, that KNDO could afford the equipment needed to go on the air.

Transmitter installation work is done at KNDO-TV in preparation for station sign-on. The UHF transmitter is an RCA model, as are the frequency and modulation monitors on the left.

In the summer of 1959, I took a U-Haul truck to Kalispel, MT. There I met the area RCA sales representative and the local sheriff, who removed a padlock from the studio door so that we could load the truck with equipment. That is how I bought the original studio cameras, lighting and terminal equipment for the station. The transmission equipment came to KNDO-TV through similar means. The station bought its antenna from a bankrupt South Carolina station and its transmitter from a *dark* UHF facility in Texas.

*The author has been with KNDO-TV since it signed on the air 25 years ago.

Continued on page 36

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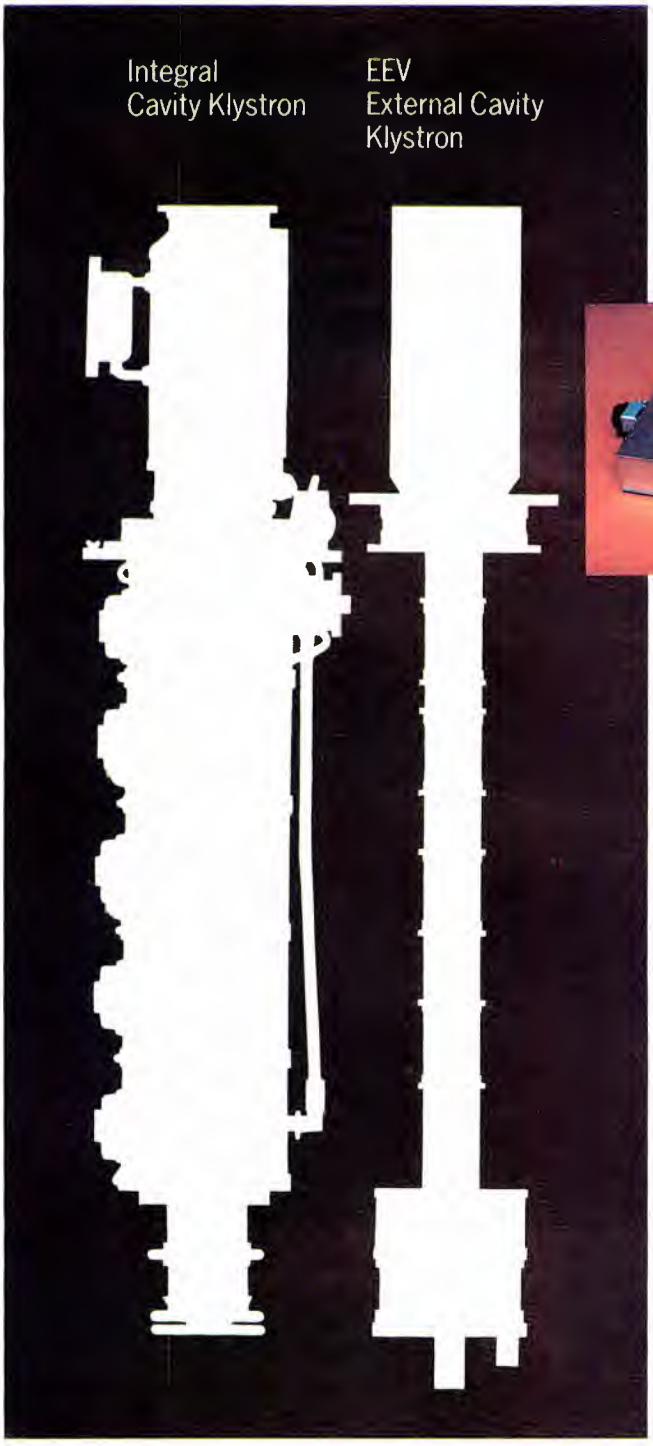

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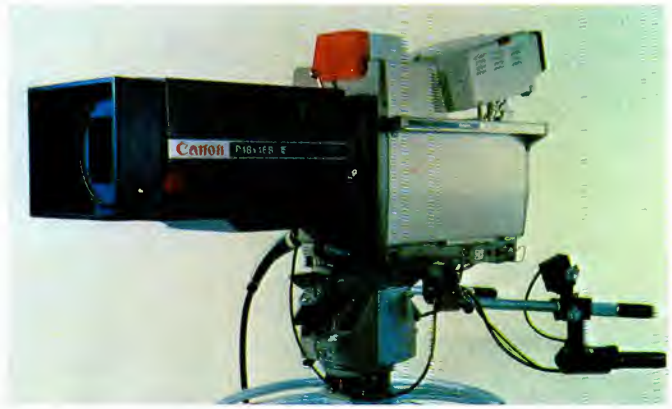
Midwest puts



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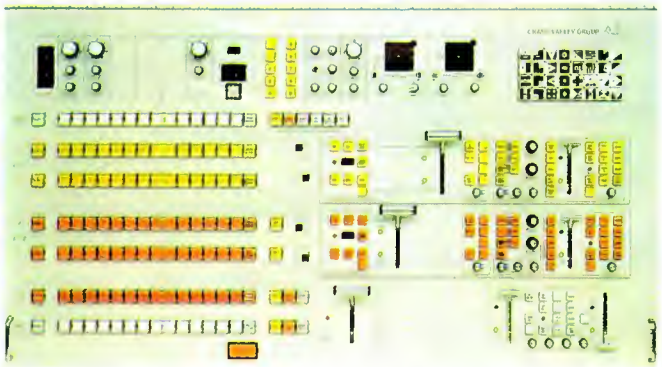

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Continued from page 32

Finally, after a lot of hard work and a fair amount of luck, the equipment was ready to go. It was a Wednesday night—Oct. 15, 1959—and KNDO-TV hit the air in time to carry the Wednesday Night Gillette Boxing Match. Much to my surprise, everything worked.

There were many people at the time who thought that building a second station in Yakima was akin to insanity. I remember being told that the station would not last six months. It survived, though, often with the help of other broadcasters who lent a helping hand when it was needed. Shortly after KNDO-TV made it on the air, I found myself taken under the wing of a crusty old broadcaster—the late Dick Dunning—who managed KHQ-TV in Spokane, WA. Dunning taught me a phrase that I have never forgotten: "The income has got to be more than the outgo."

The reader-board sign in front of the KNDO-TV studio is shown as it was on the station's sign-on night. The first program broadcast by the station was the Wednesday Night Gillette Boxing Match.

The KNDO-TV studio is shown as it is today. The station is tied via a 2-way microwave link to a sister station 90 miles away in Tri-Cities, WA. The link is used for news, program and data transfers.

It is hard to believe that KNDO has been broadcasting for 25 years. In some ways, much of the fun of the early days has gone out of the business, but, on the other hand, it is comforting to know that the equipment will operate properly on a daily basis.

KNDO-TV's studios today are a far cry from the old days. The studio complex and corporation headquarters building is located in Yakima and the transmitter plant is on Ahtanum Ridge, south of town. The station operates on Channel 23 with an effective radiated power of 500kW (maximum). A sister station, KNDU-TV, is located 90 miles away, and the two are tied together by a 2-way, 9-link microwave relay system. This relay chain is used for 2-way transmission of video, audio and intercommunication (voice, teletype and computer data) traffic.

The future holds a number of challenges for KNDO-TV and KNDU-TV. Multichannel TV sound will mean more microwave subcarriers, stereo audio consoles, multichannel video/audio tape recorders and transmitter changes. Increased use of satellite systems for program interconnection is certain, as is teletext service. It will be exciting to see what happens next. 25

Station profile 1959 - 1984:

KOIT-FM, San Francisco, CA

By Michael Rush, chief operator, engineering, KOIT-FM, San Francisco, CA

Broadcasting has undergone some major technological changes in the past 25 years, and it seems to be a never-ending task to stay one step ahead in this high-tech revolution. KOIT-FM in San Francisco takes pride in being on the cutting edge of these new technologies. The station has seen major changes in the past quarter-century, and it will see still more in the future.

KOIT went on the air in 1959 with a limited 7-hour/day operating schedule. Its studio and transmitter were located at Mount San Bruno. The station's effective radiated power (ERP) was 9kW. KOIT, which had a classical music format, had just one full-time employee, Burt Case, who is still with the station in the capacity of assistant chief operator.

1968 was the year that KOIT began broadcasting in stereo. It also was the year the station raised its ERP to 50kW. The station in 1972 started a slow process of switching program formats from classical to beautiful music. The operating day also was expanded to 16 hours.

In 1974, KOIT made two major moves. The transmitter was relocated to Mount Sutro above San Francisco, and new studio facilities were built in the city. The move to Mount Sutro required that KOIT reduce the ERP to 33kW. A new RCA BTF-40E1 transmitter was installed to feed an RCA panel antenna.

The station was sold to Bonneville International Corporation in 1976, and the operating day was expanded to 24 hours. A year later KOIT started its high-tech climb. New studio facilities were constructed in San Francisco's Transamerica Pyramid Building, and automation was introduced to daily operation. The automation system was a custom-built design capable of controlling 20 different audio sources in stereo. Two new air production studios were built around Sparta Centurion-2 consoles, and all tape equipment was replaced with ITC cartridge and reel-to-reel decks.

In 1980, KOIT began another slow evolution of program formats—this time from beautiful music to easy

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KOIT-FM's transmitting antenna is located on the fifth level of San Francisco's Mount Sutro tower, just below the TV antenna superstructure.

listening. A year later the station began replacing the tape decks in the automation system with MCI machines.

1982 saw a new address and a satellite system for KOIT. The first four months of the year were spent building new studios and offices near Union Square in San Francisco (the present location). At the heart of each studio was a Pacific Recorders BMX-14 audio console. Cartridge decks were updated with Pacific Recorders TOMCAT machines, which feature the MaxTrax head configuration. 1982 was also the year that KOIT began using Bonneville's Satellite Music Service for most of the broadcast day. The automation system ran everything on the air with only a few problems. Another project completed in 1982 was a studio-to-transmitter-link (STL) system to the transmitter site at Mount Sutro.

1983 was a busy year for KOIT's engineering staff. Early in the year, the station purchased and installed a

Continued on page 42

The impressive battery of equipment in the KOIT-FM automation/equipment room contains virtually all hardware needed to run the station.

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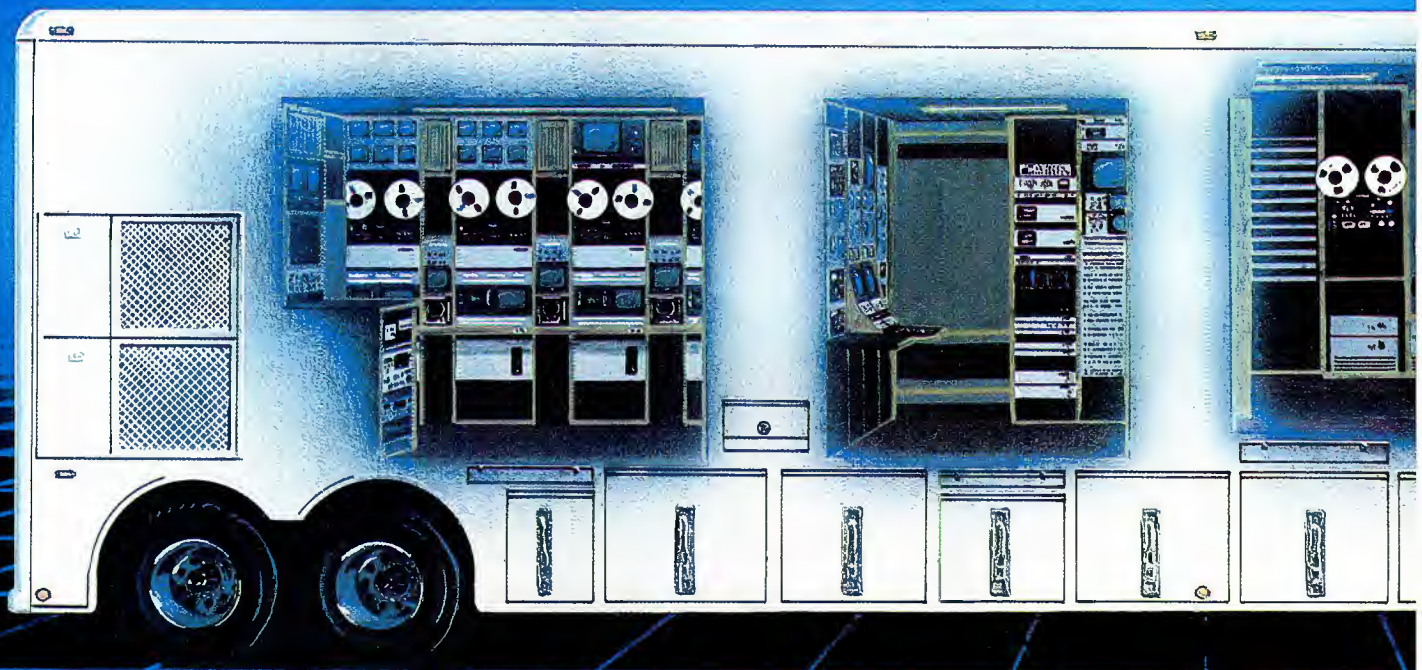

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Continued from page 38

new ERI transmitting antenna on the Sutro tower. Bonneville also purchased an AM station to complement KOIT-FM, which meant new construction. A new Harris 9003 automation system was installed to take over duties on FM so that the older automation system could be used on the AM station. The Harris system controls nine TOMCAT cart decks, four MCI reel-to-reel decks and four IGM Instacarts.

New studio facilities also were built to accommodate the new station. At the heart of the main FM control room is a Pacific Recorders BMX-10 audio console. Source machines include nine TOMCAT cart machines, six of which are under control of the automation system. For remote-control functions, a Moseley MRC-1 microprocessor-based system was installed to handle both transmitter sites. Audio distribution within the studio facility is accomplished with a Ramko Research routing switcher and backup patch bay.

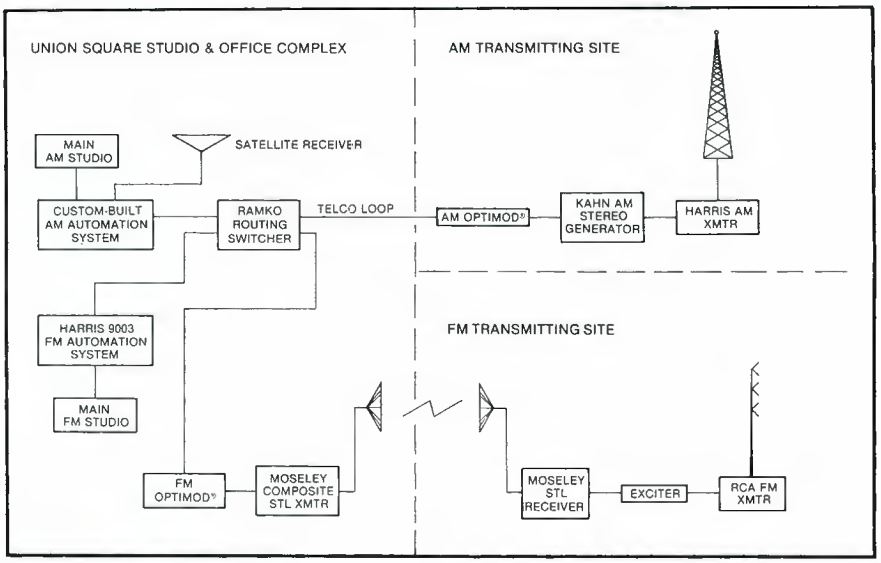

Figure 1. The block diagram of KOIT-AM/FM's audio chains. Note the centralized location of the routing switcher unit, which permits versatility in source equipment and control room configuration.

KOIT-FM's control room is equipped with a live-assist automation system and standard audio source gear.

Presently two projects are under way at KOIT-AM/FM. A Kahn AM stereo system is being installed and a translator project is nearing completion for improved FM fringe-area reception.

The future holds many exciting new possibilities for radio broadcasters. KOIT is dedicated to maintaining a state-of-the-art facility, which is the only way to remain competitive in today's marketplace. 25

Station profile 1959 - 1984:

KMBI-AM, Spokane, WA

By Gordon Canaday, chief engineer, KMBI-AM/FM, Spokane, WA

KMBI-AM and sister station KMBI-FM serve the Pacific Northwest from Spokane, WA. The stations are owned and operated by the Moody Bible Institute of Chicago and provide non-commercial, listener-supported programming.

The roots of KMBI-AM go back to June 1959, when the station—then known as KCFA—signed on at 1330kHz, daytime. At that time it was owned by a group of local businessmen. The equipment chosen for the station came from the Gates Radio Company in a package deal. The transmitter was a BC-5P (5kW), which is still in use. It has been operating faithfully since '59 with few breakdowns, especially since its high voltage rectifier tubes #8008 were replaced with solid-state rectifier stacks. The Gates studio equipment consisted of a Yard console, 16-inch transcription turntables, Sta-Level audio processor, and frequency and modulation monitors. Three Ampex model 601 tape decks were used for reel-to-reel recording.

Not long after beginning operation, the owners decided to research the possibility of directional nighttime operation. An engineering study was conducted and an application to modify the station license was filed with the FCC by March 1962. It later was retracted, however, when a pend-

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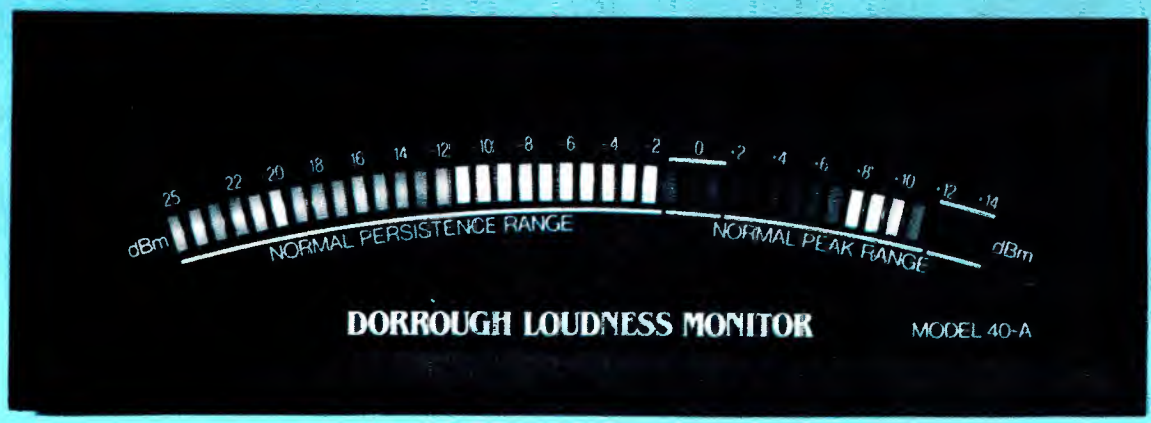

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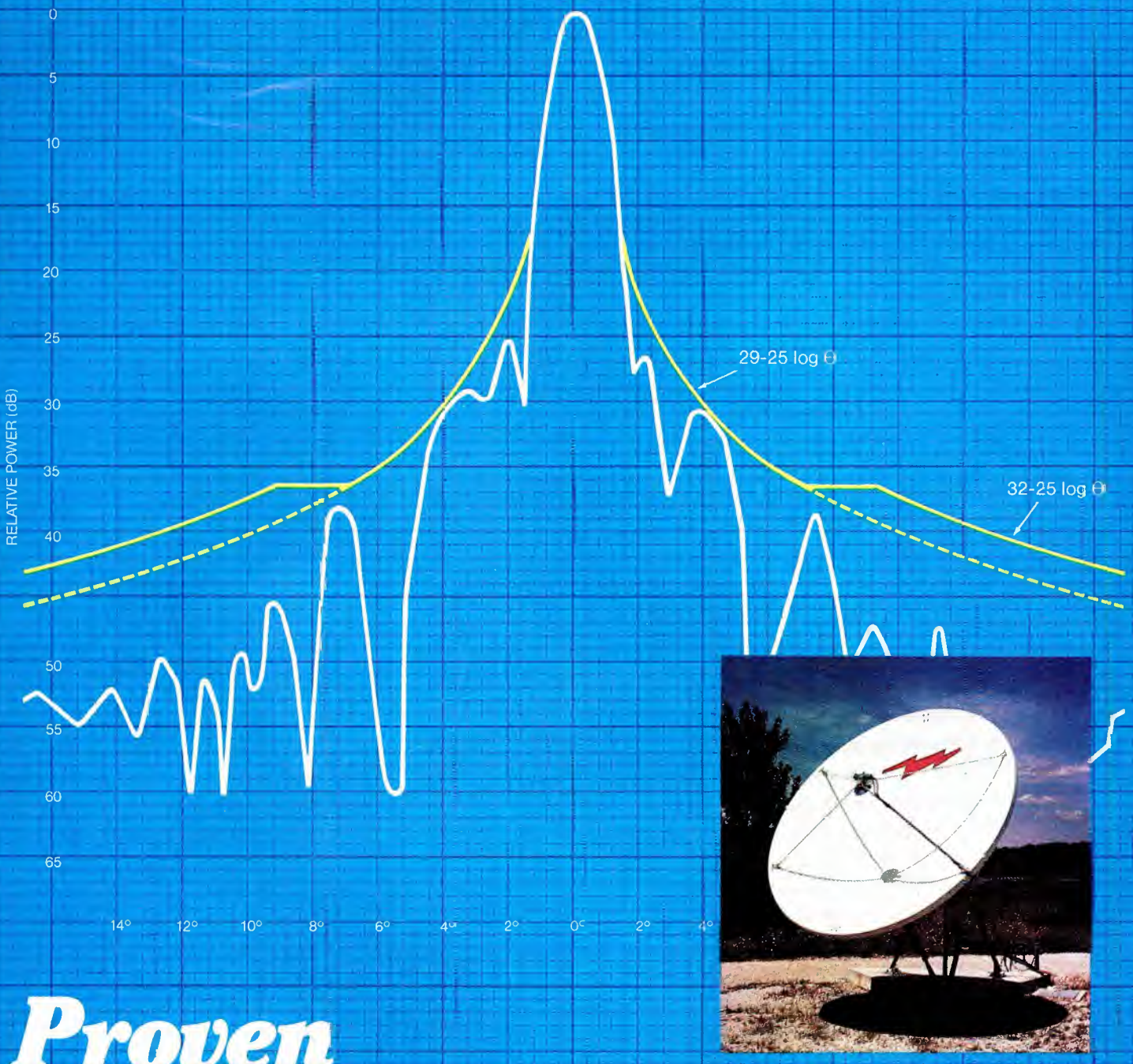
ing 10kW Canadian license on 1330kHz in nearby Calgary, Alberta, was discovered.

The setback was disappointing, but proved to be fortunate in the long run for the owners because it forced KCFA to look toward FM as a medium of greater coverage. By April 1968, KCFA-FM was on the air from Washington state's Mica Peak, the first of four FM stations to locate there. This 5200-foot mountain provided excellent coverage for the station and reduced operating costs considerably. Because of the increased elevation, the effective radiated power was set at 56kW and the supporting tower needed for the antenna was just 100 feet high.

Other factors were not so favorable, however. The transmitting site was 25 miles from the studio, and there was no line-of-sight path from the studio to the transmitter, thanks to a 3500-foot mountain (Krell Hill). Soon discovered were snow depths of 8-10 feet during the winter, poor local utility service, RFI problems with nearby Air Force and FAA sites, and even a porcupine that fed on brake line hoses during maintenance nights.

The 5200-foot KMBI-FM transmitting site is shown.

The solution to the STL path problem was a sharp dogleg consisting of a single 15kHz telephone company line that fed a Marti Electronics tube-type STL transmitter. A Marti remote-control unit was used for the FM transmitter, using a one-of-a-kind control/fail-safe uplink. The KCFA engineer designed (and Marti built) a supersonic filtered system that sent control tones down the 15kHz Telco



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Shown is the newly remodeled KMBI control room.

program line at frequencies as high as 35kHz. The system worked!

The transmitter building housed a CCA 20,000D FM unit with a tube-type exciter. The antenna was a 6-bay Collins 37-CP. Transmitter return telemetry was sent to the studio via a Marti 26MHz remote pickup system.

In 1973, KCFA was sold to Moody Bible Institute, and on July 1, 1974, KMBI-AM/FM signed on the air, this time as non-commercial stations. The new owners, armed with a healthy new-equipment budget, launched a 4-year improvement program that purged tube-type equipment from the stations and ushered in the era of solid-state. The effort's initial phase included the purchase of four Scully 280 tape recorders, QRK turntables, CBS processors, Belar monitors, a McMartin B-910 FM exciter, and Hewlett-Packard and Tektronix test equipment.

Transmitter telemetry return then was switched over to the SCA channel, primarily because the chief engineer could not make the 26MHz remote pickup unit transmitting antenna survive the howling winters of the 5200-foot mountain-top. The FM transmitter also was replaced. A new CSI T20F took over for the aging 3-tube CCA transmitter (heavily modified by now) and suffering strange oscillations, low power output and arc-overs that continually punctured the PA blocking capacitor.

Control room and studio remodeling were involved in the next phase of the improvement program. In addition to the equipment already purchased, a new stereo console from Audio Products, an ITC 3-D cart player and two Technics SP-10MkII turntables were ordered and installed.

The last phase of the improvement project focused on the STL system and much-desired stereo programming on FM. The tube-type microwave had become a nightmare, and doing the proof with a limiter located between the studio and transmitter presented a few challenges. The old system was replaced with a 2-hop path using Moseley PCL-505-Cs. An Optimod 8000A and Belar FMS-1 stereo monitor provided the ingredients to go stereo. A TFT 7610 remote control completed the modernization work.

Since that time, two more technical milestones have been reached by KMBI. In 1982, satellite receiving equipment was installed to pick up the Moody Broadcasting Network and other feeds. A small-scale automation system also was installed during '82 using three Studer Revox PR-99 playback decks and a custom-built programmable sequencer. The tapes are divided into solo, group and instrumentals, and provide no duplication of programming for an entire month.

KMBI is proud of its technical plant. The station has kept pace with the state-of-the-art, and intends to stay there. 25

1959 - 1984:

Moving with the industry

By Jerry Whitaker, radio editor

We have detailed in the foregoing series of *Station Profile* articles the growth of several radio and TV stations over the last quarter-century. To round out our examination of *Applying Technology* in this special **BE** *Anniversary Issue,* we conducted a survey of all radio and TV stations that signed on during 1959. A list of those stations, with broadcasters who participated in our questionnaire, is shown in a sidebar. We thank the station engineers and managers who answered the survey questions, giving us a perspective on the progress of our industry over the last 25 years. To all stations shown in the sidebar, we issue our congratulations on their silver anniversary observances.

Continuously broadcasting for 25 years is not unique—many stations have been in operation for 50 years or more. Still, as we observe our silver anniversary, it seems appropriate to feature stations in our survey that are marking a similar event.

Survey results

By 1959, most of the valuable major market radio and TV frequencies already had been claimed. Examining the sidebar shows that the majority of stations are outside the Top 50 markets. Of the radio stations responding to our questionnaire, the vast majority (virtually 100%) were

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commercial operations, and more than 50% of those stations were affiliated with one of the major radio networks. TV stations responding to our survey were, on the other hand, about evenly split between commercial and public (non-commercial). Of the commercial TV stations returning our form, all were affiliated with a network.

Questions on the survey concerned the use of program automation, satellite interconnection, stereo operation, color broadcasting, electronic newsgathering (ENG) and remote transmitter control. Staff size change from 1959 to the present also was addressed. The questionnaire's goal was to gain insight into the timetable for implementing technology at broadcast facilities during the last 25 years. Tabulation of the results shows an advance of technology that generally can be divided into decades. (See Table I.)

1960-1969

From the standpoint of broadcast

*Because of the statistically small number of TV stations participating in the survey, drawing any hard conclusions from the available data is risky. Further, because most of the stations in the survey *universe* are located in small radio and TV markets, the results may not be entirely representative of the broadcast industry as a whole.

Table I.
The implementation of new technology during the last 25 years.*

1959	Median staff size: radio = 7 TV = 12
1960	
1961	
1962	
1963	
1964	
1965	Median year local stations began color operation
1966	
1967	
1968	Median year stations began remote-control operation of transmission equipment
1969	Median year FM stations began stereo operation
1970	
1971	
1972	
1973	
1974	Median year radio stations began using program automation equipment
1975	
1976	
1977	
1978	Median year TV stations began ENG operations
1979	
1980	
1981	
1982	
1983	Median year stations began using satellites on a regular basis
1984	Median staff size: radio = 15 TV = 63

Continued on page 53

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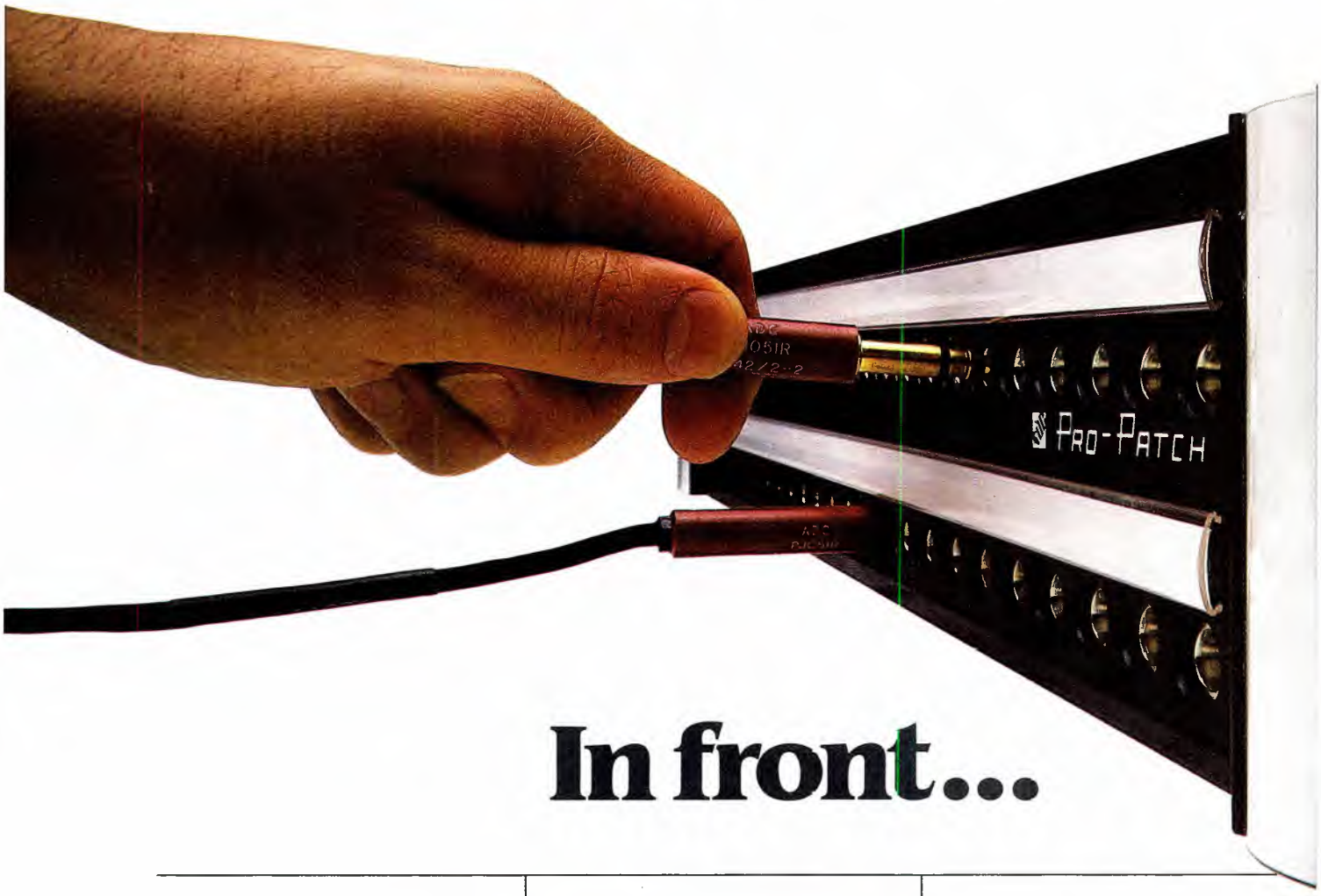

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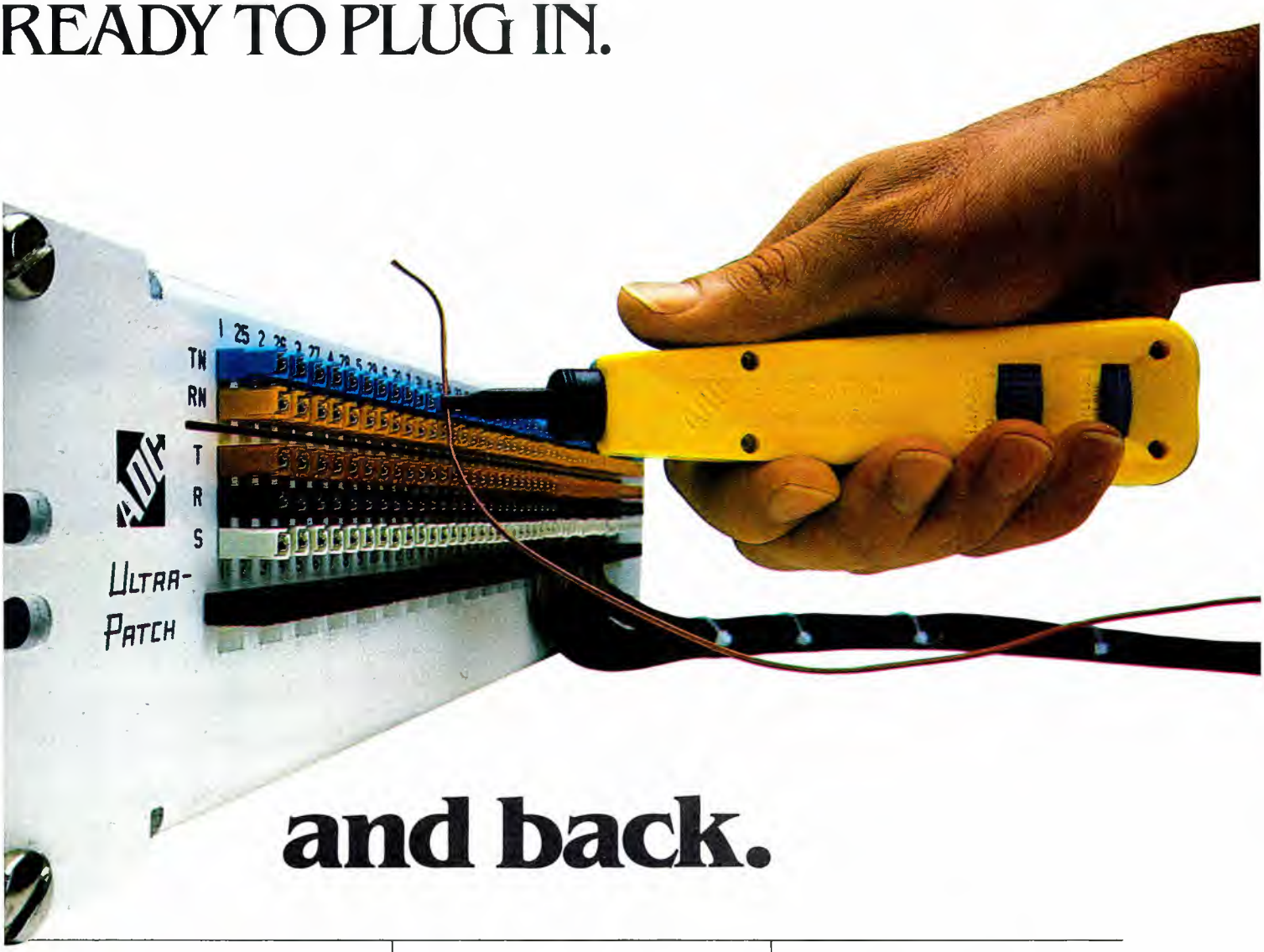
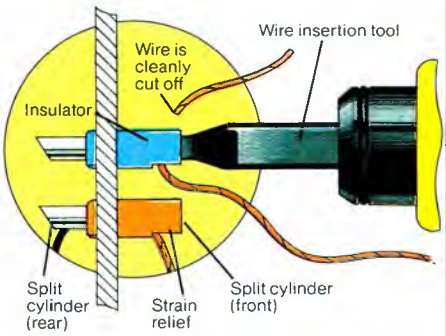


and back.



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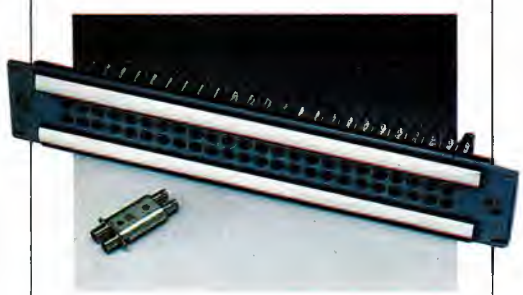

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Continued from page 48

equipment, this was the decade of color television, stereo FM and remote transmitter control. Stations responding to our survey reported that during the mid- to late-'60s most conversion work was accomplished, and operation under the recently authorized new modes begun.

The color TV conversion process often was slow, as local stations replaced or modified pickup, playback and transmission equipment one piece at a time. By the early 1960s, the switch to color programming was gaining steady momentum, led primarily by NBC-TV. By the fall of 1965, almost all of NBC's prime time schedule was produced on color film. CBS was a year behind in reaching that point, and ABC followed in the 1967 season. Our survey puts the median conversion date for first local color TV transmission at 1965.

The conversion of FM radio stations to stereo operation was, according to the survey, a lengthy process that spanned most of the decade. In 1959, the National Stereophonic Radio Committee was established to examine the proposed FM stereo systems and submit a final recommendation to the FCC. Tests were conducted in the summer of 1960 over KDKA-FM in Pittsburgh, with receivers set up in Uniontown, PA. The system of stereo transmission proposed by the General Electric Company and the Zenith Corporation was adopted, and operation under the new mode of broadcasting was authorized to begin on June 1, 1961. **BE's** survey, however, indicates that it was not until 1969 that most stations converted to FM stereo. The delay in implementing the new technology presumably was because of the lack of profitability of FM broadcasting at that time.

During the decade of the '60s, many stations converted to remote-control operation of their transmitters. Advances in digital technology helped this process along greatly. Station coverage-area improvement and studio facility relocation are two of the reasons for increased interest in remote-control operation during the '60s. Our survey shows that the median year for stations switching to remote operation was 1968.

1970-1979

With color television, stereo FM and transmitter remote control in full swing, broadcasters looked for more efficient methods of operation during the 1970s. Radio station program automation became feasible from a technical standpoint during the decade, and managers saw in automation a way to improve the on-air sound and reduce staffing requirements. Many of the AM and FM stations responding to our survey reported the installation of an automation system for program control during the '70s. Earlier attempts (some dating back to 1959) were made at program automation, but it was not until digital circuitry had been perfected that the system controllers were "smart" enough and versatile enough to handle sophisticated program formats. The **BE** survey puts the median conversion date at 1974.

The '70s also ushered in a milestone in TV broadcasting—ENG. News reporting "live from the scene" became commonplace on the evening TV newscast as ENG began to grow and mature. 1978 was the median date (according to our survey) for local ENG operation.

1980 to the present

The '80s are marked by the development and growth of satellite interconnection networks. Nearly all radio and TV stations responding to the **BE** survey indicated that they had installed satellite equipment between

1980 and the present. The median date for this activity was 1983. This leap in technology has reshaped the face of network radio, and television is not far behind.

Staff size

The questionnaire results on TV and radio station staffing levels showed predictable jumps between sign-on in 1959 and the present. TV stations reported a 5-fold increase in staffing levels during the last 25 years, from a median count of 12 persons in '59 to a median count of 63 persons in '84. Radio stations reported a much lower growth rate of just more than 2-fold. The median radio station staff in 1959 totaled about six persons, while the 1984 median count was 15 persons.

Comments

As part of the **BE** survey, comments were solicited from the selected stations on the progress of broadcasting over the last 25 years, and what the next decade may hold for the industry. The general tone of the comments received was positive, if somewhat cautious. A sampling of the comments follows:

- "The average TV viewer's appetite for innovation has grown enormously, absorbing technical advances as quickly as they roll off the production lines. A broadcaster has to adapt quickly to the changing technologies, especially those that affect the on-air image, or be left in the dust."
- "I have been actively working in broadcasting for 31 years and in that time I have seen television go from a medium only the wealthy could afford to one that covers almost 100% of the country's homes and is watched more than seven hours every day. During the growing years, television was both good and bad, but there has been enough *good* so that now, more than any other medium, the nation depends on television for most of its information."
- "CATV will continue to siphon viewers from the three networks, but I feel the local stations with their strong news and public affairs programming will not only survive, but continue to dominate all TV viewing."
- "Advances in technology and increased competition have created new opportunities and new challenges. The business has changed dramatically, but it is still exciting, interesting and important."
- "For so many years, you couldn't give FM away, and today it is the predominant medium. Advances in receiver technology and format choices made the difference."
- "For small market radio, survival will depend on service to the local community. There is no competition from the outside metros in this category."
- "The growth of FM audience shares is now leveling off, as quality AM stereo comes into its own. The future of small market broadcasting will be based on technical quality, program quality and local community service. Some facilities, regrettably, are in deplorable condition, and are likely to remain so until their audiences have disappeared."
- "As history has proved, it is important for stations to serve their local communities. The ability to operate more efficiently in an atmosphere of increased competition is a must."
- "I foresee a rebirth of AM radio as a powerful voice in this nation in the coming years. The change can be accomplished by offering quality signals, excellent programming and having a desire to win."
- "Until somebody finds a way to drag cables to all automobiles, boats, airplanes and bikes, radio will still be in there informing, entertaining and selling."

Continued on page 58

WHO SAYS YOU CAN'T AFFORD GREAT ART?

The 3M Paint System delivers just about all the goodies that the expensive paint systems do. 28 brush styles. Control of hue, luminance and saturation. Cycling of colors for the illusion of animation. And a 16:1 zoom, among many other features.

We even offer a few things the expensive machines don't offer.

Like more than 16 million color possibilities.

Yet the 3M Model BFA Paint System is only $31,995. And that's about $70,000 less than those other paint systems.

For more information about the 3M Paint System, call us toll-free at 1-800-328-1008.

Broadcasting and Related Products Division/3M.

3M hears you...

3M

Circle (35) on Reply Card

The Nearest Thing to

a Custom Made VTR.

Even if you could have your VTRs custom-made to fit your needs and facility, you really don't need that luxury. Now Ampex offers so many VPR-80 configurations and accessories that it's almost like having your VTRs custom-made. And all the choices are priced affordably.

There's a VPR-80 for any job in any studio, editing suite or remote truck. Along with all the options, many VPR-80 features are standard, such as AST automatic scan tracking, microprocessor-based dual-cue editing, and many more. You also get the bonus of Ampex service and support, unequalled anywhere in the world.

It's easy to match your individual needs and budget with the VPR-80 that fits best. Call your Ampex sales engineer for the details you need to make a decision.

AMPEX

Ampex Corporation • One of The Signal Companies

Circle (36) on Reply Card

Atlanta 404/491-7112 ▪ Chicago 312/593-6000 ▪ Dallas 214/960-1162 ▪ Dayton 513/254-6101 ▪ Los Angeles 818/240-5000 ▪ Louisville 502/239-6111 ▪ New York/New Jersey 201/825-9600 ▪ Salt Lake City 801/487-8181 ▪ San Francisco 415/367-2296 ▪ Seattle 206/575-0156 ▪ Washington, DC 301/530-8800

Continued from page 54

Stations celebrating 25 years of operation

These radio and TV stations are observing their 25th year of broadcasting in 1984. Stations participating in the **BE** survey are shown in bold type.

Alabama
WAAY-TV Huntsville
WAHR-FM Huntsville
WBSA-AM Boaz 10/1/59
WKXX-FM Birmingham
WMLS-FM Sylacauga
WPRN-AM Butler

Arizona
KHIL-AM Wilcox
KUAT-TV Tucson

Arkansas
KBHC-AM Nashville 5/59
KBJT-AM Fordyce
KBRI-AM Brinkley
KCCB-AM Corning
KCCL-AM Paris
KPWR-TV Little Rock
KTPA-AM Prescott

California
KACE-FM Inglewood
KBIG-FM Los Angeles
KDFM-FM Walnut Creek
KDON-FM Salinas
KDUO-FM Riverside
KEZY-AM Anaheim
KFJC-FM Los Altos
KFMB-FM San Diego
KHIS-AM Bakersfield
KHNY-FM Riverside
KHSJ-AM Hemet
KJAZ-FM Alameda
KLHT-FM San Francisco
KLVE-FM Los Angeles
KKGO-FM Los Angeles 2/18/59
KKHI-FM San Francisco
KOIT-FM San Francisco 3/59
KOLA-FM San Bernadino 6/59
KOME-FM San Jose
KPFK-FM Los Angeles
KQAK-FM San Francisco
KROY-FM Sacramento
KTRT-AM Truckee
KUNA-FM San Luis Obispo
KVIE-TV Sacramento 2/21/59
KWIN-FM Lodi
KXFM-FM Santa Maria
KZAP-FM Sacramento

Colorado
KIIX-AM Fort Collins
WLIR-FM Lakewood

Connecticut
WHCT-TV Hartford
WMMM-AM Westport
WYBC-FM New Haven 3/9/59

Florida
WAMA-AM Clearwater
WBSS-AM Pompano Beach 5/8/59
WHYM-AM Pensacola
WKIZ-AM Key West
WKQE-AM Tallahassee
WLIZ-AM Lake Worth
WPOM-AM West Palm Beach
WRBD-AM Pompano Beach
WRKT-AM Cocoa Beach 6/22/59
WSEB-AM Sebring
WSHE-FM Fort Lauderdale

Georgia
WBBK-AM Blakey
WBBT-AM Lyons 3/12/59
WLAW-AM Lawrenceville
WOKS-AM Columbus
WPLK-AM Rockmart
WRWH-AM Cleveland
WVLD-AM Valdosta

Hawaii
KOHO-AM Honolulu

Idaho
KSPD-AM Boise
KSRA-AM Salmon

Illinois
WAKO-AM Lawrenceville
WCGO-AM Chicago Heights 8/27/59
WICD-TV Champaign 4/24/59
WJBM-AM Jerseyville 10/11/59
WMET-FM Chicago
WRMS-AM Beardston
WXRT-FM Chicago

Indiana
WFTE-AM Lafayette
WFWQ-FM Fort Wayne
WWCM-AM Brazil
WYCA-FM Hammond

Iowa
KDIN-TV Des Moines
KOUR-AM Independence

Kansas
KKAN-AM Phillipsburg
KLOE-TV Goodland
KUDL-FM Merriam

Kentucky
WBGN-AM Bowling Green
WEZJ-AM Williamsburg
WGOH-AM Grayson 6/1/59
WMTL-AM Leitchfield
WSGS-FM Hazard

Louisiana
KEPT-FM Shreveport
WLBI-AM Denham Springs
WVIE-TV New Orleans

Maine
WKTJ-AM Farmington
WMER-AM Westbrook
WQDY-AM Calais 7/4/59

Maryland
WLTT-FM Bethesda
WTTR-FM Westminister

Massachusetts
WHAV-FM Haverhill
WVBF-FM Farmingham

Michigan
WFMK-FM East Lansing
WILX-TV Onondaga
WMVN-AM Ishpeming
WPBK-AM Whitehall
WQTK-AM St. Johns
WTOM-TV Cheboygan

Minnesota
KDWB-AM St. Paul
KEYL-AM Long Prairie
KGHS-AM International Falls
KLFD-AM Litchfield
KRRK-AM East Grand Forks 8/14/59

Mississippi
WABG-TV Greenwood
WELZ-AM Belzoni
WNSL-FM Laurel 3/59
WXTN-AM Lexington

Missouri
KAOL-AM Carrollton 4/18/59
KPLR-TV St. Louis
KYRO-AM Potosi 2/22/59
KXTR-FM Kansas City

Montana
KGVW-AM Belgrade
KURL-AM Billings
KYSS-AM Missoula 6/27/59

Nebraska
KGOR-FM Omaha
KIMB-AM Kimball 1/13/59
KNCY-AM Nebraska City 6/28/59
KRFS-AM Superior
KSNK-TV McCook

New Hampshire
WENH-TV Duram 7/5/59
WKBK-AM Keene 5/30/59

New Jersey
WDVL-AM Vineland
WNBR-FM Wildwood 11/25/59

New Mexico
KAVE-TV Carlsbad
KBIM-FM Roswell
KDAZ-AM Albuquerque
KKBK-AM Aztec
KRRR-AM Ruidoso
KYVA-AM Gallup 7/15/59

New York
WAUB-AM Auburn
WBFO-FM Buffalo
WBNR-AM Beacon
WBZA-AM Glens Falls
WECW-FM Elmira
WEZG-AM North Syracuse
WLIR-FM Hempstead 10/59
WNED-TV Buffalo 3/30/59
WOTT-AM Watertown
WPXY-FM Rochester
WRNY-AM Rome
WSEN-AM Baldwinsville

North Carolina
WETC-AM Wendell-Zebulon
WGAS-AM South Gastonia
WGHB-AM Farmville 12/12/59
WHKY-FM Hickory
WKSK-AM West Jefferson
WPNC-AM Plymouth
WOOW-AM Greenville
WSMY-AM Roanoke 5/1/59

North Dakota
KDDR-AM Oakes
KTHI-TV Fargo 10/11/59

Ohio
WBNS-FM Columbus
WCPZ-FM Sandusky
WDMT-FM Cleveland
WELA-FM East Liverpool
WIOI-AM Portsmouth
WLVQ-FM Columbus
WMPO-AM Middleport-Pomeroy 2/28/59
WOXY-FM Oxford
WPBF-FM Middletown
WPTO-TV Dayton
WQOD-FM Youngstown
WRRM-FM Cincinnati
WSRD-FM Youngstown
WTTF-AM Tiffin 12/19/59
WTUE-FM Dayton
WWOW-AM Conneault

Oklahoma
KMOD-FM Tulsa
KOED-TV Oklahoma City 1/1/59
KOKH-TV Oklahoma City

Oregon
KRKT-AM Albany

Pennsylvania
WAYZ-FM Waynesboro
WCTX-FM Palmyra
WDAC-FM Lancaster
WDAS-FM Philadelphia
WGRP-AM Greenville
WHYL-FM Carlisle
WHYW-FM Braddock
WQEX-TV Pittsburgh
WTTC-AM Towanda
WWSH-FM Philadelphia

Rhode Island
WARV-AM Warwick

South Carolina
WAGI-FM Gaffney
WGOG-AM Walhalla
WNOK-FM Columbia

South Dakota
KBFS-AM Belle Fourche
KCCR-AM Pierre 2/4/59
KJAM-AM Madison 12/3/59
KKLS-AM Rapid City

Tennessee
WBNT-AM Oneida
WLIJ-AM Shelbyville
WRKM-AM Carthage

Texas
KBAN-AM Bowie
KCTA-AM Corpus Christi
KDLF-AM Port Neches
KEGL-FM Fort Worth
KHBR-FM Hillsboro
KIKK-FM Houston
KIXL-AM Austin
KKAS-AM Silsbee
KKOL-AM El Paso
KNFM-FM Midland
KNFO-FM Waco
KRBE-FM Houston
KXOI-AM Crane
KVLG-AM La Grange

Vermont
WSNO-FM Barre 10/13/59

Virginia
WCWM-FM Williamsburg
WGAT-AM Gate City
WHEO-AM Stuart
WMBG-AM Wiliamsburg
WMNA-FM Gretna 2/28/59
WNLB-AM Rocky Mount
WNWZ-AM Richmond
WSGM-FM Staunton
WSWV-AM Pennington Gap
WVOV-AM Danville
WWWV-FM Charlottesville

Washington
KMBI-AM Spokane 6/59
KNDO-TV Yakima 10/15/59
KPLZ-FM Seattle
KRPM-FM Tacoma
KYXX-FM Seattle

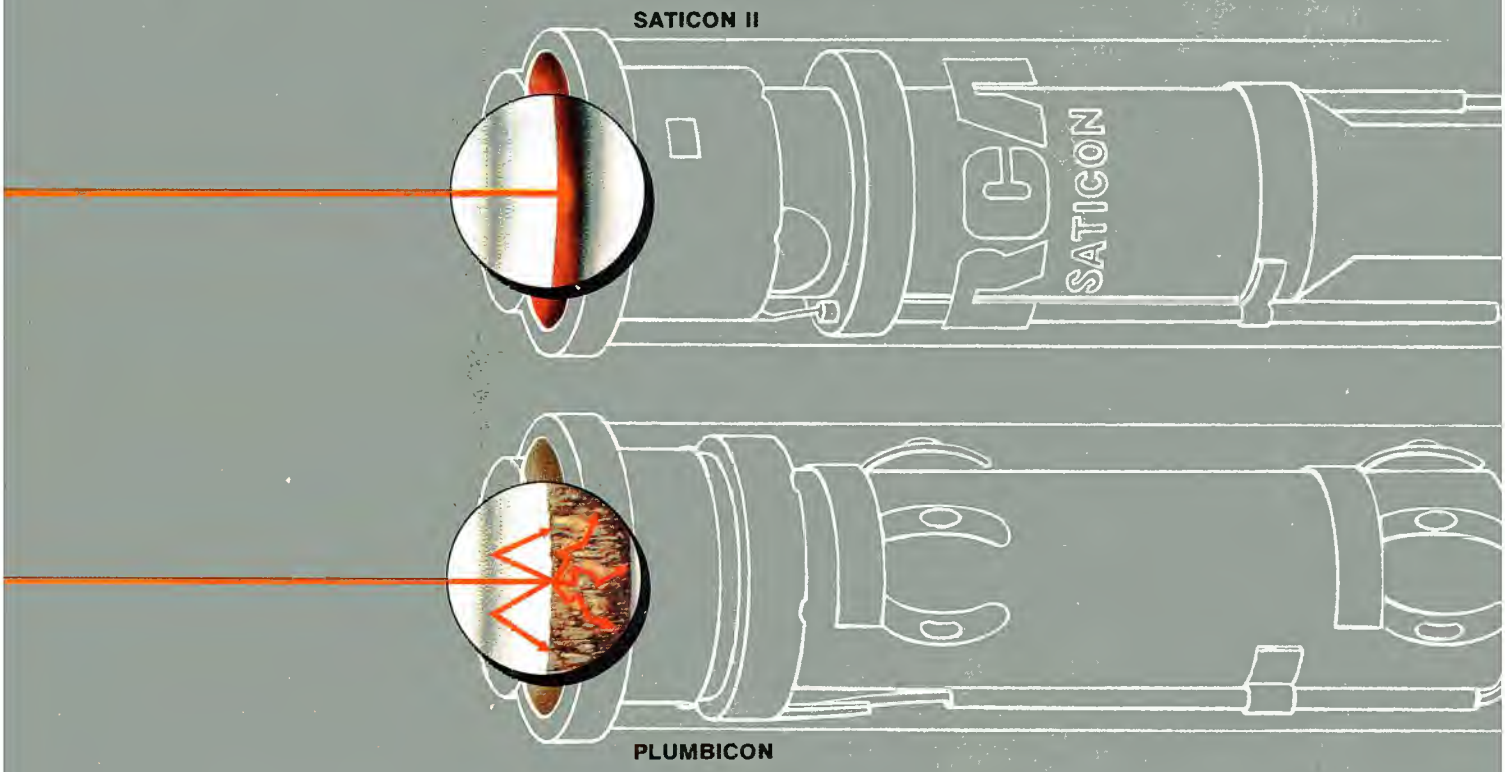
West Virginia
WBUC-AM Buchannon
WQBE-FM Charleston

Wisconsin
WEKZ-FM Monroe
WKTI-FM Milwaukee
WNWC-FM Madison 2/29/59
WSJY-FM Fort Atkinson
WTMB-AM Tomah
WVTV-TV Milwaukee
KXTP-AM Duluth

Puerto Rico
WGSX-FM San Juan
WPRM-FM San Juan 4/1/59
WZNT-FM San Juan

Editor's note:
This listing is based on the 1983 *Broadcasting Yearbook* of radio and TV stations.

Part of your best work may never get past your camera tube.



What you see is not always what you get. The character and quality of your pictures are dependent to a significant degree on the camera tubes you use.

With high performance Saticon* II tubes, you can expect distinctively cleaner, clearer and sharper pictures. The reason lies in Saticon II's newly improved photoconductor. Developed through computer-aided processes, this thin glassy film allows the light to pass through without color diffusion or distortion. The end result is high resolution, distortion-free color, very low lag, high sensitivity and depth of modulation. Highlight memory (without red trail) is also significantly reduced with Saticon II.

With Plumbicon™ tubes, the polycrystalline structure of the photoconductor causes diffusion of incident light. The Plumbicon photoconductor is three times thicker than Saticon II's, which limits its resolution.

Make sure your best work gets past your camera and on the air by specifying high performance Saticon II camera tubes in your original equipment and for tube replacements.

For our guide to camera tube selection, contact your RCA distributor or write to RCA Camera Tube Marketing, New Holland Avenue, Lancaster, PA 17603. Or call (800) 233-0155. In Penna., phone (717) 397-7661. Overseas, contact RCA Brussels, Belgium. Sao Paulo, Brazil. Sunbury-on-Thames, Middlesex, England. Paris, France. Munich, W. Germany. Hong Kong. Mexico 16 DF, Mexico.

*Used by permission of trademark owner.

RCA

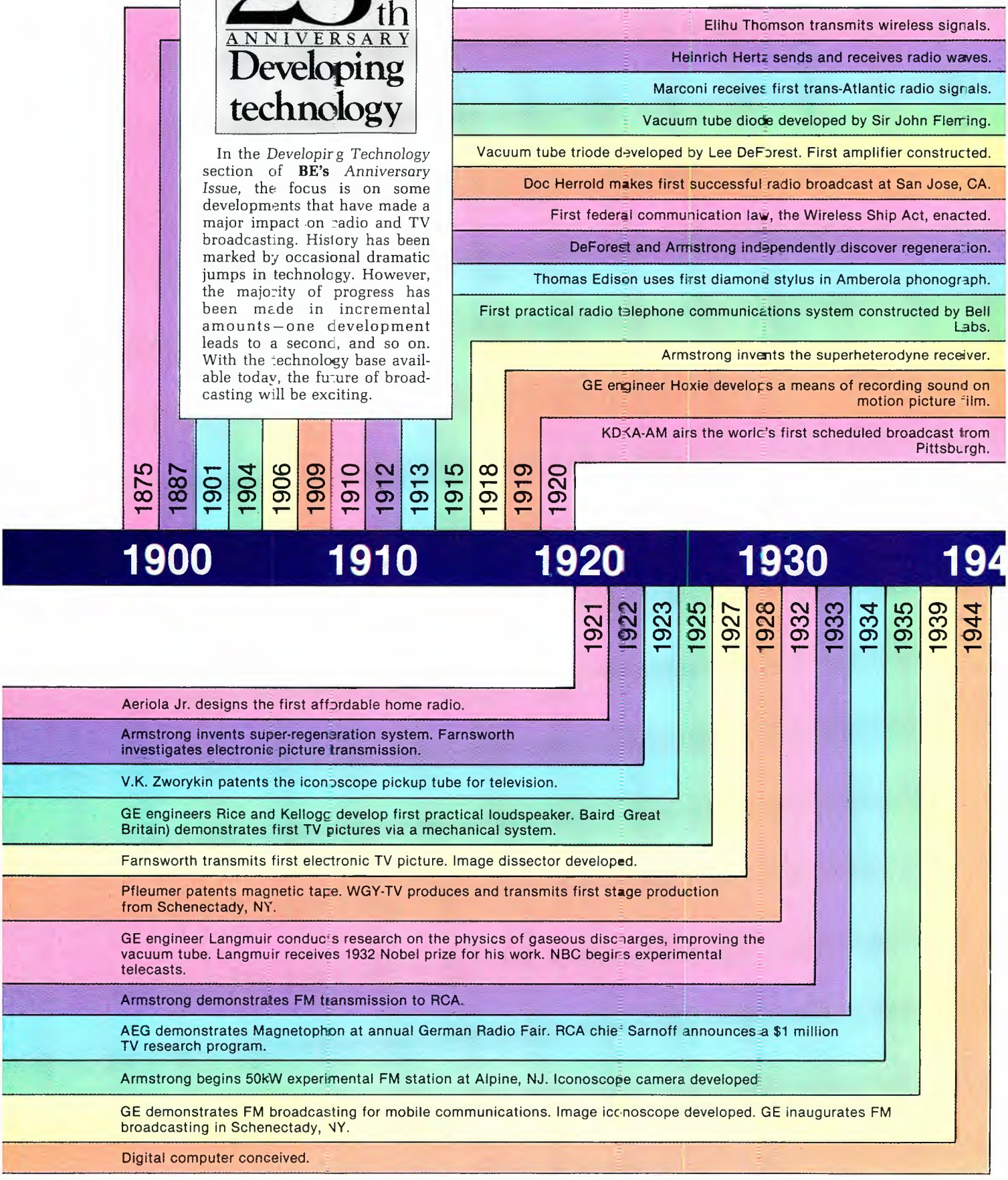
Take out the doubt.

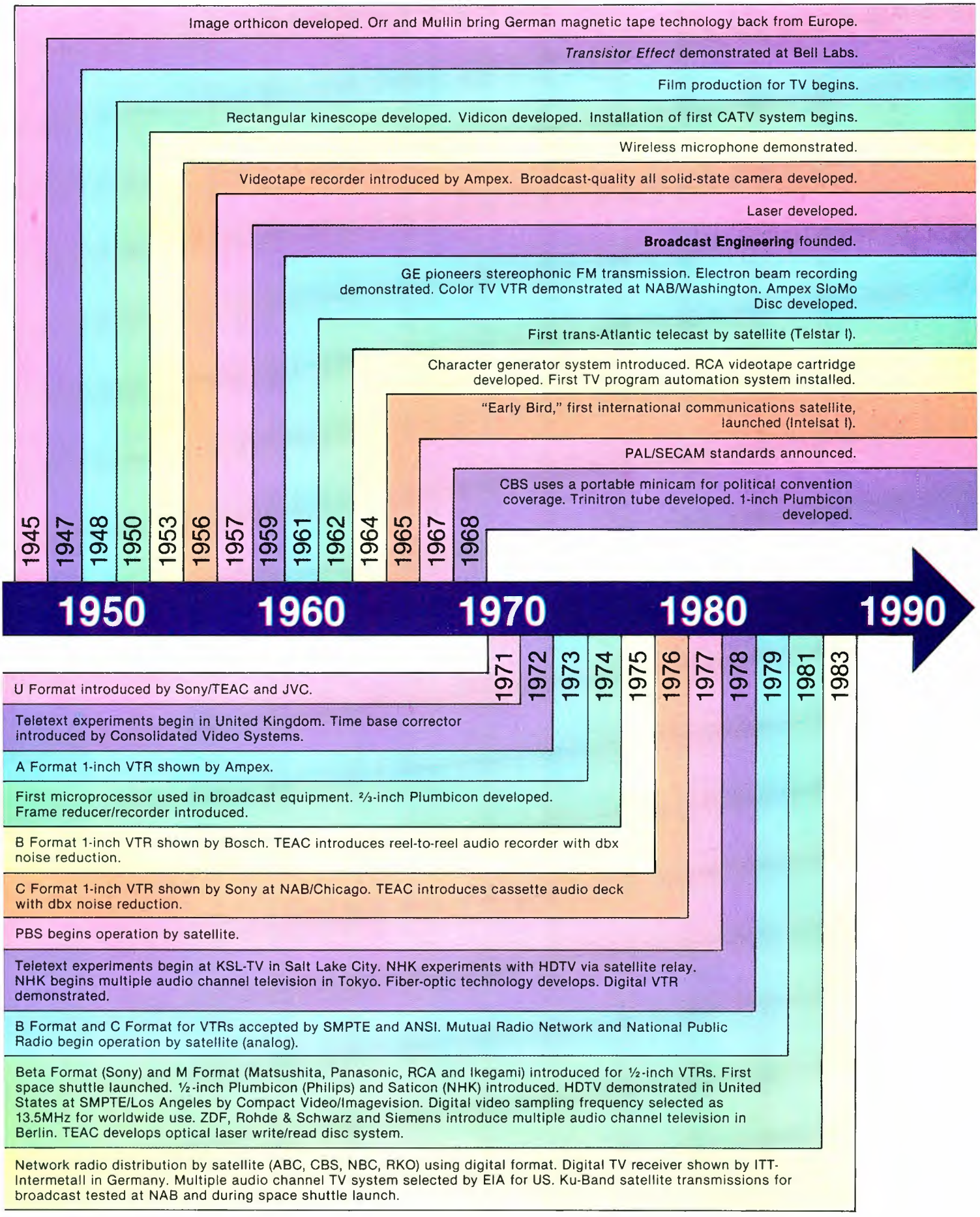
Circle (37) on Reply Card

25th ANNIVERSARY Developing technology

In the *Developing Technology* section of **BE's** *Anniversary Issue*, the focus is on some developments that have made a major impact on radio and TV broadcasting. History has been marked by occasional dramatic jumps in technology. However, the majority of progress has been made in incremental amounts—one development leads to a second, and so on. With the technology base available today, the future of broadcasting will be exciting.

Major industry milestones





Milestones in the evolution of technology

By the **BE** staff

The invention of the vacuum tube diode by J. Ambrose Fleming in 1904 and the triode vacuum tube amplifier by Lee DeForest in 1906 launched radio into a new era. Early experimental stations took this new technology and began developing their own tubes using in-house capabilities, including glass blowing. As the young electronics industry began to grow, vacuum tubes were produced in great quantity and standardized (to a point), making it possible for the new technology to grow immensely.

In December 1947, Dr. William Shockley of Bell Laboratories changed the course of history by demonstrating to his colleagues a newly

Courtesy of AT&T Bell Labs

Shown is the first point-contact-type transistor, assembled on Dec. 23, 1947, at Bell Laboratories. The device amplified electrical signals by passing them through a solid semiconductor material—the same basic operation performed by present-day junction transistors.

Courtesy of AT&T Bell Labs

Some of the first investigations leading to the discovery of the transistor were made with this apparatus at the Bell Telephone Laboratories. Dr. William Shockley (seated) initiated and directed the lab's transistor research program. Dr. John Bardeen (standing, left) and Dr. Walter H. Brattain were key scientists in bringing the invention to reality.

discovered device that exhibited what he called the *transistor effect*. From this demonstration and a later one at the Bell Labs in New York City on June 30, 1948, sprang one of the most important inventions of the 20th century—the working transistor. For their development efforts, Bell Telephone scientists John Bardeen, Walter H. Brattain and Shockley received the Nobel Prize in physics in 1956.

The transistor launched a new era in science and technology. Advances in transistor junction construction and miniaturization have led to devices such as the integrated circuit (IC), microprocessor, large scale integration (LSI) IC chip and very large scale integration (VLSI) IC chip.

Broadcasters and broadcast equipment manufacturers have been eager to implement this new technology because of the compactness, reliability, flexibility and efficiency that it affords.

Television

The development of TV broadcasting dates back to the 1920s and two men, Philo T. Farnsworth and Vladimir Zworykin, who spent their lives perfecting the new technology. As early as 1923, Zworykin, then working for Westinghouse, demonstrated the first pickup tube that permitted all-electronic television. His first device, the iconoscope, consisted of a thin aluminum-oxide film supported by a thin aluminum film and coated with a photosensitive layer of potassium hydride. With this crude camera tube and a CRT as the picture reproducer, Zworykin had the essential elements for electronic television.

Continuing his pioneering work, Zworykin developed an improved iconoscope eight years later that employed a relatively thick, 1-sided target area. He had, in the meantime, continued work on improving the quality of the CRT and presented a paper on his work to the Eastern Great Lakes District Convention of the Institute of Radio Engineers (IRE) on Nov. 18, 1929. The presentation attracted the attention of David Sarnoff, then vice president and general manager of RCA, leading to Zworykin joining RCA Victor in Camden, NJ, where he was made director of RCA's electronics research laboratory. By 1931, with the iconoscope and CRT well-developed, electronic television was ready to be launched—and Sarnoff and RCA were ready for the new industry of television.

In 1922, Farnsworth, another pioneer in developing television, concluded that mechanical TV systems were doomed to failure and that an electronic means was the way of the future. By 1927, he had achieved his

Continued on page 68

The Studer for Tomorrow's Teleproduction

Introducing the A810 stereo recorder with center track SMPTE code...from Studer, the world leader in audio recording equipment.

Stereo + SMPTE Code on ¼" Tape

This is the one recorder made to meet your demand for better quality stereo audio for video productions. With a Studer A810 you can produce state-of-the-art audio tracks, then use any SMPTE-based synchronizing/editing system to lock the A810 to your VTR's.

You don't need a 4-track recorder. You don't need ½" tape. And you don't have to program offsets into your synchronizer.

It's all possible because the A810's optional center-track SMPTE code system uses a separate set of code heads, working in conjunction with a microprocessor controlled digital delay. The separate heads assure code-to-audio crosstalk rejection of better than 90 dB. And the digital delay automatically compensates for the tape travel time between code and audio reads at all four tape speeds.

Total Microprocessor Control

The on-board CPU controls all A810 transport functions, all audio status switching, and all audio parameter settings. Design flexibility lets you program the A810 to do what **you** want it to do. A zero locate and one autolocate position are fixed, but three additional "soft keys" may be programmed for a variety of functions, including up to three more locate positions and two different edit modes. All audio parameters (bias, level, EQ) are set digitally and stored in memory, with memory storage for two different formulations at all four speeds. After initial set-up, you can switch to your alternate tape simply by pushing a button.

External Computer Control

With the optional serial interface, you can control all transport and audio functions with your personal computer (RS232) or with any device conforming to the forthcoming EBU/SMPTE standard (RS422 modified).

Studer Performance and Reliability

Using all-new electronics with advanced phase compensation circuits, the A810 delivers audio performance that is – compared to most other recorders – just short of phenomenal. And, as with all Studer products, the A810 is made from solid components and assembled with Swiss precision.

Get your production room ready for tomorrow's stereo audio. Call today for the location of your nearest Studer dealer.

STUDER REVOX

Studer Revox America/1425 Elm Hill Pike/Nashville, TN 37210/(615)254-5651

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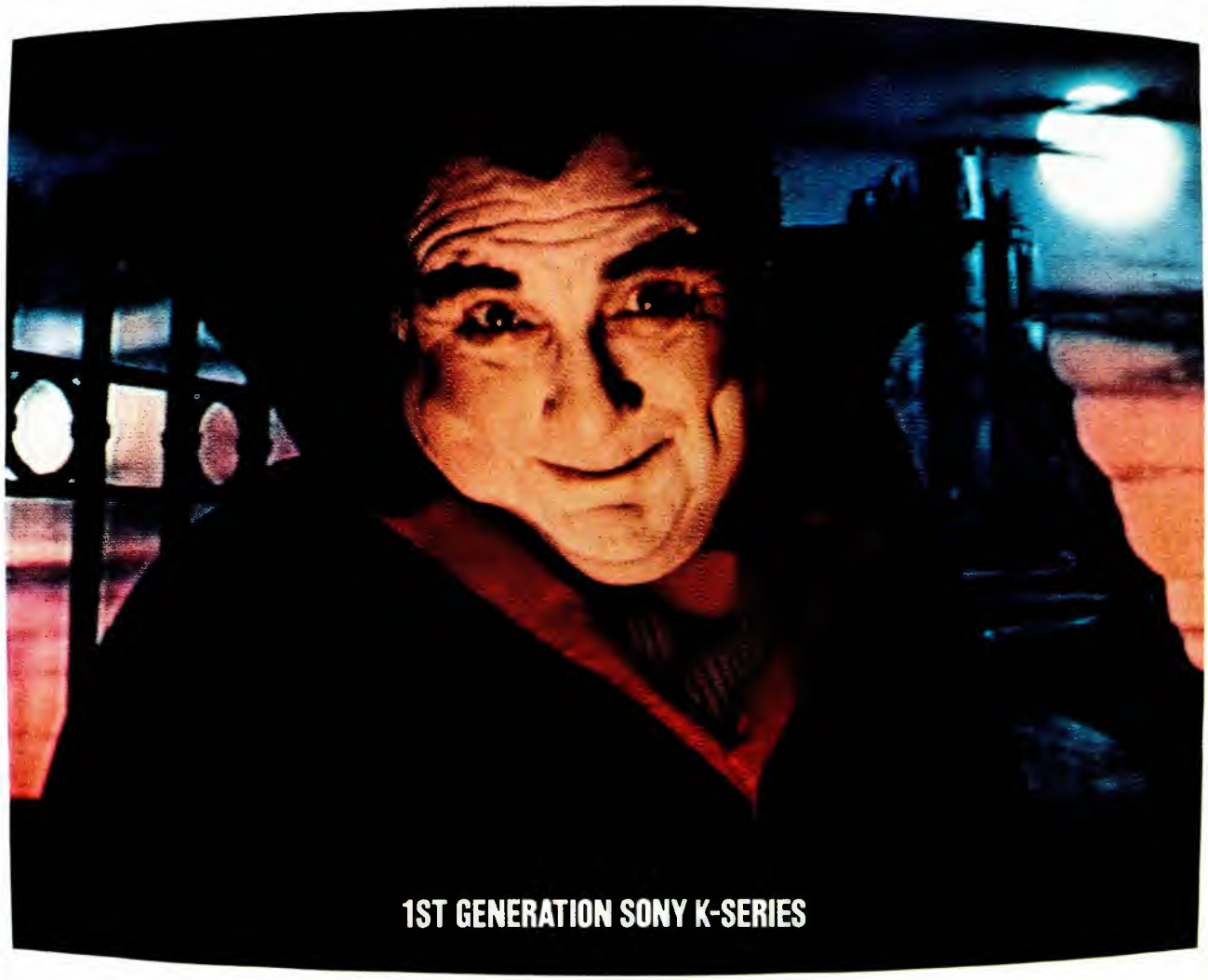
NOW YOU TERRIFIC FOR

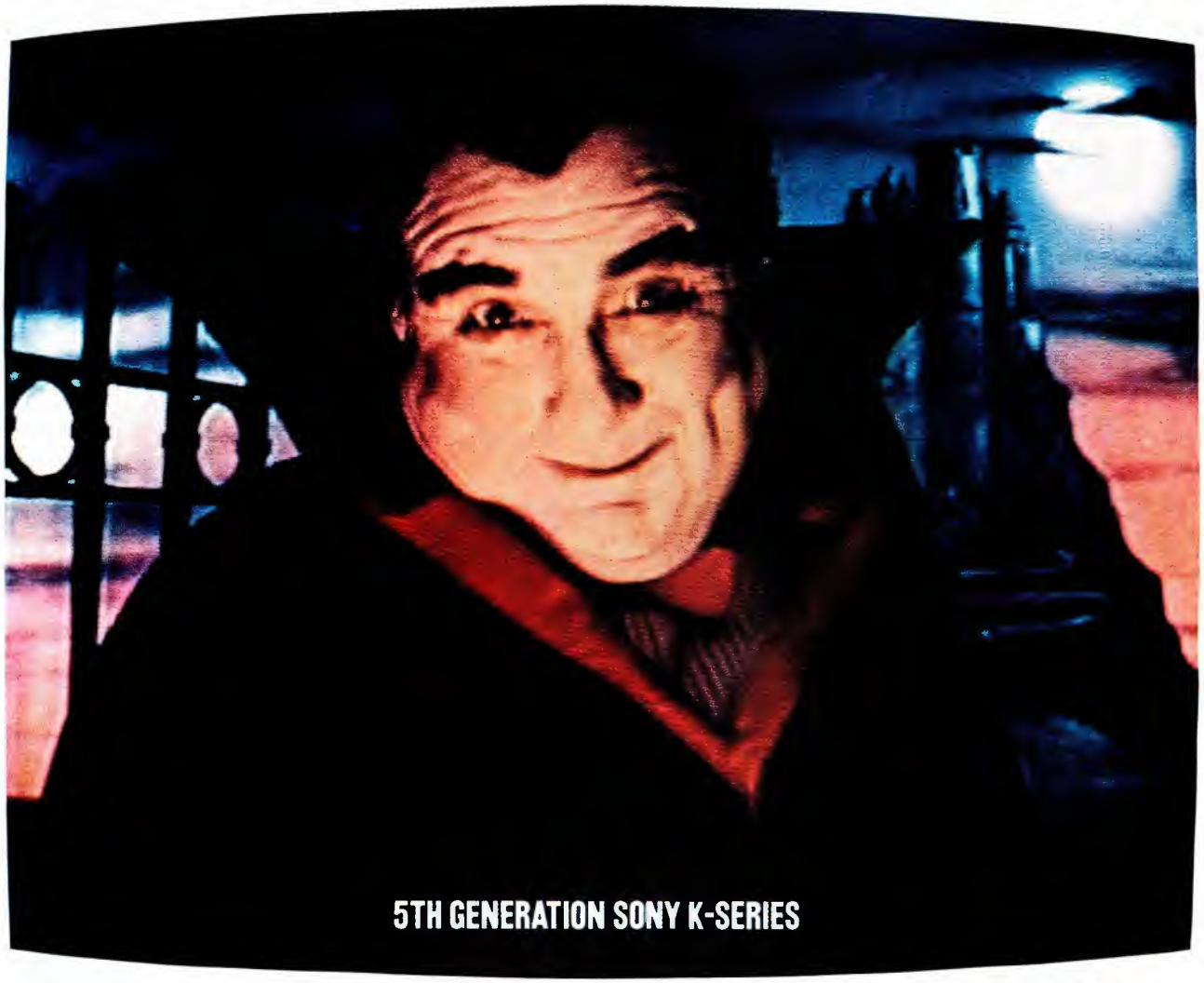


You can search the tape manufacturing facilities from Toledo to Transylvania and you'll go bats trying to find a ¾″ videotape that'll render pictures like the new Sony K-Series.

In the deep recesses of the Sony labs, our scientists have discovered the secret to long life. No longer will multi-generations draw the color out of your production. This is due in part to Sony's exclusive signal retention binder. It keeps the signal on the tape under the most demanding uses, even extreme temperature fluctuations.

The tape formulation is equally unique. Sony K-Series features Vivax™ magnetic particles, which are smaller than chrome oxide particles, and give you more information on the tape than ever before. So you start out with more vivid, lifelike pictures. Demons like dropouts, which have a nasty habit of puncturing holes in your video, have been dramatically reduced. As is the case for modulation noise. And the Sony K-Series has the highest color

CAN LOOK GENERATIONS.



signal-to-noise ratio in the industry. This new Sony U-matic® tape is also distinguished by a smoother tape surface. It reduces headwear. So you not only increase your tapes' usability, but your tape recorder's as well.

And there's one other significant factor to consider. After close examination of videotape, we've discovered one thing is consistent: the inconsistency of tape. This is a problem you won't have to face with Sony K-Series. The millionth one you buy will be a mirror image of the first.

So if you're looking for a U-matic tape that gives you better pictures that last longer, look for the one designed for the run and rerun and rerun and rerun. New K-Series from Sony.

SONY®
The Tape Measure In Video.

Continued from page 64
first successful transmission and applied for his first TV patent. In 1930, the 34-year-old Farnsworth received his patent, and in the following year entertained Zworykin in his California laboratory.

Farnsworth's original broadcast included the transmission of graphic images, film clips of a Dempsey/Tunney fight and scenes of Mary Pickford combing her hair from her role in the *Taming of the Shrew*. This pioneering broadcast set in motion the progression of technology that would lead to commercial broadcast television 20 years later.

In his early systems, Farnsworth could transmit pictures with 100- to 150-line definition at a repetition rate of 30 lines per second. By 1939, Farnsworth held many patents for television, and through the mid-1930s remained RCA's fiercest competitor in developing new technology. In many ways, the image dissector pickup tube developed by Farnsworth, who worked for a time at the Philco Corporation, was unable to match the quality of RCA's iconoscope. In other ways, however, it exhibited superior performance.

Farnsworth died in 1971 and is credited only slightly for the giant industry that he helped create.

General Electric also played an early role in the development of television. In 1926, Ernst Alexanderson, a young engineer at the company, developed a mechanical scanning disc for video transmission. He gave a public demonstration of the system two years later. Coupled with the GE experimental TV station, WGY (Schenectady, NY), Alexanderson's system made history on Sept. 11, 1928, by broadcasting the first dramatic program on television. It was a 40-minute play titled, *The Queen's Messenger*. The program involved two characters performing before three simple cameras.

Courtesy of AT&T Bell Labs

Shown is the first point-contact transistor (Bell Labs code number 1A) to find commercial use in the United States. Although announced to the public in 1948, it was 1952 before transistors similar to this one assumed an active role in the Bell System communications network.

Courtesy of AEG and Ampex Museum of Magnetic Recording

Starting in 1931, AEG engineers in Berlin began developing the Magnetophon tape recorder (a dc-bias machine) while BASF chemists produced the first modern iron-oxide tape formula. The discovery of ac bias recording in 1939-'40 led to regular on-air use of the Magnetophon on German radio by 1941. Shown at Radio Kiel in 1942 is an AEG K-4 deck similar to the two machines brought back to San Francisco by John Mullin in 1946. Mullin's machines inspired Ampex to produce the first successful US professional audiotape recorder in 1948.

Tape recording

Before the Germans developed their Magnetophon tape recorder in the mid-1930s, recording technology was strictly a laboratory science. Near the end of the war, several of the recording machines and reels of recording tape were obtained by Allied forces. Two of the Magnetophons were returned to the United States after the war and were the basis for early development of the audiotape recorder.

John Mullin, in the US Army Signal Corps at the time, first saw the Magnetophon at a makeshift radio station outside the bombed-out town of Frankfurt, Germany. Mullin was impressed with the device's wide dynamic range and remarkable audio fidelity. After he returned to the United States, Mullin modified the Magnetophon and demonstrated its capabilities to Bing Crosby. Mullin remembers the historic encounter:

"The most unforgettable moment in my life was the one when I stood before my Magnetophon tape recorder and pressed the *Playback* button for the first time in the presence of Bing Crosby, John Scott Trotter, and Bing's producers, Bill Morrow and Murdo McKenzie. Everything was at stake. By invitation I had been present with my colleague, Bill Palmer, to record the first radio show of the 1947-'48 season in the NBC/ABC studio complex in Hollywood. And now we were to hear the result of our efforts and be judged by perhaps the most critical ears in the world of radio and recording.

"Prior to our invitation to come to Hollywood from San Francisco to record, and possibly, just possibly, to edit our tape into a complete show, the producers had looked into every alternate means of recording sound that showed any promise of success. Mostly, these boiled down to variations of disc recording methods and photographic sound-on-film systems. I am sure ABC held out little hope for

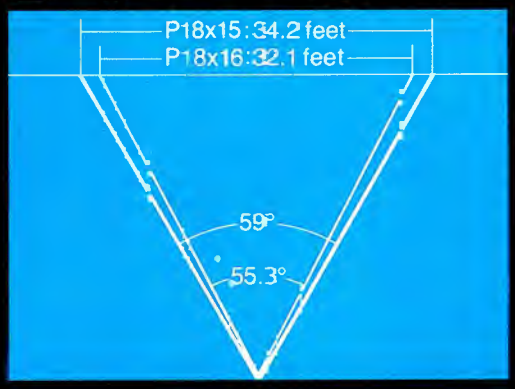
New Standards

The Widest Angle, The Highest Performance

Canon engineers have done it again, advancing the optical state-of-the-art so far forward that new standards must be considered.

The Canon P18 x 15 BIE offers the widest angle of any broadcast television zoom lens: 59° plus incredible edge-to-edge sharpness, fidelity and sensitivity throughout its 18X range.

Every one of these superb lenses will be supplied with both 1.5X and 2X built-in extenders and a pattern projector. Options include manual, semi-servo or full servo operation.



The Canon P18 x 15 is the most versatile studio lens ever made, setting new standards for years to come.

P18 x 15 BIE F2.1 for 30mm Cameras*
KEY SPECIFICATIONS

- Focal length: 15-270mm
- Max. Relative Aperture: 1:2.1 (15-218mm) 1:2.7 at 270mm
- Angular Field of View: 59° x 45.8° at 15mm 3.6° x 2.7° at 270mm
- Minimum Object Distance: 0.6 meter (2 feet)

*Also available PV18 x 1 BIE F1.6 for 25mm Cameras

Canon Studio Standards

P18 x 16 BIE

PV12 x 14 EIE

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Circle (41) on Reply Card

success in testing our apparatus.

"The tape came up to speed, then, opening theme—Crosby: *Blue of the Night;* applause; introductory patter—Crosby and Carpenter; song—Crosby: *My Heart is a Hobo;* applause.

"Murdo McKenzie signaled me to 'cut.' I pressed the *Stop* button. There were surely no more than two seconds of silence, which seemed more like minutes to me, and then a shower of compliments. One small machine, one of a pair, side-by-side on a makeshift table—the only two of their kind in the United States arranged to record and reproduce magnetic tape with such remarkable fidelity—had, in a listening demonstration lasting almost exactly five minutes, upset the entire future of sound recording in this country."*

Videotape recording

While work continued on perfecting audiotape recording, the TV side of broadcasting was growing up. In the early 1950s, Ampex Corporation engineers began work to open up a new frontier—videotape recording. In less than a decade, recording technology advanced from a high frequency limit of 20kHz to video magnetic frequencies ranging to 5MHz or higher.

The development of the videotape recorder was the product of years of hard—and at times inspired—work by a 6-man engineering team at Ampex. At times progress was slow, and the project was put on the shelf more than once.

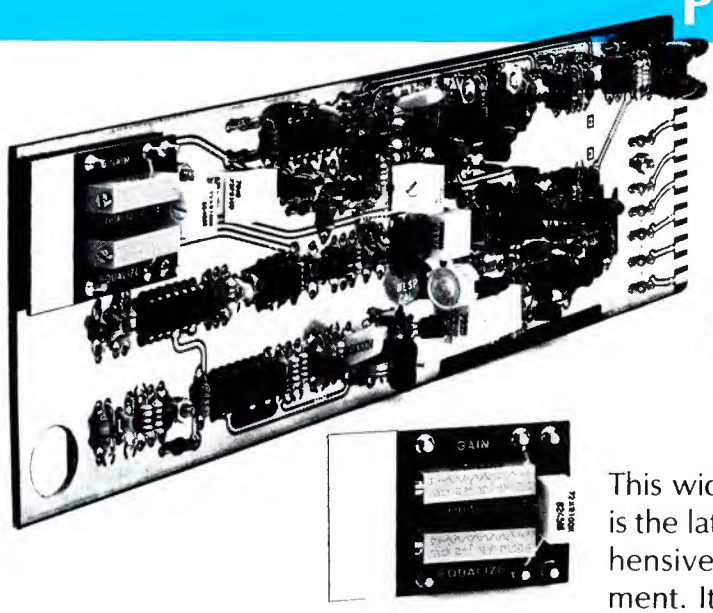
At the beginning of the effort in 1951, the concept of the video recorder system involved the use of three tape heads mounted on the surface of a drum, scanning in an *arcuate* fashion the surface of a 2-inch-wide tape. The tape-to-head speed was to be about 2500ips (with the tape moving at 30ips). This speed proved to be impractical, however, and eventually was set at 1500ips. Designers hoped the system would give dependable recording frequencies as high as 2.5MHz. Progress was slow in the early months of the project, but in October 1952 engineers were able to demonstrate an almost unrecognizable picture that still was promising enough to maintain management's enthusiasm in the video recording project.

By March 1953, a second machine had been built using four heads mounted on the plane face of the drum (instead of three). An amplitude modulation system was used in the recorder and a switching arrangement

*Reprinted from the article, "Discovering Magnetic Tape," by Mullin, which appeared in the May 1979 issue of **BE**.

Continued on page 74

HIGH PERFORMANCE



Video Equalizing Amplifier VEA-662

$265.00

This wideband, six-output amplifier is the latest addition to our comprehensive line of distribution equipment. It features differential input, soft backporch clamping and easily set, continuously variable equalization from zero up to 300 meters (1000 feet) of Belden 8281 or equivalent coaxial cable. Delay trim and common mode hum null controls are also provided. A unique feature of this ultrastable, low power amplifier is a removable sub-module which contains the operational controls for gain and equalization. This allows instant, adjustment-free amplifier substitution.

Here are some prominent **SPECIFICATIONS**

Input

Return loss	> 54 dB to 5 MHz > 46 dB to 10 MHz
Common mode rejection	> 60 dB to 1 kHz

Outputs

Return loss	> 40 dB to 5 MHz > 36 dB to 10 MHz
Output isolation	
Signal (3.58 MHz)	> 48 dB
Load	< 0.05 dB/load at 10 MHz < 0.15°/load at 3.58 MHz
Output DC	< ±25 mV at back porch

Timing

Delay	25.4 ns (32.7° at 3.58 MHz)
Adjustment range	typically 6° at 3.58 MHz

Power Requirements

Total power dissipation	< 2 W

Performance

Frequency response	< ±0.02 dB to 5 MHz < ±0.1 dB to 10 MHz +0 -0.2 dB at 15 MHz typically -0.6 dB at 20 MHz
Differential phase	< 0.1° 10% to 90% APL
Differential gain	< 0.2% 10% to 90% APL
H tilt	< 0.25%
V tilt	< 0.25%
S/N ratio	> 70 dB to 20 MHz (rms noise/0.714 V) unweighted

Equalization

Range	0 - 300 m (0 - 1000 ft) Belden 8281, Northern Electric 728, or equivalent
Response	< ±0.05 dB to 5 MHz < ±0.15 dB to 10 MHz typically -0.2 dB at 15 MHz typically -1.0 dB at 20 MHz

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Tel.: (804) 424-7920
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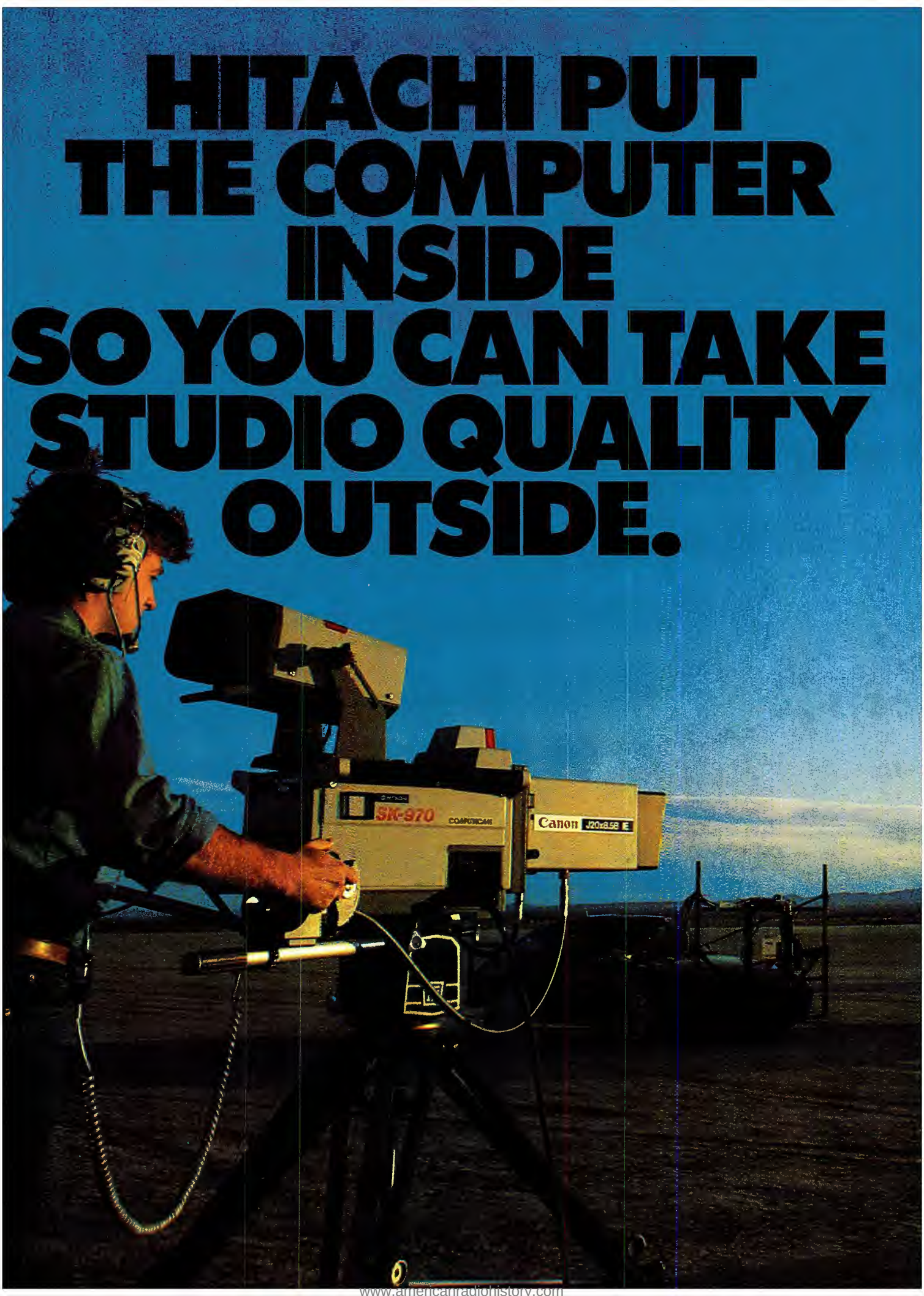
Telex: 06 986 241

Circle (43) on Reply Card

HITACHI PUT THE COMPUTER INSIDE SO YOU CAN TAKE STUDIO QUALITY OUTSIDE.



You're shooting the big one. A national political convention. The World Series. Or the most ambitious car commercial ever taped on location.

Until now, either you run the risk of ruining your best studio cameras in the field. Or go with your best field cameras and risk falling short of the quality you're looking for.

Well, agonize no longer. Hitachi's new Computacam™ is here. The first video camera with an on-board computer that sets up automatically in just 2 minutes—including the green channel. And that delivers big camera studio performance at virtually any location. Because the computer in Computacam gives *you* total control.

POWERHOUSE COMPUTER IN A 55-POUND PACKAGE.

With the Hitachi Computacam SK-970, you don't set up cameras one by one using an external computer—which can waste all kinds of expensive time on a multi-camera shoot. And which means you can lose automatic set up on *all* your cameras if the external computer should ever go down.

Your least experienced cameraman can balance all your Computacam cameras perfectly with the push of a button. Each camera has a built-in diascope. And each computer has data files that correct for everything from light to lenses. These files even "remember" conditions if you should ever have to reshoot. Yet all these electronics come in one small, incredibly rugged package.

Most important, the computer in Computacam is the *only* one that can store data to correct for registration errors caused by lens zooming and focusing. And it's the *only* computer that dynamically compensates for temperature so you'll know your picture's centered in either a blazing desert or a blinding snowstorm.

PLUMBICONS AND OTHER PLUMS FOR PERFECTIONISTS.

For all its finesse in the field, don't forget you're also getting a *great* studio camera in Computacam SK-970. That comes with either Plumbicon® or Saticon® high-performance pickup tubes that provide up to 700 lines of horizontal resolution. This means picture quality that can open up whole new markets.

Computacam is the beginning of a whole new family of cameras. We already have an EFP shoulder-mount version—the SK-97—that also has an on-board computer and the same technical features you get in the SK-970.

What will it cost you to have the camera for all places and all seasons? Put it this way. Even with a 7-inch viewfinder and a wide array of lenses, it's a whole lot cheaper than the finest motor car. And you'll be getting the same order of performance.

Only Hitachi has Computacam. And it's not excessive to say it's the next generation of video cameras.

For more information, contact Hitachi Denshi America, Ltd., Broadcast and Professional Division, 175 Crossways Park West, Woodbury, NY 11797. (516) 921-7200. Offices also in Chicago, Cincinnati, Dallas, Denver, Seattle, Atlanta, Los Angeles and Washington, D.C.

HITACHI

Circle (44) on Reply Card

High speed camera car by Rainbow Industries

Continued from page 70

selected the proper heads during rotation of the drum. The capstan motor was driven directly from the 60Hz line frequency and the high speed drum motor was driven by a power amplifier whose input was the fifth harmonic of that signal (300Hz). A reference drum motor speed signal was recorded on the tape along with the video information and used during playback to provide drum motor power amplifier control.

In September 1954, after periods of inactivity, the VTR project was recommended in earnest, with several

New frontiers in IC design

AT&T, through its research arm, Bell Laboratories, has been a driving force in the development of new semiconductor products. In less than 40 years, semiconductor technology has grown from a single, crude junction transistor to microcomputers on a chip.

Today an experimental, interactive computer-based system is helping Bell Labs design engineers lay out and examine new integrated circuits on a color graphics display terminal. The circuit's various layers are shown in different colors, and the engineer easily can modify the design by using the computer system's comprehensive software package. Bell Labs has used other advanced computer-aided design techniques for such complex circuits as an echo-canceler chip that improves transmission quality on satellite circuits. The echo-canceler chip contains 35,000 transistors and replaces about 350 separate integrated circuits.

New photoresist coatings developed at Bell Labs could lead to integrated circuits with perhaps more than 1 million elements per device. The simple steps of the process may allow today's standard optical lithography equipment to create circuit features less than a micron wide.

IC design work is being aided today by laser technology. Precisely timed pulses as short as 30 millionths of a billionth of a second (30 femtoseconds) are used as tools to investigate ultrafast electronic processes in the materials from which integrated circuits are made.

THE TECHNOLOGY THAT REVOLUTIONIZED VIDEO

THE COMPUTER BASED DIGITAL AUDIO STORAGE SYSTEM
WHICH PROVIDES INSTANT RANDOM ACCESS TO
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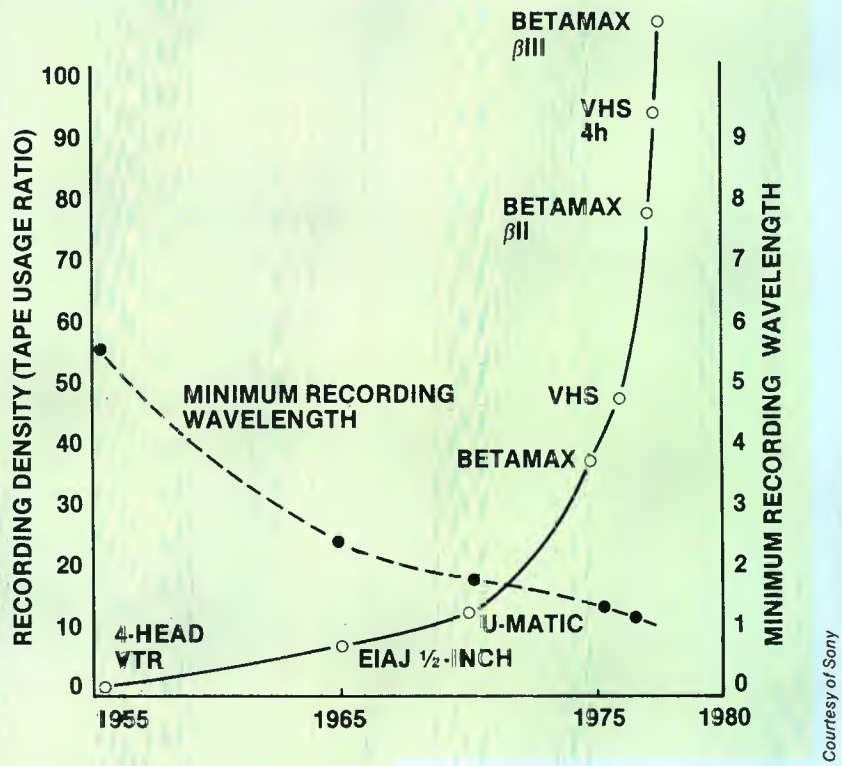
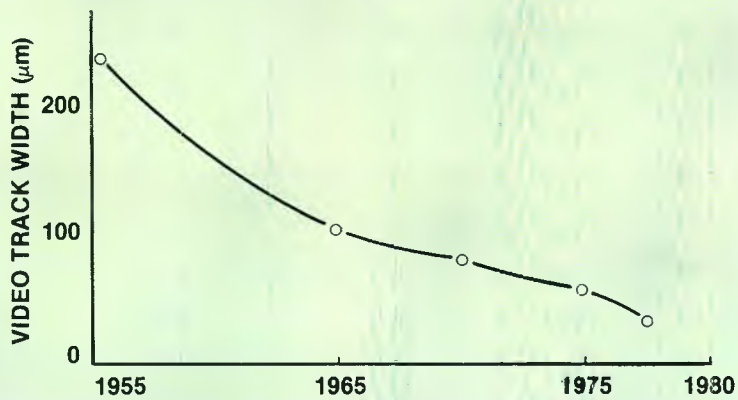
Improvements in recording density

Great advances have been made in recording density since Ampex first demonstrated its videotape machine at the 1956 NAB Convention in Chicago. Figure 1 charts increased tape usage with time, showing the dramatic advances made in tape recording technology over the past 28 years. Figure 2 illustrates improvements made in recording technology as measured by tape track width.



Courtesy of Sony

Figure 1. Shown are the improvement in videotape recording density with time and the improvement in minimum recording wavelength with time.



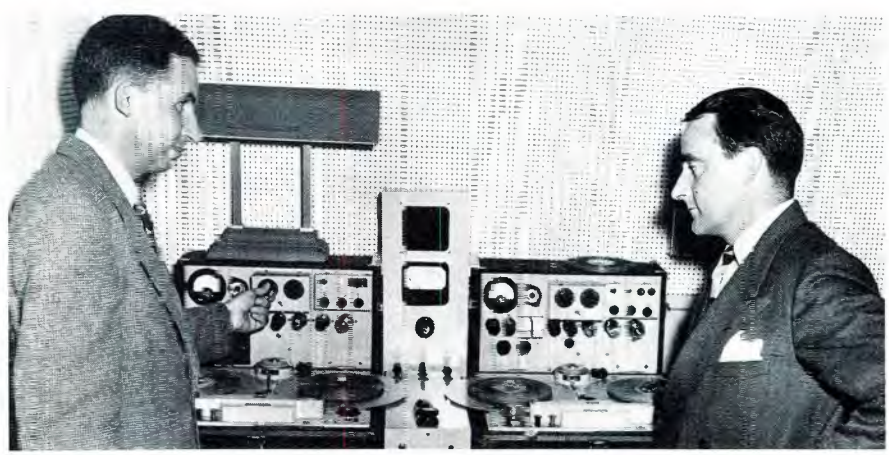
Courtesy of Sony

Figure 2. Improved tape recording density has resulted in reduction of the video recording track width, as shown.

significant technical changes. Instead of the arcuate sweep configuration, engineers changed to a geometry that became standard in the late 1950s in which the tape wrapped transversely around the rotating head drum. Consequently, the video information was written across the moving tape in straight lines. An automatic gain control also was developed to compensate for amplitude fluctuations of the rotating head recording system.

Creating the head assembly was a monumental task. Engineers had to develop a head unit that met stringent mechanical and electrical specifications. Complicating the process were the high centrifugal forces that the head assembly faced during operation.

In December 1954, the first picture was demonstrated using the new



Courtesy of Ampex Museum of Magnetic Recording

In this 1947 photo, engineer Mullin (left) shows his modified Magnetophon tape recorders to Murdo McKenzie, Bing Crosby's technical producer. Mullin's ability to edit on his high fidelity German recorders without generation loss created a sensation in American broadcasting. Mullin's machines later inspired the Ampex model 200.

5050 MARK III-2 Two Channel Recorder

IN 1994, YOUR STATION IS SURE TO HAVE ONE FAMILIAR FACE.

The compact console version of the legendary OTARI 5050 "B" is built to be around for many years. It's the ¼" two-channel professional machine that has been designed with the performance, features and flexibility a broadcaster needs—today and well into tomorrow.

The rugged MARK III-2 has three-speed capability (field-selectable in pairs of 7.5/15 or 3.75/7.5 ips) with ±7% vari-speed, dynamic braking for gentle tape handling, and it's the only machine in its price category that's available with a full-function autolocator. The MARK III-2 also features an external machine control interface connector for use with SMPTE time code-based synchronizers or the autolocator. Front panel record calibration adjustments, two-frequency oscillator and an extra ¼-track playback head are just a few of the helpful production features we've built in.

After you compare features, performance and price, you can feel comfortable making an investment in the machine that's built for the real world.

We're confident of our new MARK III-2. And you can be too.

Contact your nearest dealer who represents The Technology You Can Trust.

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Courtesy of Ampex Museum of Magnetic Recording

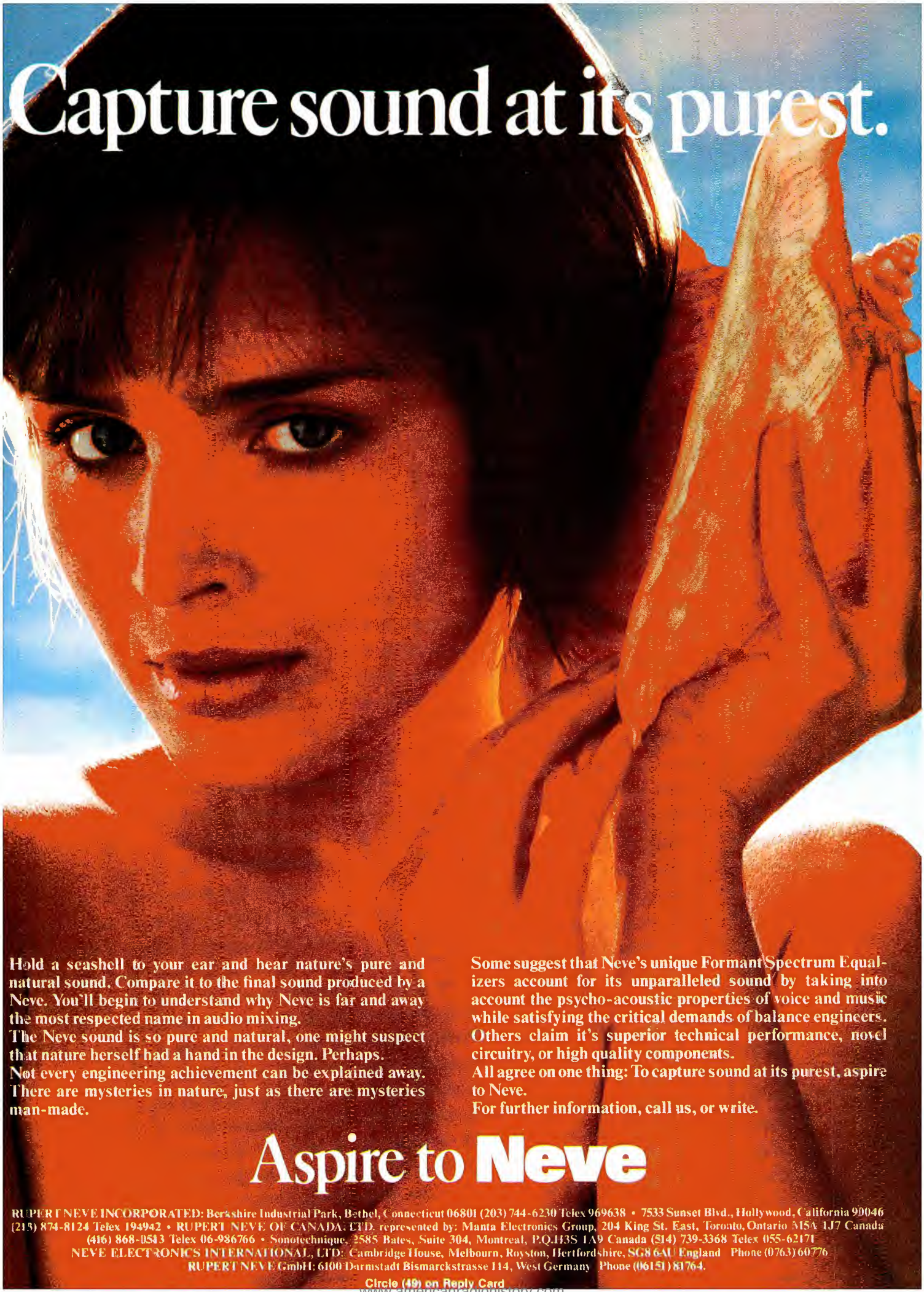
Above, Ampex chief engineer Harold Lindsay checks out the first American professional audiotape recorder, the model 200. This machine was first used by ABC in 1948. The rugged design of the model 200, and financial and political support from Crosby, turned industry skepticism about magnetic recording into widespread confidence—almost overnight.

Crosby's influence on American broadcast technology extended to television, as well as radio. The first promising VTR experiments took place at the Crosby Enterprises Electronics Division under chief engineer Mullin. At right, this 1951 fixed-head longitudinal recorder pulled tape at 100ips. With an 8000-foot-long reel of tape, 16 minutes of program material could be recorded. RCA—led by Harry Olson—and the BBC—under P.E. Axon—also used fixed-head recording systems and high tape speeds. None of the machines, however, reached production.

Courtesy of 3M

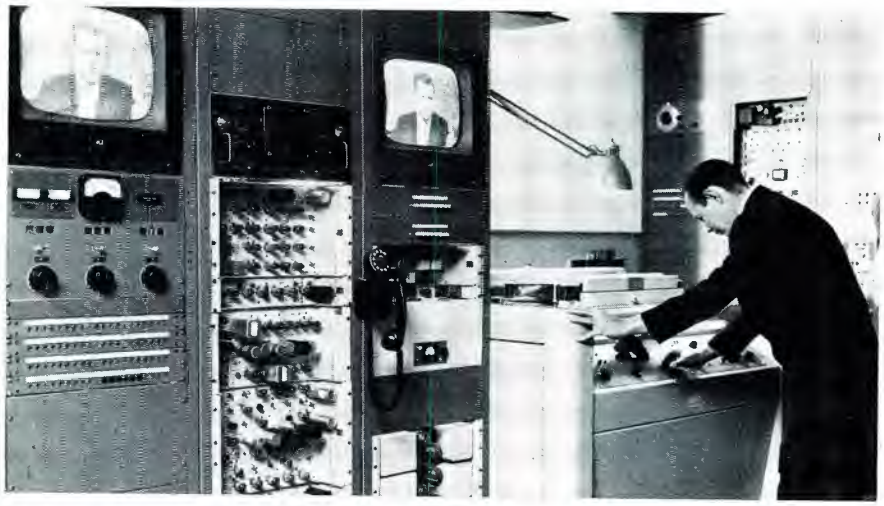
Mullin checks a section of tape from the Magnetophon machine used to record Crosby's first shows for radio broadcast in 1947. For comparison, to his left is a modern, multitrack professional audio recorder.

Courtesy of John Mullin



Courtesy of Ampex Museum of Magnetic Recording

In February 1956 Charles Ginsburg and his engineering team showed their almost-perfected VTR to Ampex management. Ginsburg (left) is shown leading the demonstration. The managers gave the R&D team a standing ovation after viewing the results of its work.



Courtesy of Ampex Museum of Magnetic Recording

The historic first broadcast via videotape was the CBS airing of the *Douglas Edwards and the News* program on Nov. 30, 1956, from New York City. CBS Television City in Hollywood, shown, replayed the broadcast three hours after it was received on the West Coast. CBS engineer John Radis stands at the controls of the Ampex VRX-1000. In the following months, NBC and ABC followed the CBS lead. Note the racks of support electronics (on the left) for the tape transport.

Courtesy of Ampex Museum of Magnetic Recording

Members of the Ampex videotape recorder R&D team pose around the prototype Mark IV VTR that changed TV broadcasting. Ampex built 16 Mark IV production prototypes in 1956-'57—calling them VRX-1000—before beginning production of the VR-1000 in 1957. Shown (from the left) are: Fred Pfost, Shelby Henderson, Ray Dolby, Alex Maxey, Charles Ginsburg (team leader) and Charles Anderson.

Presenting the Major Maintenance Tool for Dynair's Series 10 Switch

Right. A feather duster.

We first placed the Series 10 audio/video switching systems in the field four years ago. Today, most are still maintenance-free. Unless, of course, you count dusting the buttons.

Nobody's perfect. But we're close.

In fact, this solidly reliable, solid-state Series 10 switching system is virtually transparent to broadband signals. And the specifications we publish are not "typical" or best case. They are guaranteed, off-the-shelf minimums.

Study them. Then consider your installation. The Series 10 uses a single coax cable for control. That's only one economy.

Compare the cost effectiveness:

- The Series 10 switches both standard and high definition signals.
- A 72-hour battery protects the memory.
- The "in use" status of each channel is constantly displayed.
- Up to four levels of switching are available, including video and multiple video, audio and multiple audio, audio-follow-video and time code.

The Series 10 is also flexible.

Select local or remote control. Panel or desktop operation. Or both. You can start with a single level, then add levels and controls with ease.

All this, and it's almost maintenance free. Ask us for a specification booklet.

Feather duster optional.

DYNAIR

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Circle (51) on Reply Card

geometry and modified electronics. In the words of Charles Ginsburg, leader of the Ampex research team, "It took a great deal of faith and understanding to be optimistic in the face of some rather gross shortcomings in the reproduced picture." The decision then was made to attack the video recording process from a different perspective.

A recording system using vestigial sideband frequency modulation was proposed to replace the amplitude modulation technique. In January 1955, the first pictures were seen using the FM video recording system. A few months later, the engineering team gave a convincing demonstration to the Ampex board of directors. Although the resolution was extremely low (the system bandwidth was somewhat less than 1.5MHz) and the video monitor had to be modified to compensate for horizontal instabilities generated by the system, the images produced by the recorder were good enough to persuade management that work should continue.

Development progressed with a number of changes and improvements in the recording system. Vacuum-controlled tape tension was introduced to the unit, and a radical redesign of the tape heads (going to a sandwich-type of construction) was made.

Finally, in early February 1956, the engineering team put on a demonstration for what was supposed to be a small Ampex management group. About 30 company people showed up, however, for the historic event. Ginsburg remembers the demonstration this way:

"For all of us on the engineering project, this was the most dramatic demonstration we were to make. The guests arrived, were seated, a few words were spoken to the effect that we would show them what we had produced and the machine was put in the playback mode to reproduce a program we had recorded an hour earlier.

"We then announced that we would record a sequence and immediately play it back. We recorded for about two minutes, rewound the tape and pushed the *Playback* button. Completely silent up to this point, the entire group rose to its feet and shook the building with hand clapping and shouting. The two engineers who had done more fighting between themselves than the rest of the engineering crew combined, shook hands and slapped each other on the back with tears streaming down their faces."

A crash program followed the demonstration, with introduction of the machine to the industry scheduled for the NAB Convention in Chicago, just six weeks away. After further improvements on the system, the Mark IV (as it then was known) was disassembled for shipment to Chicago. Once reassembled at the convention center, final trimming and adjustments were made. After the surprise Ampex demonstration of videotape recording to the convention, "Pandemonium broke loose and Ampex was flooded with orders," Ginsburg said. The era of videotape recording had arrived.

Editor's note:

Ginsburg's comments and other information contained in the videotape section of this article were taken from the Ampex Corporation publication, *The Birth of Videotape Recording*, by Ginsburg. A copy of the publication is available by writing the Ampex Museum of Magnetic Recording, Ampex Corporation, 401 Broadway, Redwood City, CA 94063. Ginsburg is vice president of advanced technology planning for Ampex.

EMMYs were awarded to Ampex by the National Academy of Television Arts and Sciences in 1957 for development of the first practical videotape recorder and in 1967 for development of highband color videotape recording. 25

Manufacturers' contributions to broadcast technology

Many manufacturing and engineering companies have made significant contributions to broadcast technology over the past 25 years. During this time, there has been a steady march toward the production of equipment with greater versatility, better reliability, smaller size, lower power consumption and easier maintenance than before; the goal of broadcast engineering manufacturers for decades. This drive for product improvement and better market position has pushed the industry ahead in many ways. As **Broadcast Engineering** observes its 25th anniversary, it recognizes some of the manufacturers that provided information and products to the industry in 1959. Table I shows companies that had editorial coverage in the first issue of **BE.** Table II lists companies that ran advertisements in the magazine during 1959.

Table I.
Equipment manufacturers* that had editorial coverage in the first issue of **Broadcast Engineering,** May 1959.

Ampex
Cetec Antennas (Jampro)
Cetec Broadcast (Schaffer)
Continental Electronics (Collins)
Fairchild Instruments
General Electric
Harris (Gates)
Honeywell
Kahn Communications
Kliegl Brothers
Eastman Kodak
Philco
RCA
3M

*Original company name in parenthesis.

Table II.
Some of the major manufacturers* that ran advertisements in **BE** during 1959.

AKG Acoustics
Ampex
Blonder-Tongue Labs
Cetec Antennas (Jampro)
Conrac
Continental Electronics (Collins)
Elcom-Bauer (Bauer)
Hughey & Phillips
Kahn Communications
Nagra Magnetic Recorders
Premier Metal Products
RCA
Sprague Electronics

*Original company name in parenthesis.

Save $10,000 every year for 20 years with the new Harris 60 kW UHF transmitter!

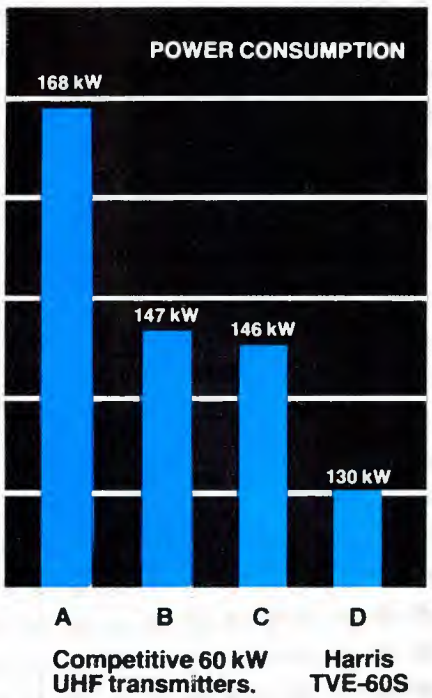
The new Harris TVE-60S is the most efficient 60 kW UHF-TV transmitter on the market today. And that translates directly into improved bottom line results for your operation.

With the TVE-60S, you can actually save an average of $10,000 annually* on your power bills. Multiply this by the average 20-year life of a transmitter, and you come up with *a $200,000 savings!* Without considering inflation.

How We Got There

The very latest in high power UHF technology has been incorporated into the TVE-60S. For instance, a single Varian 5-cavity VKP-7550 "S" Series klystron is used for full 60 kW visual power output.

This new integral-cavity klystron is an improved, ultra-high-efficiency version of the Varian VA-950 Series that has been field proven in hundreds of UHF transmitters worldwide.



When operated with a variable visual output coupler and a mod anode pulser—both supplied as standard in the TVE-60S—the new klystron provides visual beam efficiencies ranging from 63% to 68%.

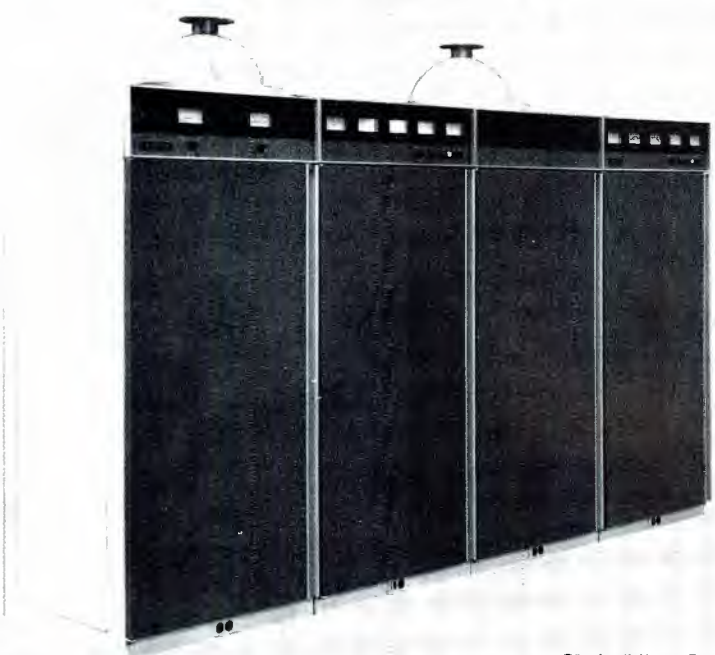
Add to this an aural klystron coupler and an efficient vapor phase heat exchanger, and you have a 60 kW transmitter with power consumption of 130 kW or less. No other UHF transmitter in this power range comes close.

No Performance Sacrifices

There has been no sacrifice of performance for high efficiency. The MCP-2U visual exciter, with its Quadrature Corrector and unique, adjustment-free VIDEO SAW filter, provides unmatched color specifications and highest reliability. Also, the TVE-60S is designed for TV stereo, teletext and other services.

For complete information on the new TVE-60S, or the 120 kW and 240 kW versions, write or call: Harris Corporation, Broadcast Transmission Division, P.O. Box 4290, Quincy, Illinois 62305. 217/222-8200.

*Figured from the National Average Power Cost as published in "Electric Power Monthly", based on a 20-hour broadcast day, and compared with the published power consumption specification (as of Feb., 1984) on the next closest competitive 60 kW UHF transmitter. Comparisons in chart based on published specs as of Feb., 1984.



HARRIS

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Some advertisements from 1959 *BE* issues

The image makers

Whatever your imaging application—medical or industrial diagnostics, broadcasting or CCTV, surveillance or robotics—Amperex is eager to work with you.

The resources available to you at our Slatersville, Rhode Island facility include our Research and Development and Applications Engineering Departments. Both are integrated with a "super clean" Class 100 manufacturing plant. In addition to offering a broad range of imaging devices, Amperex is continuously developing new technologies and adapting existing products to the specific needs of our customers.

The Amperex reputation as an image maker is based on supplying the right products for all your imaging needs. For more information call or write Imaging Products Group, Amperex Electronic Corporation, Slatersville, Rhode Island 02876. (401) 762-3800. A North American Philips Company. Outside the U.S.A. contact: Philips Electronic Components and Materials Division, 5600 MD Eindhoven, The Netherlands.

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High Resolution Diode Gun ™ Plumbicon® camera tubes for diagnostic imaging.

Pyroelectric DTGFB vidicon tube with 8–14 micron sensitivity for thermal imaging and 24-hour surveillance.

Solid state thermal imaging devices for 3–5 micron and 8–13 micron applications.

Electro-magnetic coil assemblies.

Vidicon tubes—low cost general purpose to fiber optic special window types.

Image intensifier tubes including microchannel plate and proximity focused types.

Newvicon®high-sensitivity camera tubes for low light and 1 micron IR imaging.

Diode Gun and Triode Gun Plumbicon® camera tubes for color or general purpose imaging.

Circle (55) on Reply Card

Silver anniversaries for manufacturers

In "Manufacturers' Contributions to Broadcast Technology" **BE** acknowledged manufacturers that still supply equipment to broadcasters and that were promoted or ran ads in our 1959 issues. Here **BE** takes a brief look at two companies founded in 1959 that thus are celebrating silver anniversaries also this year: the Grass Valley Group on the West Coast and Panasonic on the East Coast. **BE** staff members have visited both companies' facilities in the past year.

Grass Valley Group (GVG)

Nestled in the heart of what once was the gold-mining frontier of California, the Grass Valley Group has evolved into a dynamic and progressive organization dedicated to serving selected communications markets. Founded by Dr. Donald Hare, the company initially was intended for R&D and consulting purposes, mainly in the audio field. However, in 1964 the problems and needs of a local TV station turned GVG's attention to video. Solving that problem in one week launched the company onto a growth path in high technology video equipment.

With staff skills and manufacturing capabilities strongly rooted in audio and video, the company is qualified to handle a wide range of communications needs. Most recently, this includes developing equipment for the laser (optical) communications field.

Visitors are first amazed at the setting of GVG's facilities. It is more like a campus, or think tank, than a progressive manufacturing operation. Buildings are set among towering pines, some designed at odd angles to avoid destroying the natural surroundings. Meandering paths connect various buildings, most of which are hidden from each other by trees or hills.

As a complement to the outdoor environment, GVG's management has created an environment within the company that allows its talented people to retain individuality and yet achieve high productivity. The results of this atmosphere are shown on productivity charts on the company's bulletin boards. The charts detail a dynamic, productive organization. (GVG policy prohibits publication of exact figures.) The charts are posted to let employees track their production and service.

Another aspect about the company that visitors find interesting is the corporate attitude concerning quality. Quality is considered vital by every employee—in work habits, in design, in manufacturing and in the environment. So intense is the attention to quality at every level of the company that no formal department called "Quality Control" is needed.

Highlights of the company's growth are detailed in a sidebar.

Panasonic

1959 also marks the founding of the Matsushita Electric Corporation of America (MECA). A number of companies operate under this corporation, including the Panasonic Industrial Company, which was highlighted in our April 1984 issue. Brand names associated with MECA are as follows: Panasonic, Technics, Quasar and RAMSA.

Behind MECA nestles a giant in-

Continued on page 90

Highlights of GVG's growth

1959: Dr. Donald Hare, Ph.D., arrived in Grass Valley, CA, and incorporated the Grass Valley Group for research and development of audio electronic products. The company began with six employees.

1960: Cinerama took the GVG-developed audio systems into 70 of its US theaters. Deliveries on these systems continued through 1961.

1961: The company purchased 80 acres of land six miles outside of Grass Valley. (Today GVG sits on a 310-acre tract of land.) The first manufacturing and administrative building occupied 5000 square feet. Equipment shipments increased more than 250% over the previous year.

1963: GVG began developing video equipment.

1964: The company supplied ABC with its model 700 clamping amplifier for political convention coverage in San Francisco's Cow Palace.

1965: The company introduced the 700 series video DAs at its first NAB appearance. Plans already were under way for developing the 900 series.

1966: Shipments increased to more than 250% over 1965.

1967: The 900 series video distribution equipment line was almost completed. GVG began issuing stock in the company.

1968: The company's first advertisement ran in a trade publication (**Broadcast Engineering**), announcing its series 1400 production switchers. Approximately 300 units were sold in the next four years.

1969: The company's stock was listed for the first time on the American Stock Exchange.

1970: The 1800 series of routing switchers was shipped to ABC in New York. The APC2000 automation system was introduced and the Borderline generator became a GVG product.

1971: The company exhibited for the first time at international events such as the IREE and Montreux symposiums. At these shows, the 1400-11 and 1400-12 production switchers were introduced.

1972: The first installation of the APC2000 automation system took place. A 2400 machine control system went to NBC in New York.

1973: The 1600 series production switchers replaced the 1400.

1974: The company merged with Tektronix, Beaverton, OR.

1976: The GVG exhibit at the NAB convention became a "complete TV studio" for the first time.

1978: The Effects Memory (E-MEM) production system, the 3240 video processor and the 440 series routing systems were introduced.

1979: This was a tremendous growth year with employee count reaching 650 by the year's end. The 300 series, 3230 isophasing amplifier, 3256A sync generator and 410 audio routing switcher were new offerings.

1959-1979: Growth nearly 25% per year. Employment rose from six to 679.

1980: Grass Valley Group went to the Winter Olympics with fiber-optics.

1982: GVG instituted a distributor program.

1983: The Horizon System was introduced at the annual NAB convention.

1984: Dubner Computer Systems acquired as wholly owned subsidiary. Employment grows to more than 900.

The brightness you need to show it big

General Electric Professional Large Screen Video Projection

With General Electric's exclusive sealed light valve and sealed Xenon lamp system, in both color and monochrome General Electric Professional Large Screen Video Projectors, you can depend on sharp pictures from 2 to 25 feet wide. New high brightness models allow the room lighting viewers need to take notes and refer to written material.

The color projectors reproduce every color accurately, with the convenience of inherent color registration. General Electric's exclusive single gun, single optical path light valve system eliminates the need for manual color convergence.

Portable and flexible, the projectors are being used for a wide variety of applications, including front and rear projection. Our applications experts will tell you whether yours can be added to the growing list, which includes:

Education: Medical, dental, engineering, computer science instruction.

Business: Sales meetings, industrial training, product presentations, real-time display of computer-generated data, teleconferences.

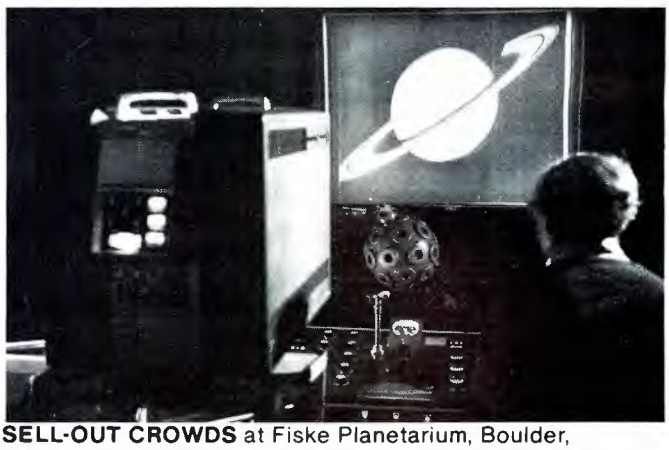
Aerospace and Defense: Situation displays, simulator training.

Entertainment: Theatre television, closed-circuit TV events, overflow crowds, special effects.

Television Production: Backgrounds for news programs, special effects, data display, program previewing.

Call or write: General Electric Company, Projection Display Products Operation, Electronics Park 6-206, Syracuse, NY 13221. Phone: (315) 456-2152. TWX 710-541-0498.

NEWS BACKGROUND at KBTV-TV, Denver, is displayed by General Electric PJ5055 Talaria projector.



SELL-OUT CROWDS at Fiske Planetarium, Boulder, watched live NASA transmission presented by General Electric projector.

GE Professional Large Screen Television Projector Specifications

COLOR PROJECTORS

Model	Light Output in Lumens			Resolution* in TV Lines per Picture Height		Input Power Req.		Scan Standards***	Video Input**
	Open Gate Min.	Modulated TV, Min.	Modulated TV, Typ.	Min. Horiz.	Min. Vert.	Max. Watts	Max. Volt-Amps		
PJ 5050	1000	500	650	750	300	1100	1550	525 li./60 fps; 625 li./50 fps	(1)
PJ 5055△	2000	1000	1300	750	300	1750	2600	525 li./60 fps; 625 li./50 fps	(1)
PJ 5800	500	250	300	750	600	900	1350	875 lines/60 fps	(2)
PJ 5850	1000	500	600	750	600	1100	1550	875 lines/60 fps	(2)
PJ 5855△	2000	1000	1200	750	600	1750	2600	875 lines/60 fps	(2)
PJ 5100	500	250	300	750	650	900	1350	1023 lines/60 fps	(2)
PJ 5150	1000	500	600	750	650	1100	1550	1023 lines/60 fps	(2)
PJ 5155△	2000	1000	1200	750	650	1750	2600	1023 lines/60 fps	(2)
MONOCHROME PROJECTORS									
PJ 7000	900	600	750	800	400	900	1350	525 li./60 fps; 625 li./50 fps	(3)
PJ 7050	1500	1000	1250	800	400	900	1350	525 li./60 fps; 625 li./50 fps	(3)
PJ 7055	3000	2000	2400	800	475	1100	1550	525 li./60 fps; 625 li./50 fps	(3)
PJ 7800	900	600	750	800	650	900	1350	875 lines, 60 fps	(3)
PJ 7850	1500	1000	1250	800	650	900	1350	875 lines, 60 fps	(3)
PJ 7855	3000	2000	2400	800	650	1100	1550	875 lines, 60 fps	(3)
PJ 7100	900	600	750	800	750	900	1350	1023 lines, 60 fps	(3)
PJ 7150	1500	1000	1250	800	750	900	1350	1023 lines, 60 fps	(3)
PJ 7155	3000	2000	2400	800	750	1100	1550	1023 lines, 60 fps	(3)

*Resolution measurements made with wide-band monochrome video input. **Video Input Key (1) NTSC or RGB Standard. NTSC/PAL/SECAM Switchable as Option. (2) RGB. (3) Wide-Band monochrome. ***For use at other scanning rates, contact General Electric Projection Display Equipment Operation for special application/model information. Projector line voltage 105 to 132v or 190 to 260 volts 50/60 Hz except those marked (△) above, which are 190 to 260 volts 50/60 Hz only.

GENERAL ELECTRIC

Circle (56) on Reply Card

YOUR WORLD

The whole show builds to a series of quick cuts. But building those cuts isn't a quick process. So you take it back and forth...frame by frame...over and over. Through endless passes–and endless points of view. But in the end, what you really have to trust are your own eyes. And your instincts. And your tape.

Photographed at VCA Teletronics, New York City.

Continued from page 86

dustrial complex, Matsushita Electric Industrial Company Ltd. (MEI) of Osaka, Japan. Started in 1918 by Konosuke Matsushita, with an idea for a unique electrical socket and an investment of $50, MEI now has grown into one of the 50 largest international companies. It produces more than 14,000 different kinds of products, employs more than 125,000 people worldwide, and has 46 manufacturing plants and 34 sales companies. World sales from this operation exceed $16 billion annually, with net income for 1983 exceeding $774 million.

MECA, from its modest beginnings in 1959, has shown remarkable growth. Some of the highlights along the way, especially for the Panasonic line, are contained in a sidebar. As the company's product line grew, so did MECA. From an initial 3-man sales office, the company has grown to employ more than 7000 people; operate six sales companies, seven manufacturing facilities and one service and engineering company; and log more than $2.8 billion in sales annually. Overall, that works out to an average productivity sales figure of $400,000/employee. However, some MECA operations report productivity sales figures more than double that of the company as a whole.

Highlights of MECA's growth

1959: Matsushita Electric Corporation of America (MECA) established.

1961: Panasonic selected as a brand name.

1975: Headquarters moved from New York City Pan Am building to facilities in Secaucus, NJ.

1976: MECA established Panasonic Company. Quasar Electronics Company was purchased.

1978: RECAM and other systems inventions listed. Applied for patents.

1979: Design goals established. Matsushita began hardware development.

1980: Matsushita working model of FM/FM chroma recording system, M Format, tested and accepted. Compression/expansion chroma system rejected. RECAM prototype shown to NHK. RAMSA introduced in the United States as the MECA professional audio line.

1981: RECAM working system consisting of recording cameras, studio recorder/players and an edit controller shown at NAB and Montreux shows. First systems delivered.

1982: NAB and SMPTE, *complete* M Format system products became available. Format documents for interchangeability specifications submitted to SMPTE. Panasonic Industrial Company formed. Broadcast Group expanded.

1983: MVP-100 Multifunction Video Playback cart machine prototype shown at NAB. Preproduction model shown at SMPTE. Customers on back order. Transmission over microwave for ENG. Interfaces available to all manufacturers' edit controllers. Thirty-minute tape for 30-minute programming demonstrated at SMPTE show.

1984: New Technology Products Group formed Jan. 1; Panasonic Broadcast Products included. Production model of MVP-100 Multifunction Video Player shown at NAB. Immediate deliveries available. MECA celebrates its 25th anniversary.

These are impressive statistics. However, they are merely the *results* of success, not the *means*. When we visited Panasonic early this year, we got a brief insight into its operation. The keys to MECA's business success were similar to those found earlier in our tour of GVG's facilities.

Final comments

It was a pleasure to visit with GVG and MECA and to meet their people and see their operations. Although they differ in many ways, they have similarities:

- First, their corporate concerns include a strong sense of responsibility for creating a favorable work environment for employees.
- Second, staff members seemed to take an inordinate amount of pride in the quality of products offered to the company's selected markets.
- Third, there was visible dedication by employees to excel in serving customers.

These corporate characteristics are assets for all manufacturers, no matter what anniversary they are celebrating.

Editor's note:
BE, celebrating its 25th anniversary, salutes GVG and MECA as they do likewise. For other manufacturers also celebrating silver anniversaries, send details and we will prepare a follow-up piece. 25

MAKING GOOD?

...THAT'S TOO BAD!

If make-goods have become a fact of life at your station, it's probably time to talk to someone from Utah Scientific about automating your on-air operation.

Here are some important facts about our Station Automation Systems:

Built around the Utah Scientific MC-500 Series Master Control Switcher—the only switcher specifically designed for automation.

Distributed processing throughout—where hardware failures are an inconvenience, not a catastrophe.

Interfaces directly with your business service computer—no manual entry required.

Generates media pull lists, FCC log and business service reconciliation.

Bar code reader available for direct entry of machine names and media numbers. Also interfaces with TCR-100 bar code reader.

Machine control interface included.

Also automates off-line operations such as network and satellite delays and feeds.

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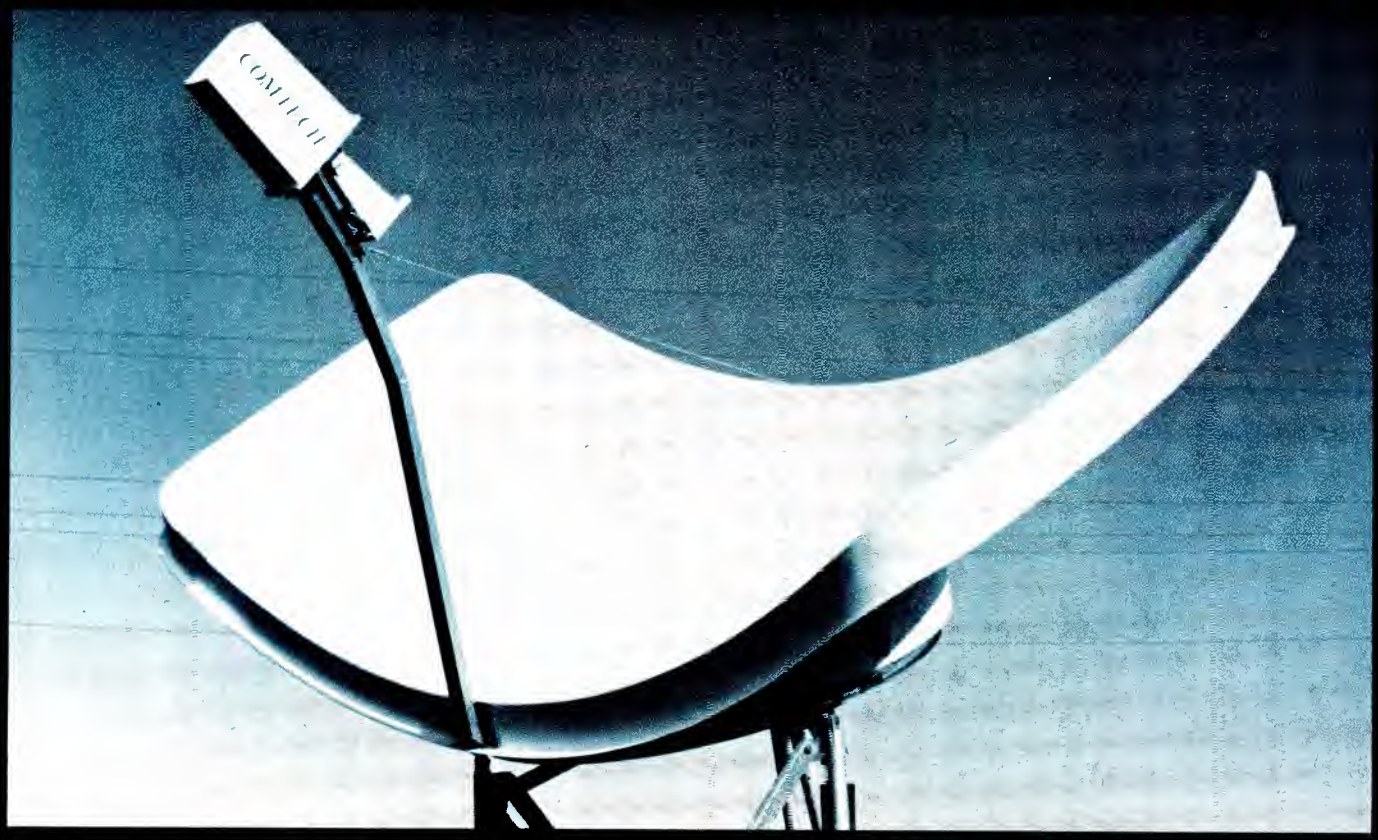
Circle (58) on Reply Card

Then and now

The steady advance of technology makes it easy to lose sight of the great progress made from decade to decade in broadcast equipment design. Only by stepping back and comparing where we are with where we have been can we measure the true distance covered. With this thought in mind, **BE** presents a look at equipment available to radio and TV broadcasters in 1959, compared with common gear available today.

OFF SAT™

Comtech's Full Offset Antenna



At last. A small licensable antenna for KU and C-BAND

Here's a unique one-piece antenna design with an innovative offset feed that makes the "Offsat" the only antenna in its size category capable of exceeding all FCC specifications for 2° spacing. Comtech's "Offsat" is the intelligent response to the new stricter requirements and it has the surface tolerance necessary for KU band.

This fresh approach to the 2° spacing dilemma has one important advance over competitive systems: It works now and will work in the future – you can install the "Offsat" today and be set for tomorrow.

The idea is simple. The width of 5.5 meters creates the very narrow beamwidth needed to meet and exceed the 1983 FCC requirements. The offset feed assures zero signal blockage, totally eliminating feed support reflections. A reflector height of just 8 feet allows easy, one-piece shipping. The "Offsat" is available for uplink and downlink applications in EL/AZ, polar or transportable configurations.

This range-tested licensable transmit/receive antenna will make economical business data communications a reality. Find out more by contacting Comtech Antenna Corporation at 3100 Communications Road, St. Cloud, Florida 32769 **(305) 892-6111.**

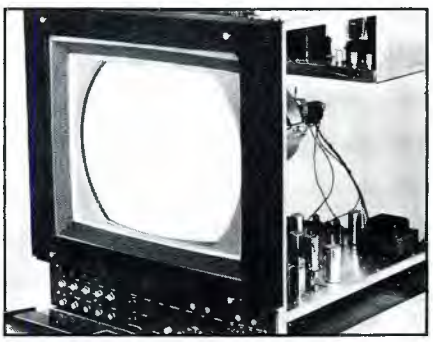
TAKING THE LEAD IN SATELLITE ANTENNA SYSTEMS

COMTECH Antenna Corporation **A subsidiary of Comtech, Inc.**

Circle (60) on Reply Card

Courtesy of Harris

Studio source and control equipment has changed dramatically in the last quarter-century. Audio control boards and video switchers have become more compact, more versatile and more user-friendly. Shown is a 1959 model Gates Radio Gatesway audio console (above), compared with the Harris Micro-Mac microprocessor-controlled audio board.



Video monitoring equipment has seen dramatic changes during the past quarter-century. The large (and heavy) picture monitors of the late '50s and early '60s used vacuum tubes by the dozen. Today's monitors are easier to use, more stable and offer more features than engineers could have imagined in 1959. Solid-state and digital technologies have made these advances possible. Another difference between the 1959-era monitor and types available today is the incorporation of unencoded RGB inputs to accommodate the growing use of computer-generated signals. Shown is a Conrac CF-21 color monitor available in 1959 (above), compared with a new Conrac 6200 19-inch RGB/NTSC color monitor.

Harris Wavestar™...

The most reliable UHF slot antenna ever designed... because it's waveguide!

The Harris Wavestar is the only slotted waveguide UHF antenna now available... the ultimate in simplicity. No center conductor. No bullets. No insulators. Fewer parts mean fewer problems. And that means less off-air time and lower maintenance costs.

Additional advantages of waveguide over coax antennas include higher power handling capabilities and greatly increased safety margins.

The Wavestar pattern performance is excellent by any standard. A highly circular omnidirectional pattern is available, as are directional patterns. All Wavestar antennas provide the smooth elevation patterns necessary for high signal strength and minimum ghosting over the entire coverage area.

The Wavestar is a low windload design for tower top or side mounting. High mechanical strength and rigidity minimize picture variations caused by wind sway.

Every Harris antenna is completely assembled and tested at the ultra-modern Harris antenna test range.

The range is located in an area far from the pattern-distorting clutter of urban development. Situated atop a high bluff, with test transmitters located up to 5000 meters away on flat, unobstructed bottom lands, the range offers ideal conditions for testing, approaching the "free space" situation of an installed antenna.

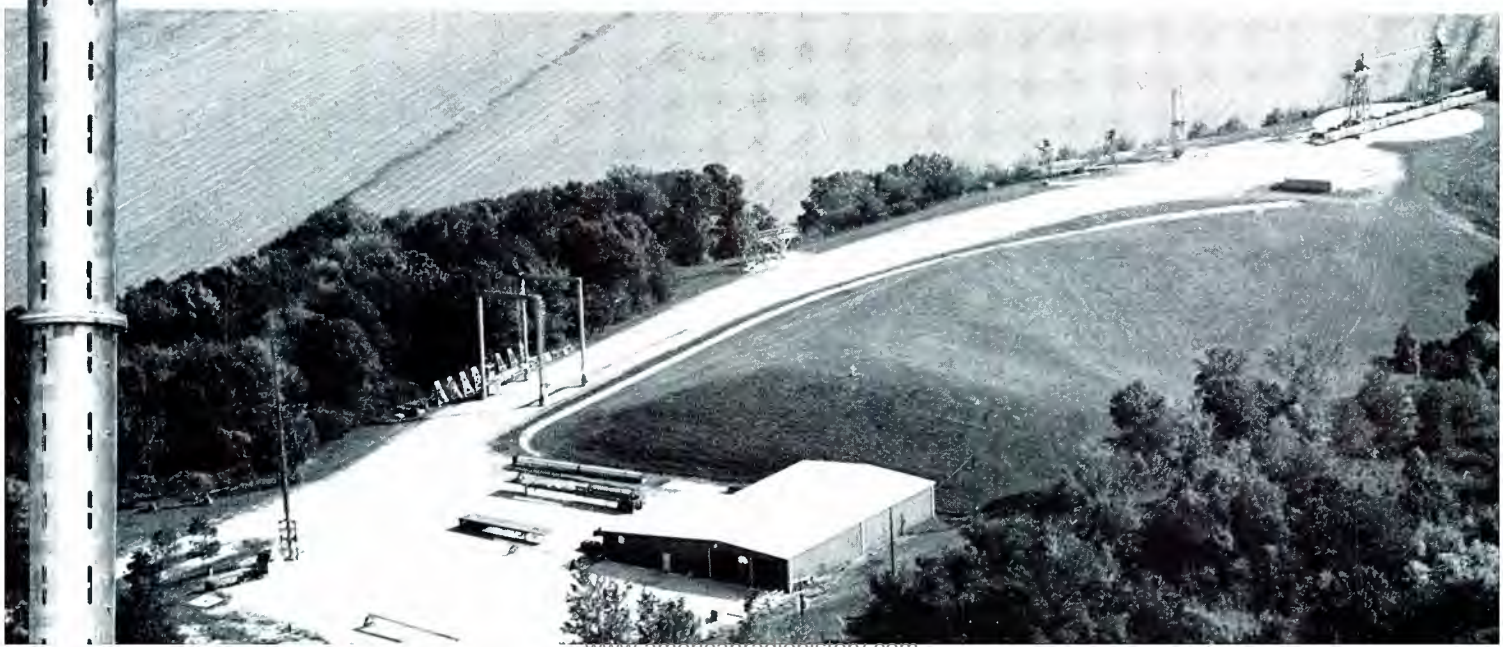
Here, azimuth and elevation patterns are verified with the most accurate and sophisticated test instruments available—translating the theory of a calculated pattern into the reality of actual antenna performance.

You can depend on Wavestar for top reliability. And you can be confident that your Wavestar antenna will be thoroughly tested by Harris to meet your exact pattern requirements.

Contact Harris Corporation, Broadcast Transmission Division, P.O. Box 4290, Quincy, Illinois 62305-4290. 217/222-8200.

HARRIS

Circle (61) on Reply Card



The effect that videotape recording technology has had on the broadcast industry over the last 25 years is immense. By 1959, Ampex and RCA were producing the fruits of their 1957-'58 technology exchange—RCA's color knowledge for Ampex's spinning head and FM signal processing technology. Ampex introduced Intersync with the VR-1000B (above left) in 1959 and the 10-10 color kit. VTRs of today, such as the Ampex VPR-3 (above right), offer features and flexibility thought impossible only a few years ago. For example, the VPR-3's vacuum-controlled tape transport can go from 500ips *fast forward* or *rewind* to a fully locked-up video image in less than a second—providing fast instant-replay operation for sporting events, such as the 1984 Olympics.

The maximum for the minimum

In designing the HK-302, Ikegami kept the frills —and the price—to a minimum while maximizing the performance. And that helps keep a moderate equipment budget from interfering with first-quality program origination.

However, staying with the basics doesn't mean sacrificing advanced technology. The HK-302's highly efficient optical system coupled to ⅔" low capacitance diode-gun Plumbicon* tubes and high transconductance FET pre-amps deliver sharp, low noise pictures (S/N 57dB) with excellent colorimetry. And the compact camera head includes a full range of operational automatics to ensure consistent signal quality.

Built-in test, maintenance and operational features are integral parts of this camera's "basics" as well. A comprehensive test pulse system lets you adjust the video with the pick-up tubes off or removed.

Complete monitoring circuitry and a broadcast quality sync generator with genlock are also standard features.

To add to the versatility of the HK-302, use the Ikegami automatic highlight compression option. It ensures highly detailed pictures even in high contrast scenes.

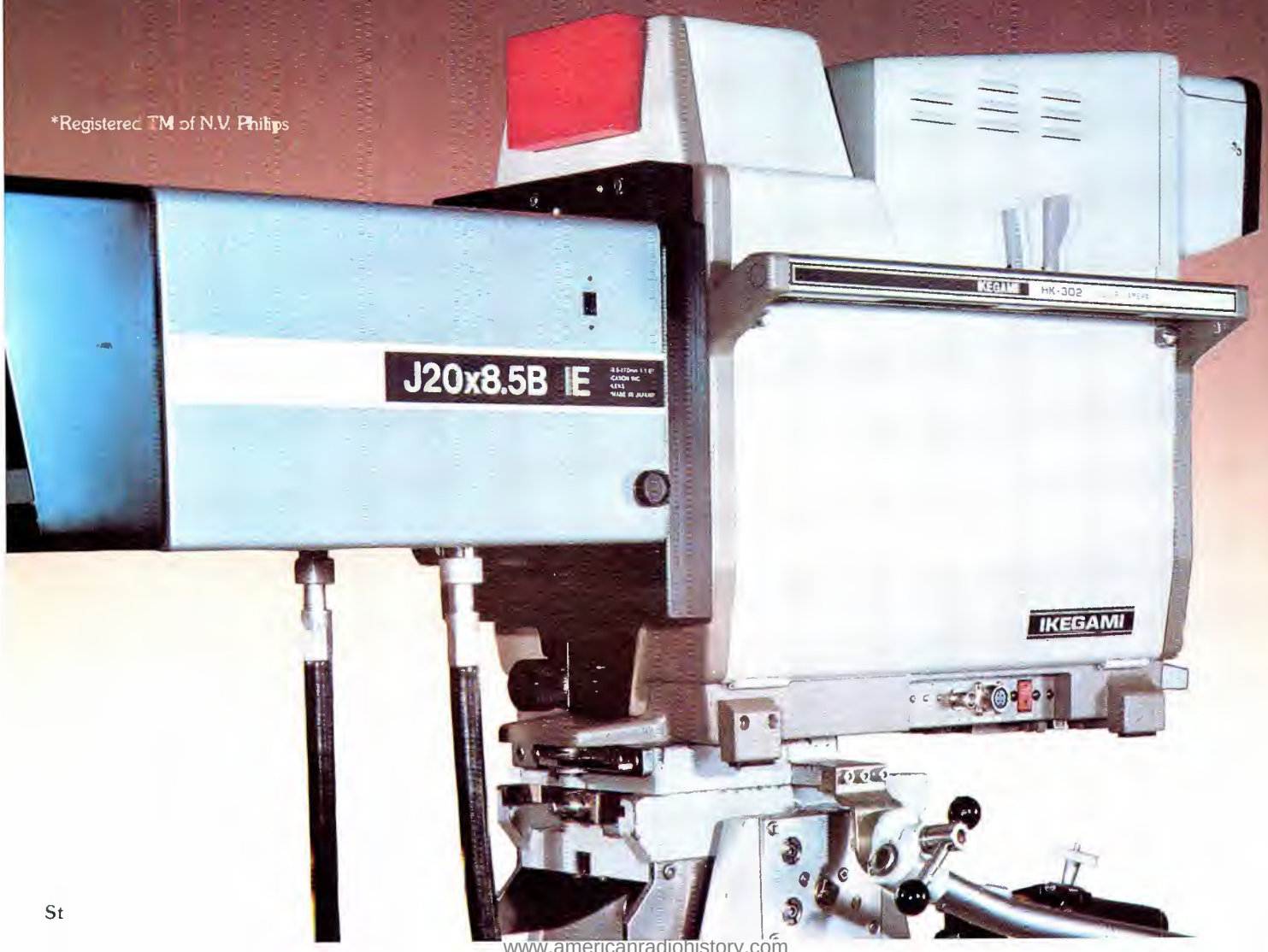
With the HK-302 you don't have to mortgage your station to afford prime time performance. So if you're looking for the maximum in studio production capability with a minimum of cost and maintenance, look over the Ikegami HK-302. For complete information and a demonstration, contact Ikegami.

Ikegami HK-302®

Ikegami Electronics (USA) Inc., 37 Brook Avenue, Maywood, NJ 07607; (201) 368-9171
Northeast: (201) 368-9171 ☐ **West Coast:** (213) 534-0050 ☐ **Southwest:** (713) 445-0100 ☐ **Southeast:** (912) 924-0061 ☐ **Canada:** (201) 368-9179

Circle (62) on Reply Card

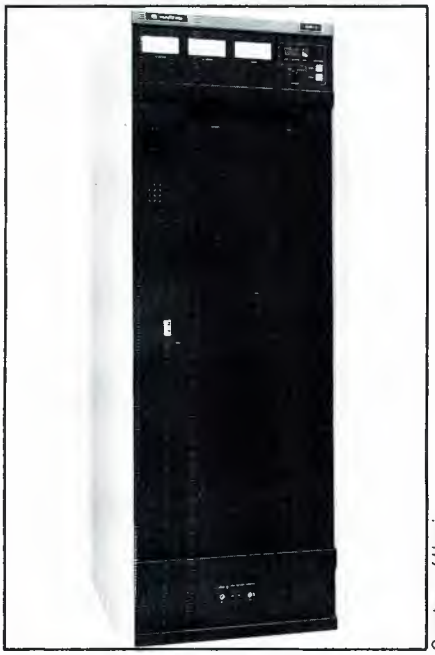
*Registered TM of N.V. Philips



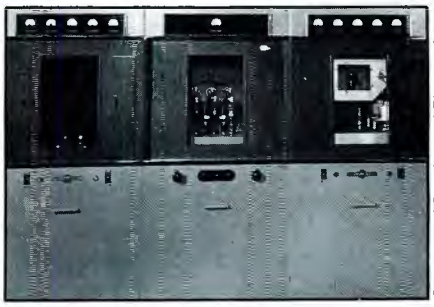
St

Courtesy of Harris

Some of the most dramatic advances in broadcast equipment design have come in transmitting equipment. Most remarkable have been the reduction in physical size and increase in system efficiency and reliability. Shown is a 1959-vintage Gates Radio Company BC-1J 1kW AM transmitter and associated monitoring equipment (left), compared with a Harris SX-1 all-solid-state 1kW AM transmitter, which uses a microprocessor for control and diagnostic functions.



Courtesy of Harris



Courtesy of Continental Electronics

Transmitters that once filled an entire wall (or even an entire room) can now be placed in one corner. They run cooler, quieter and often can switch around a problem stage on their own. Shown is a Collins Radio Company 21E/M 5kW/10kW AM transmitter in production during 1959 (above), compared with a Continental Electronics 315R-1 5kW AM transmitter manufactured today.

Courtesy of Continental Electronics

KDAY Los Angeles, CA
KABC Los Angeles, CA
KEEN San Jose, CA
KIBE San Francisco, CA
KNEW Oakland, CA
WMAQ Chicago, IL
WPLO Atlanta, GA
WQXI Atlanta, GA

WLS Chicago, IL
WNOE New Orleans, LA
WCAO Baltimore, MD
WQXR New York, NY
WPTF Raleigh, NC
WGAR Cleveland, OH
WSPD Toledo, OH
KGW Portland, OR

KYW Philadelphia, PA
WFIL Philadelphia, PA
KENR Houston, TX
KKBQ Houston, TX
KTIA Ft. Worth, TX
KTSA San Antonio, TX
WISM Madison, WI
KYA San Francisco, CA

KNBR San Francisco, CA
WPTF Raleigh, NC
WCOS Columbus, SC
WWL New Orleans, LA
KRDS Phoenix, AZ
WISN Minneapolis, MN
KRE Berkeley, CA
WKAT Miami Beach, FL

WWDC Washington, D.C.
KUGN Eugene, OR
KODE Joplin, MO
WESC Greenville, SC
KAAM Dallas, TX
WKIX Raleigh, NC
WAKY Louisville, KY
KUBA Yuba City, CA
KLAT Houston, TX
KSRO Sta. Rosa, CA

The new Optimod-AM: Who needs it?

Simple: Any AM broadcaster who is fighting the increasing competition from FM, the new video services, and the high audio quality of consumer discs and cassettes. The second-generation Optimod-AM Model 9100A can deliver strikingly good sound quality at the output of *common, everyday AM radios*—sound quality which the average consumer is likely to prefer in the car because the AM signal doesn't suffer from the classic FM problems (like multipath bursts, signal dropouts, and "picket-fencing").

There are already hundreds of 9100A's on the air in every format. They are giving some of the top-rated majors their competitive audio edge—and giving small-market stations major-market sound quality. This sound is not only loud—it is also outstandingly clean, open, and free from the processing artifacts which say "We're only AM" to your audience.

These stations have already decided that they needed the Optimod-AM edge. . . in stereo or mono. They knew that they couldn't afford any less in a world where the rules have changed and where second class audio just doesn't cut it anymore.

Who needs Optimod-AM? Probably you. Your Orban Broadcast Products dealer can give you the technical details. Or write or call us.

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San Francisco, CA 94107
Toll Free: (800) 227-4498
In California: (415) 957-1067
Telex: 17-1480

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ORBAN PROCESSING KEEPS YOU COMPETITIVE

Circle (64) on Reply Card

Awarding technology

25th ANNIVERSARY

Awards for technical achievements in broadcasting and production form a vast collection of tributes to outstanding efforts by people and organizations in our industry. Organizations bestowing these awards include the NAB, SMPTE and AES associations; the Montreux Television Symposium; the National Academy of Television Arts and Sciences (New York, the EMMY); and the Academy of Television Arts and Sciences (Hollywood, the EMMY).

BE contacted every major source of awards, all industry manufacturers and all networks, requesting details on awards given or received for technical achievements in broadcasting, with special emphasis on awards during the past 25 years. Stemming from this research, this report summarizes awards given by associations and organizations to broadcasters, production facilities and manufacturers. It also includes a spotlight on manufacturers' awards to their staff members. Some awards were excluded because their main contribution was not related to broadcasting, and others because the award presenters did not provide details.

Association/industry awards

Canadian Association of Broadcasters

From 1950 to 1981, the Canadian Association of Broadcasters (CAB) bestowed the Col. Keith S. Rogers Engineering Award, an award offered by Canadian General Electric through the CAB. In 1982, the award was replaced by the CAB Gold Ribbon Award.

Rogers Engineering Award

This award was created in memory of Col. Keith S. Rogers, a broadcasting pioneer who constructed the first mobile wireless station in a Canadian military camp. He also was honorary president and vice chairman of the CAB.

The award was given to the station or individual most successfully developing engineering or technical ideas to improve service in technical terms or to extend existing services.

Gold Ribbon Award

The CAB Gold Ribbon Award for Engineering Achievement honors AM, FM or TV member stations, networks or group stations that, during the past year, have successfully developed engineering or technical ideas, methods or systems to improve operator techniques in Canadian private broadcasting. The award also may be given to an individual for engineering leadership in a closely related industry. To date there has been only one winner. In 1982, CHED in Edmonton, Alberta, was honored for developing a fully automated on-air system.

RM1608

SPECIFICATIONS

TOTAL HARMONIC DISTORTION (T.H.D.)
Less than 0.1% at +4dB *output, 20Hz to 20kHz (all Faders and controls at nominal)

HUM & NOISE (20Hz to 20kHz) Rs = 150 ohms
(INPUT GAIN "–60")

–128dB	Equivalent Input Noise (E.I.N.)
–95dB	residual output noise: all Faders down.
–80dB	(84dB S/N) PGM Master volume control at maximum and all CH PGM assign switches off.
–64dB	(68dB S/N) PGM Master volume control at maximum and one CH Fader at nominal level.
–73dB	(77dB S/N) STEREO Master Fader at maximum and all CH STEREO level controls at minimum level.
–64dB	(68dB S/N) STEREO Master Fader at maximum and one CH STEREO level control at nominal level.
–80dB	(70dB S/N) ECHO SEND volume at maximum and all CH ECHO volumes at minimum level.
–75dB	(65dB S/N) ECHO SEND volume at maximum and one CH ECHO volume at nominal level.

CROSSTALK
–70db at 1kHz: adjacent Input.
–70db at 1kHz: Input to Output.

MAXIMUM VOLTAGE GAIN (INPUT GAIN "–60")

PGM	74dB: MIC IN to PGM OUT.	ECHO	70dB: MIC IN to ECHO SEND.
	24dB: TAPE IN to PGM OUT.	C/R	74dB: MIC IN to C/R OUT.
	34dB: ECHO RETURN to PGM OUT.		24dB: 2 TRK IN to C/R OUT.
	14dB: PGM SUB IN to PGM OUT.	STUDIO	74dB: MIC IN to STUDIO OUT.
STEREO	74dB: MIC IN to STEREO OUT.		24dB: 2 TRK IN to STUDIO OUT.
	24dB: TAPE IN to STEREO OUT.		
	34dB: ECHO RETURN to STEREO OUT.		

CHANNEL EQUALIZATION
± 15 dB maximum
HIGH: from 2k to 20kHz PEAKING. MID: from 0.35k to 5kHz PEAKING. LOW: from 50 to 700 Hz PEAKING.

HIGH PASS FILTER –12dB/octave cut off below 80Hz.

OSCILLATOR Switchable sine wave 100Hz, 1kHz, 10Hz

PHANTOM POWER 48V DC is applied to XLR type connector's 2 pin and 3 pin for powering condenser microphone.

DIMENSION (W x H x D) 37-1/2" x 11" x 30-1/4" (953 mm x 279.6 mm x 769 mm)

Hum and Noise are measured with a –6dB/octave filter at 12.47kHz; equivalent to a 20 kHz filter with infinite dB/octave attenuation.
*OdB is referenced to 0.775V RMS.
• Sensitivity is the lowest level that will produce an output of –10dB (245mV), or the nominal output level when the unit is set to maximum gain.
• All specifications subject to change without notice.

The specs speak for themselves. But they can't tell you how natural, logical and easy the RM1608 is to work. All the controls and switches are logically arranged to help you get the job done quickly and accurately.

And in the tradition of Yamaha's sound reinforcement mixers, the RM1608 sets new standards of reliability as well as ease of operation. For complete information, write: Yamaha International Corporation, P.O. Box 6600, Buena Park, CA 90622. In Canada, Yamaha Canada Music Ltd., 135 Milner Ave., Scarborough, Ont. M1S 3R1.

YAMAHA

Circle (65) on Reply Card

Table I.
Recipients of the Col. Keith S. Rogers Engineering Award.

1950: J.O. Blick, CJOB, Winnipeg.

1951: CJOB/CKRC/CKY, Winnipeg, in recognition of their outstanding community action during the Winnipeg flood.

1952: George Chandler, CJOR, Vancouver, for activity enhancing the stature of broadcast engineering technical development in Canada.

1953: Glen Robitaille, CFPL, London, for contribution as chairman of the Central Canada Broadcasters Technical Committee.

1954: William Forst, CKOM, Saskatoon, in recognition of his pioneering efforts in the field of unattended operation of broadcast transmitters.

1955: CFOR, Orillia/CFJB, Brampton/CHUM, Toronto, in recognition of their outstanding community action during Hurricane Hazel.

1957: CJON-TV, St. John's, Newfoundland, in recognition of its pioneering work in the use of TV satellite transmitters.

1958: W.E. Jeynes, CHCH-TV, Hamilton, in recognition of his contribution to the technical advancement of television, for the development of an inexpensive special effects generator for TV picture mixing.

1961: Glen Robitaille, CFPL, London, in recognition of his contribution to the advancement of radio broadcast automatic programming.

1962: Clive Eastwood, CFRB, Toronto, in recognition of his efforts through the CAB Engineering Committee and the Canadian Radio Technical Planning Board Broadcast Committee in the development of FM multiplex stereo standards.

1963: W.B. Smith, D. of T., for his outstanding work in encouraging improvements in the technical side of broadcasting in Canada.

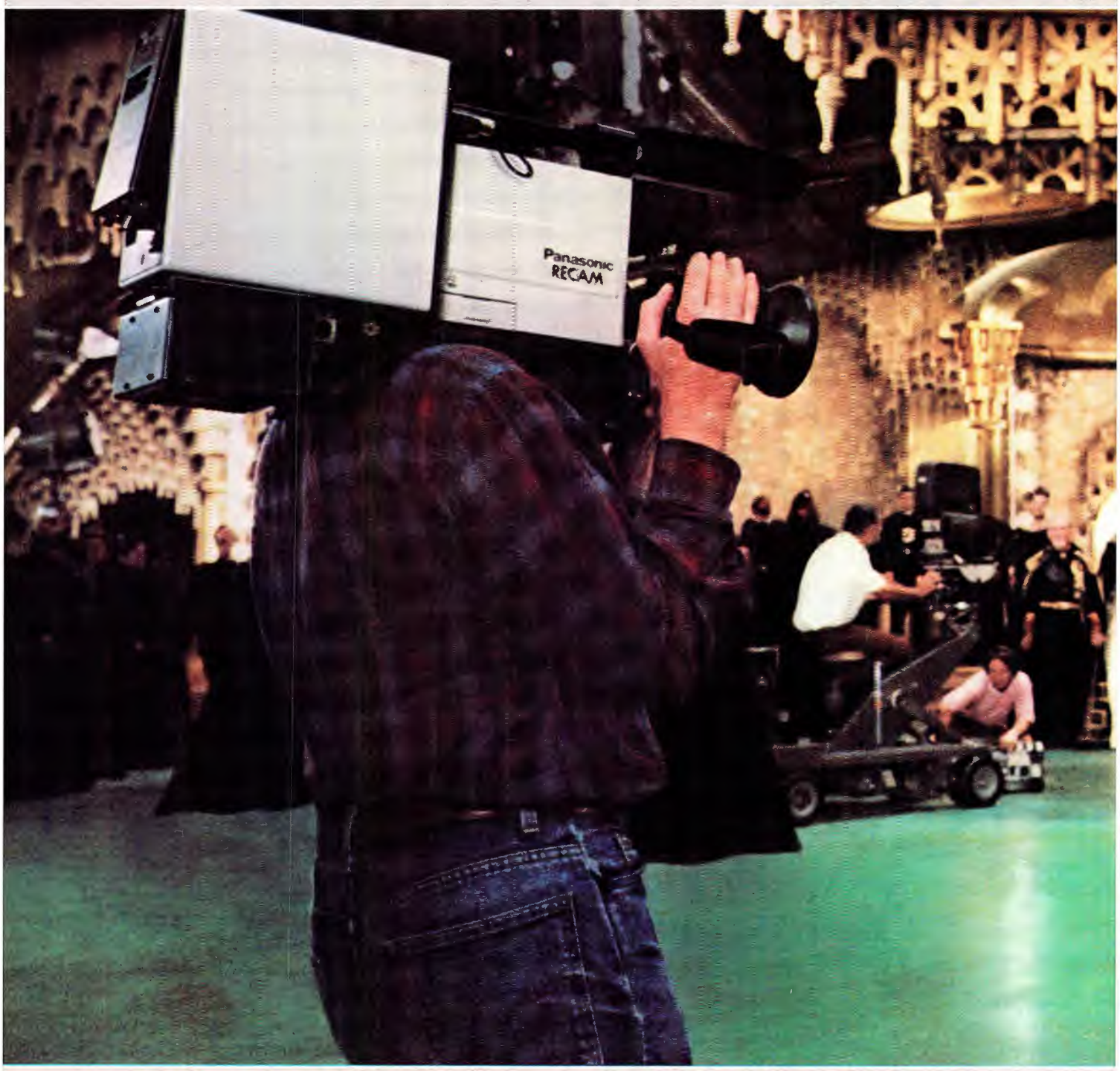
1967: R. Turnpenny, CHFI, Toronto, for radio engineering activity carried out under his general direction, including technical planning and the operation of an exemplary technical system at CHFI on 680Hz.

1970: CFAM/CHSM, Altona-Steinbach, Manitoba, for an innovative remote-control and telemetry system designed by chief engineer John Pauls, assisted by Walter Lindenbeck.

1971: Conrad Lavigne, CFCL, Timmins, for setting up the mid-Canada TV system to serve northern Ontario.

Continued on page 106

Why Panasonic Recam™ "The Making



When Dino De Laurentiis and producer Raffaella De Laurentiis got together with director David Lynch to film Frank Herbert's classic science fiction novel, "Dune," they knew it wouldn't be easy. But it wasn't just the eight sound stages, desert locations, a cast of up to 20,000 people and a crew of 900. Perhaps Raffaella De Laurentiis said it best: "Dune is the most technical picture ever made."

That's why it was no surprise that Panasonic Recam was selected to record "The Making of Dune." The reasons: Recam's picture quality and technology. After all, Recam had already made headlines by recording ABC Sports' momentous ascent of Mt. Everest which was broadcast on "The American Sportsman." And "Benji," the new CBS television series, is also being recorded by Recam.

was selected to shoot of Dune."

David Lynch
Director of "Dune."

Panasonic helped capture all the action from "Dune" on Recam's ½-inch format which will later be transferred to 1-inch for television broadcast. All made possible by Recam's incredible YIQ M-format picture quality.

You can see "The Making of Dune" in 1984. But you don't have to wait until then to see Recam. Call your nearest Panasonic regional office:
Northeast: (201) 348-7620
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Southeast: (404) 925-6835
Southwest: (214) 258-6400
West: (714) 895-7200.

Panasonic.
AUDIO-VIDEO SYSTEMS DIVISION

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Continued from page 103

1972: Western Broadcasting, Vancouver, for developing, manufacturing and marketing an improved stereo tape cartridge unit for FM broadcasters.

1973: Ernie Rose, CHAN/CHEK-TV, Vancouver, who, despite bitter winter conditions at mountain-top sites, established in only 4½ months four microwave TV rebroadcasting stations to serve the Caribou and Prince George areas.

1975: Gordon Kyle/Greg Jardine, CKXL, Calgary, designers of a futuristic computer-assisted programming system for the station.

1976: CKXL, Calgary, for station automation efforts.

1978: Radiomutuel, to Denis Dion for development of automatic transmission site control and logging system.

1979: Mid-Canada.

This silver-plated trophy, retained by the winner of the Col. Keith S. Rogers Memorial Engineering Award, symbolizes the dependence radio and TV stations have on engineering and technical personnel. It features upstretched hands, holding an electronic tube. Winners' names are engraved in a metal band around the wooden base.

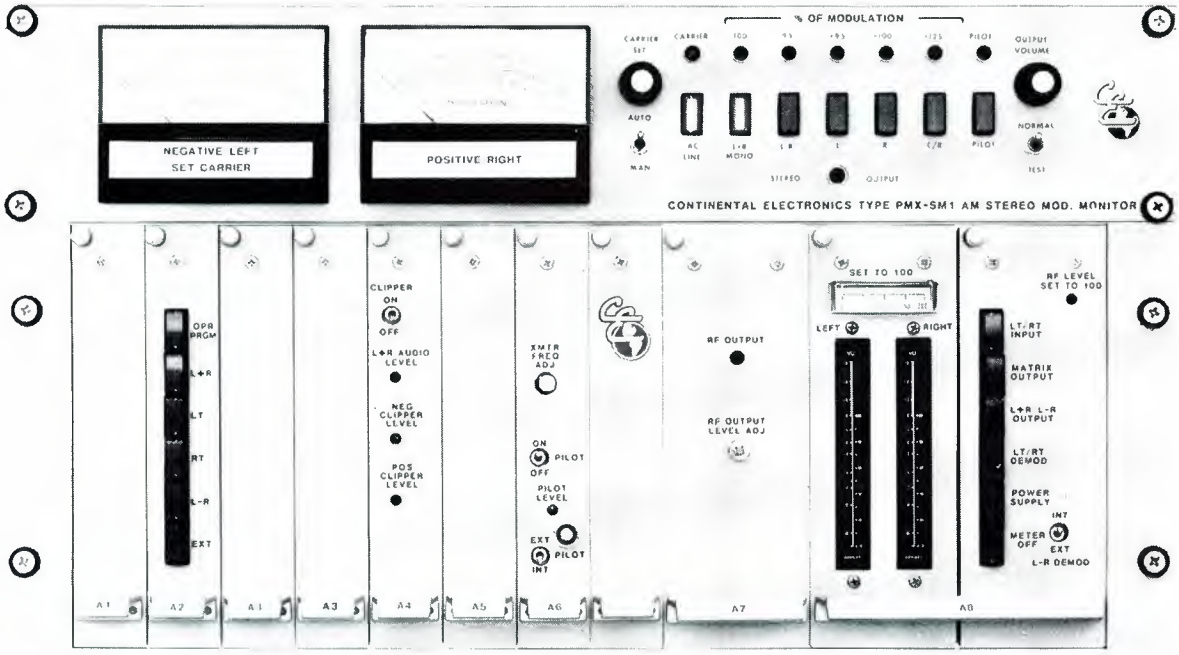
The Gold Ribbon Engineering Award was created by the CAB to honor outstanding achievements by association members.

EMMY Awards

Among the industry's most publicized and prestigious awards are the EMMY Awards. Although they are not part of the aired ceremonies, technical achievements are honored with EMMY statues and Citation plaques or certificates. Two different organizations can, and do, give EMMY Awards: on the East Coast, the National Academy of Television Arts and Sciences (NATAS), and on the

1977-1978. The first EMMY Award is given for outstanding achievement in the science of TV engineering. Shown (from left) are: Renville McMann (Thomson-CSF, for digital noise reducer); J. Kenneth Moore (CBS, for digital noise reducer); John Cannon (president, NATAS); and John Bull (PBS, for technical development of the PBS satellite).

Your winning combination for AM Stereo



Is AM Stereo ready to move up?

Market-place decisions notwithstanding, the recent introduction of receivers able to decode signals from any of the four systems in use today makes it easier for broadcasters to move ahead with AM Stereo plans.

Which system is #1?

The PMX (Magnavox) System was first selected by the FCC to be the Industry Standard for AM Stereo.

We established the system's viability during the 1979 NAB Show.

The politically-inspired "market-place" decision hasn't affected the technical performance of the PMX System one bit.

Hearing is believing.

With the PMX System, AM Stereo music sounds like FM Stereo music. So it makes for higher listener appeal and better numbers: For audience and the bottom line.

The Winning Combination

Our Type 302A Exciter, developed for the PMX System, and our new Type PMX-SM1 AM Stereo Modulation Monitor give you a superior package for AM Stereo broadcasting.

We've built a world-wide reputation for high-quality AM transmitters that offer unmatched on-air reliability with complete transparency.

Ultimately, the day-to-day operation of your AM Stereo System will depend upon equipment and service.

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Table I.
NATAS EMMY Engineering Award recipients.

1948: Charles Mesak, Don Lee Television, for Phasefader.

1949: Harold W. Jury, KTSL, Los Angeles, for the synchronizing coordinator that allows superimposition from more than one location.

1950: Orthogram TV amplifier by KNBH-NBC.

1954: NBC, color TV policy and Burbank Color—John West (best technical achievement).

1955: RCA tricolor picture tube (best engineering technical achievement).

1956: Development of videotape by Ampex and further development and practical applications by CBS; dual entry (best engineering or technical achievement).

1957: Engineering and camera techniques on *Wide Wide World*—NBC (best engineering or technical achievement).

1958-1959: Industry-wide improvement of editing of videotape as exemplified by ABC/CBS/NBC (best engineering or technical achievement).

1959-1960: The new General Electric supersensitive camera tube, permitting colorcasting in no more light than needed for black and white (best engineering or technical achievement).

1960-1961: Radio Corporation of America, Marconi's Wireless Telegraph Ltd., English Electric Valve Ltd., for the independent development of the 4½-inch image orthicon tube and camera (outstanding engineering or technical achievement).

1961-1962: ABC videotape expander (VTX) slow-motion tape developed by ABC, Albert Malang, chief engineer, Video Facilities (outstanding engineering or technical achievement).

1965-1966: Stop Action Playback, MVR Corporation and CBS; and Early Bird satellite, Hughes Aircraft and Communications Satellite Corporation (individual achievements in engineering development).

1966-1967: Plumbicon tube, N.V. Philips Gloeilampenfabrieken; and highband videotape recorder, Ampex Corporation (individual achievements in engineering development).

1967-1968: British Broadcasting Corporation, for the electronic field-store color TV standards converter (outstanding achievement in engineering development).

1968-1969: Eastman Kodak, for the ME-4 process (outstanding achievement in engineering development).

1969-1970: Apollo color television from space—for the conceptual aspects, an EMMY Award was presented to the Video Communications Division of NASA; and for the development of the camera, an EMMY Award was presented to Westinghouse Electric (outstanding achievement in engineering development).

1970-1971: The Columbia Broadcasting System, for the development of the color corrector that can provide color uniformity between TV picture segments and scenes shot and recorded under different conditions at different times and locations; and the American Broadcasting Company, for the development of an open-loop synchronizing system that enables the simultaneous synchronization of any number of color programs from remote locations (outstanding achievement in engineering development).

1971-1972: Lee Harrison III, for the development of Scanimate, an electronic means of generating picture animation (outstanding achievement in engineering development).

1972-1973: Sony, for the development of the Trinitron, a picture tube providing good picture quality in color TV receivers; and CMX Systems, a CBS/Memorex company, for the development of a videotape editing system using a computer to aid the decision-making process, store the editing decisions and implement them in the final assembly of takes (outstanding achievement in engineering development).

1973-1974: Consolidated Video Systems, for the application of digital video technique to the time base corrector; RCA, for its leading role in the development of the quadraplex videotape cartridge equipment; and the Telecopter, to John D. Silva for the conception and expertise, and to Golden West Broadcasters for its realization (outstanding achievement in engineering development).

1974-1975: Columbia Broadcasting System, for spearheading the development and realization of the electronic newsgathering system; and Nippon Electric Company, for development of digital TV frame synchronizers (outstanding achievement in engineering development).

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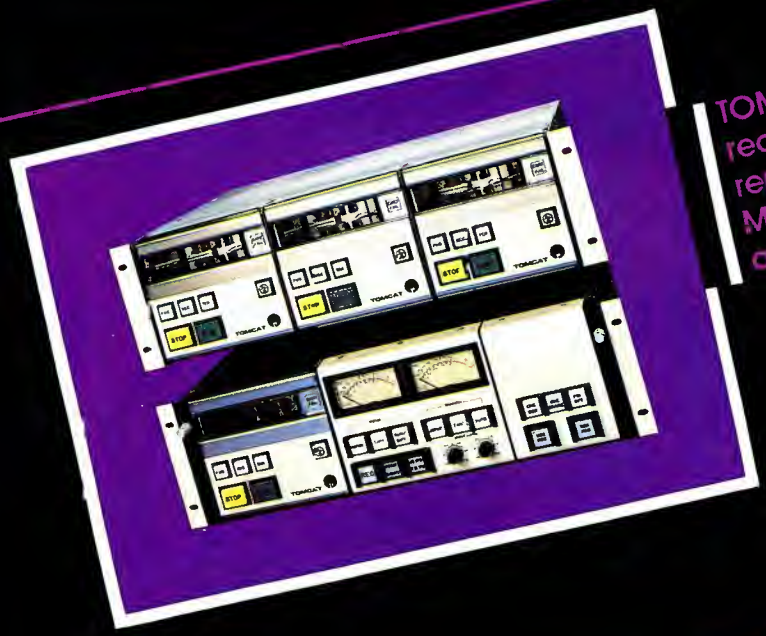

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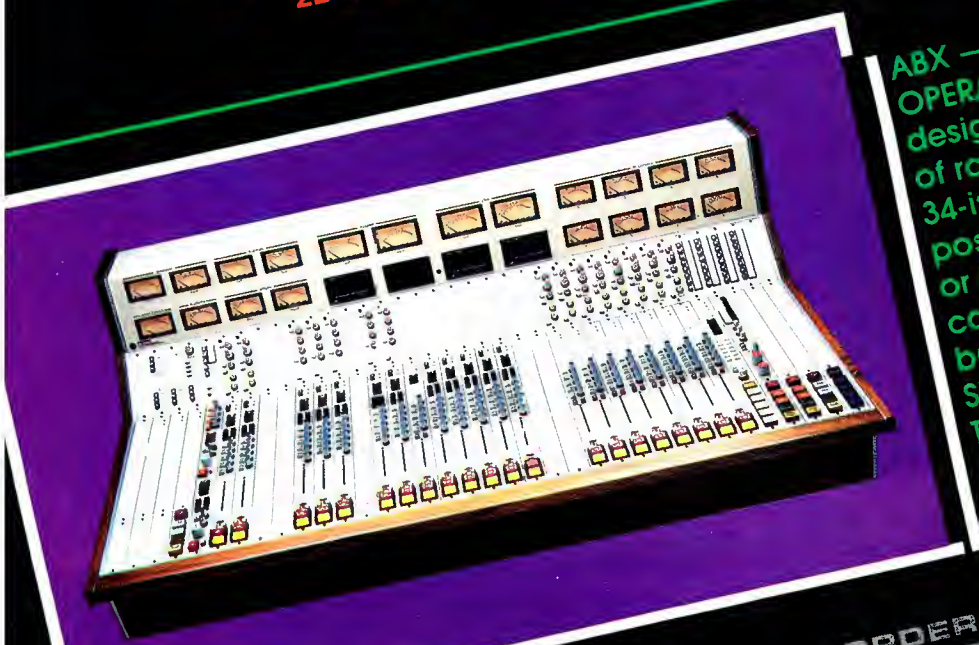

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West Coast, the Academy of Television Arts and Sciences (ATAS).

To complete this report, **BE** contacted both organizations. The ATAS agreed to send data, but did not do so. John Cannon, NATAS president, supplied the data reported here. Note that the NATAS was formed in 1948, and the ATAS was formed in 1977, accounting, in part, for the spread in data for various awards reported.

1981-1982. David J. Fenton (right) of Rank Cintel receives his company's Special Citation for its development of the Digiscan frame store for the flying spot telecine system from Cannon.

1981-1982. Hans Groll (left) of Robert Bosch receives the Special Citation for his company's development and implementation of CCD telecine technology from Cannon.

Continued

1975-1976: Sony Corporation, for the U-matic videocassette concept; and Eastman Kodak, for the development of Eastman Ektrachrome video news film (outstanding achievement in engineering development).

1976-1977: General Electric Company, for the first application of the vertical interval reference (VIR) signal system to TV receivers (outstanding achievement in engineering development).

1977-1978: CBS, for the development of the digital noise reducer (Renville H. McMann Jr. and J. Kenneth Moore); PBS Engineering, for the technical development of the Public Television satellite; and Thomson-CSF Laboratories, for the development of the digital noise reducer (outstanding achievement in the science of TV engineering).

1978-1979: Ampex, for the development of the compatible 1-inch Type C Format; and Sony Video Products Company, for the development of the compatible 1-inch Type C Format (outstanding achievement in the science of TV engineering).

1979-1980: Panasonic, for the introduction of digital techniques for the production of video special effects; and Nippon Electric, Quantel Ltd. and Vital Industries, individually, all for the development and implementation of digital techniques for the production of video special effects (outstanding achievement in the science of TV engineering).

1980-1981: Ikegami Electronics, RCA, CCSD and Video Systems, individually, all for the development of digital computer techniques for the automatic alignment of color TV studio cameras; CBS, for the original concept, assisting in the development and on-air use of the first digital electronic still-store system; and Ampex, for the engineering development of the first digital electronic still-store system (outstanding achievement in the science of TV engineering).

1981-1982: Eastman Kodak and Fuji Film, individually, both for the research and development of a new film technology that led to the introduction of the new high speed color negative film (outstanding achievement in the science of TV engineering).

Table II.
NATAS EMMY Engineering Special Citation recipients.

1968-1969: Columbia Broadcasting System, for the development of the digital control technique used in the Minicam miniaturized TV color camera.

1969-1970: Ampex, for the development of the HS-200 color TV production system.

1970-1971: General Electric, for the development of the portable earth station transmitter that has provided the only means of getting color TV pictures of Apollo splashdowns and recoveries via satellite to the mainland for worldwide distribution to the viewing public; and Stefan Kudelski, for his design of the Nagra IV recorder.

1971-1972: Richard E. Hill and Electronic Engineering Company of California, for the development of a time code and equipment to facilitate the editing of magnetic videotape; and National Broadcasting Company, for the development of the Hum Bucker, which provides a practical means to correct a picture transmission defect commonly encountered on remote pickups.

1974-1975: The Society of Motion Picture and Television Engineers (SMPTE), for the technical development of the universal videotape time code.

1975-1976: Tektronix, for leadership in development of equipment for verifying TV transmission performance in the vertical interval.

1978-1979: The SMPTE, for the standards work associated with the compatible 1-inch Type C videotape format.

1980-1981: Marconi Electronics, for engineering innovation in the design and development of a system for the automatic alignment of color TV studio cameras.

1981-1982: Rank Cintel, for its research and introduction of the Digiscan frame store for the flying spot telecine system; Robert Bosch Fernsehanlagen Company GmbH, for development and the implementation of the CCD telecine technology; British Broadcasting Corporation, Research Department, for the early development and research work on the CCD scanner telecine technology; and Arthur C. Clarke, for his early theory, studies and writings concerning the possibility of stationary satellite transmission to large areas of the earth.

Continued

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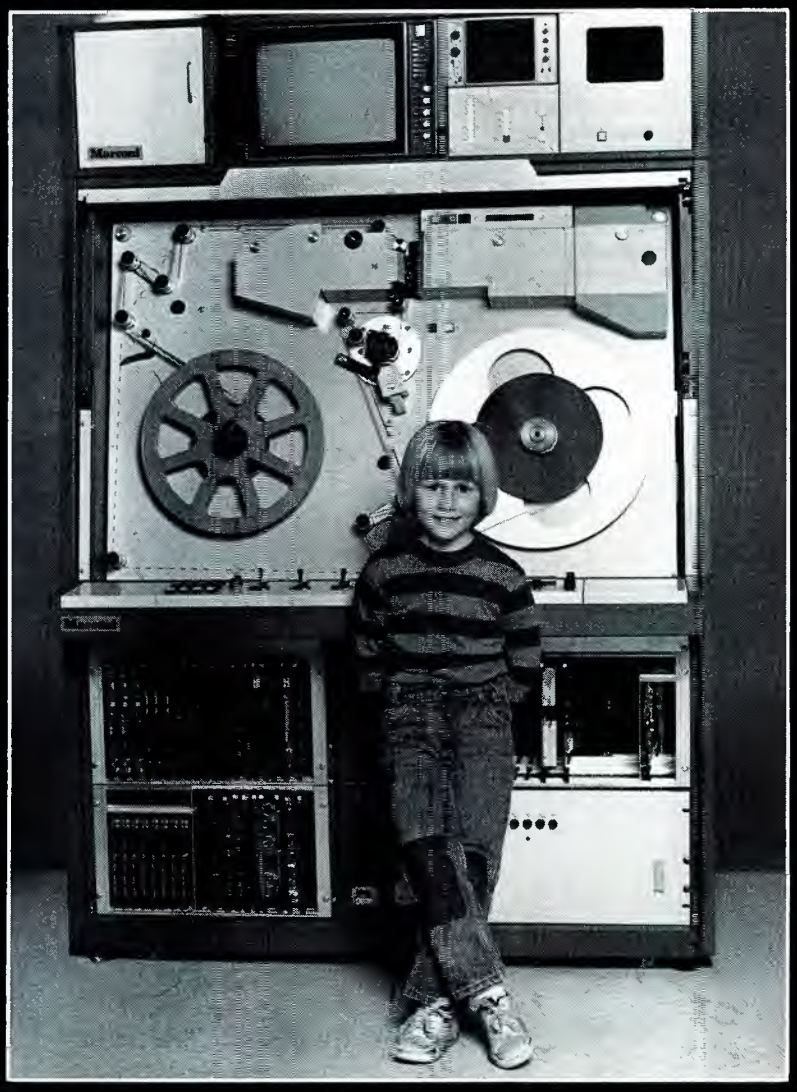

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Once it's started, you'll appreciate the Marconi B3410 for its fully digital processing and CCD image sensors that provide an extraordinarily true video picture. Moreover, the Marconi B3410 has a light bias facility that resolves dark areas of the film. It converts into all international standards and interfaces with all available color correctors.

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Continued

1982-1983: Ampex, for the engineering development of the first transparent-quality real time digital effects system with off-axis rotation, true third-dimension perspective and ultrasmooth motion, which made multiple-pass operation possible without signal deterioration; the European Broadcasting Union, for achieving a European agreement on a component digital video studio specification based on demonstrated quality studies and for its willingness to subsequently compromise on a worldwide standard; the International Radio Consultative Committee of the ITU (CCIR), for providing the international forum to achieve a compromise of national committee positions on a digital video studio standard and to achieve agreement within the 1978-'82 period; RCA CCSD Video Systems, for its pioneering efforts in the development of an electronic hand-held recording camera and the development of a system for newsgathering on videotape using a single integrated unit containing camera, recorder and battery; SMPTE, for its early recognition of the need for a digital video studio standard, its acceptance of the EBU proposed component requirement and for the development of the hierarchy and line lock 13.5MHz demonstrated specifications, which provided the basis for a world standard; 3M, for pioneering the development of the first industry-accepted videotape; Xerox, for its pioneering support of research leading to the development of the first electronic graphic creative system; Mel Sater, for his contribution to the development of the first industry-accepted videotape; and Richard Shoup, for his concept and development of the first electronic graphic creative system, which has led to the importance of videographics in television today.

Table III.
ATAS Engineering Award recipients.
These awards are presented to an individual, company or organization for developments in engineering that are so extensive an improvement on existing methods or so innovative that they materially affect the transmission, recording or reception of television.

1976-1977: An EMMY to American Broadcasting Company for leadership in establishing circularly polarized transmission to improve TV reception; and a Citation to Varian Associates for improving the efficiency of UHF klystrons.

1977-1978: An EMMY to Petro Vlahos of Vlahos-Gottschalk Research Corporation for the invention and development of the ULTIMATTE video-matting device; and a Citation to the Society of Motion Picture and Television Engineers for expeditiously obtaining industry agreement on the 1-inch Type C continuous field helical recording standards.

1978-1979: An EMMY to Ampex for developing its automatic scan tracking system for helical videotape equipment; and a Citation to Magicam for developing real time tracking of independent scenes.

1979-1980: An EMMY to National Bureau of Standards, Public Broadcasting Service and American Broadcasting Company for their development of the closed-captioning-for-the-deaf system; a Citation to David Bargen for the development of the 409 and TRACE computer program used in off-line videotape editing; a Citation to Vital Industries for its pioneering development of digital manipulation technology; and a Citation to Convergence for the videotape editing systems using a joystick control, as incorporated in its CS-100 videotape editing system.

1980-1981: An EMMY to Rank Cintel for outstanding achievement in engineering development of the Mark III Flying Spot Telecine.

1981-1982: An EMMY to Hal Collins for video editing system; an EMMY to Dubner Computer Systems for the CBG videographics/animation/character generator/paint system; and a Citation to Chapmans Studio Equipment for the development of the Crane System.

1982-1983: An EMMY to Eastman Kodak, for the development of the high speed film 5294-7294 with color negative film imprint quality; a Citation to Ikegami Electronics and CBS, for the engineering development of the EC-35 camera; and a Citation to Ampex for the development of the ADO digital effects unit.

In one of the most unusual settings in history, astronauts and broadcasters congratulate each other at EMMY functions in 1968, held in Carnegie Hall. Astronaut, (from left) Eugene A. Cernan, Thomas B. Stafford and John W. Young received EMMY awards for their spectacular color telecasts from the Apollo 10 space mission. Representing CBS are Joseph A. Flaherty (center), general manager, Engineering and Development, CBS Television Network, and Renville H. McMann Jr., vice president, Engineering, CBS Laboratories, Stamford, CT. McMann, who helped make the astronauts' mission successful, was instrumental in the development of the color conversion system used to bring live color TV coverage from the Apollo 10 voyage to a world audience. For this leadership, CBS received the engineering EMMY Award in 1970-1971.

At the meeting shown, CBS received the first-ever Special EMMY Citation for engineering development. CBS was honored for the development of the Minicam Mark VI hand-held broadcast camera system that used advanced computer techniques to improve live color telecasts of sporting news events, adding a new degree of mobility to TV coverage. This flexible system, weighing approximately 50 pounds with its companion electronics backpack, produced color pictures with the same quality as studio cameras weighing as much as 200 pounds. For his leadership in this development, Flaherty generally has been acknowledged to be the *father of ENG*.

Continued on page 122

10th International Broadcasting Convention

21-25 September 1984

IBC 84 will be held at the Metropole Conference and Exhibition Centre
BRIGHTON UK

The TECHNICAL PROGRAMME of papers by specialist authors and discussions will cover new technologies including satellite, cable systems and other developments for sound, television and related information services.

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Address .....

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Continued from page 112

Montreux Symposium

From a modest beginning in 1961, the International TV Symposium and Technical Exhibition of Montreux, Switzerland, has grown steadily to become one of the world's most important meetings for TV technology.

Since its second meeting, the symposium has been holding awards presentation programs recognizing outstanding TV technical developments. The early awards, which honored 42 industry leaders, were designated Montreux Citations. At the 10th Montreux Symposium in 1977, the Citation became the Montreux Achievement Gold Medal, which honors a specialist's outstanding achievement in developing new techniques or equipment that have significantly improved TV engineering.

A special committee, headed by E. Castelli of Rome, grants the award. The committee comprises eight TV ex-

Ryo Takahashi (center), the 1983 Montreux Achievement Gold Medalist, with Takashi Fujio (left), NHK Technical Research Laboratories, and Masahiko Morizono, deputy president, Sony Corporation.

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perts from seven countries. The 1983 Gold Medal was awarded to Ryo Takahashi, retired from NHK Japan, for his pioneering work in HDTV—steering its research and developing its potential.

Montreux Symposium Citation recipients

(1961-1975)

Fred P. Adler
Eugene Aisberg
Noel Ashbridge
G. A. Boutry
George H. Brown
Walter E. Bruch
Allen B. DuMont
Erik Esping
Donald G. Fink
Walter E. Gerber
Charles P. Ginsburg
J. Groszkowski
J. Haantjes
Georges Hansen
Charles J. Hirsch
August Karolus
M. J. Krivosheev
Bernard D. Loughlin
R.D.A. Maurice
Claude Mercier
Werner Nestel
Joseph Polonsky
Maurice Ponte
Hans Pressler
Hans Rindfleisch
David Sarnoff
Fritz Schroeter
P. V. Shmakov
Isaac Shoenberg
V. I. Siforov
Josef Sliskovic
F. Howard Steele
V. L. Svoboda
Kenjiro Takanayagi
Richard Theile
Georges Valensi
Hidetsu Yagi
Vladimir K. Zworykin
J.L.E. Baldwin
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The Montreux Achievement Gold Medal

(1977-present)

The 10th Symposium marked the first time that a special gold medal was awarded to a recipient for outstanding technical achievement in the field of television. Selected by the award committee were John Baldwin (United Kingdom) and Claude Mercier (France).

Baldwin is the head of the video and color section of independent Broadcasting Authority's experimental and development department. Under his direction the laboratory developed the digital intercontinental conversion equipment (DICE), which made possible 2-way exchange of TV programs between 625/50 and 525/60 color TV systems, without appreciable loss of quality.

Mercier is the former technical director of the ORTF, the French National TV Network. His contributions include guiding TV broadcasting developments in Europe and generating basic planning methods for satellite broadcasting. He also served for many years as chairman of the EBU's technical committees.

Subsequent Gold Medal winners are as follows: 1979, J. A. Flaherty, CBS, New York, for the development of the concept and operational implementation of electronic newsgathering (ENG); 1981, Richard Taylor, Quantel Ltd., Great Britain, for the development of INTELLECT, an interactive real time image processing system for use in broadcast television; and 1983, Ryo Takahashi, NHK, Tokyo, for envisioning the potential of high definition television (HDTV) and steering its research and development.

National Association of Broadcasters

The National Association of Broadcasters (NAB) presents a number of awards to individuals in recognition of outstanding achievements. Among these are the Distinguished Service Award, the Grover C. Cobb Award and the Engineering Achievement Award.

This final award is of special interest because it represents NAB's highest recognition of technical attainment. Past recipients of this award are world-renowned for their outstanding contributions to advancing broadcast technology. These recipients are listed in Table I. (Note that these awards themselves are celebrating their 25th anniversary, just as **Broadcast Engineering** is.)

As announced in our March and April 1984 issues, Otis S. Freeman, director of engineering, Tribune Broadcasting Company, will receive the 1984 Engineering Achievement Award at NAB-'84/Las Vegas. Among

Continued on page 130

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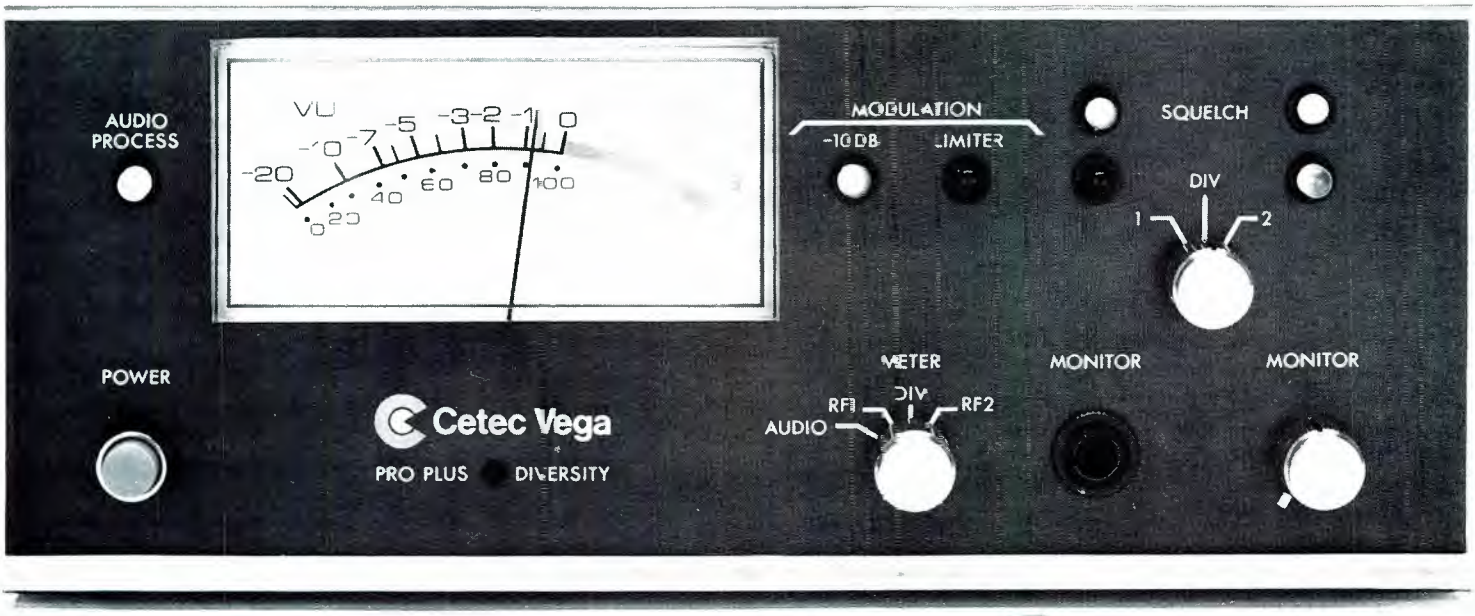

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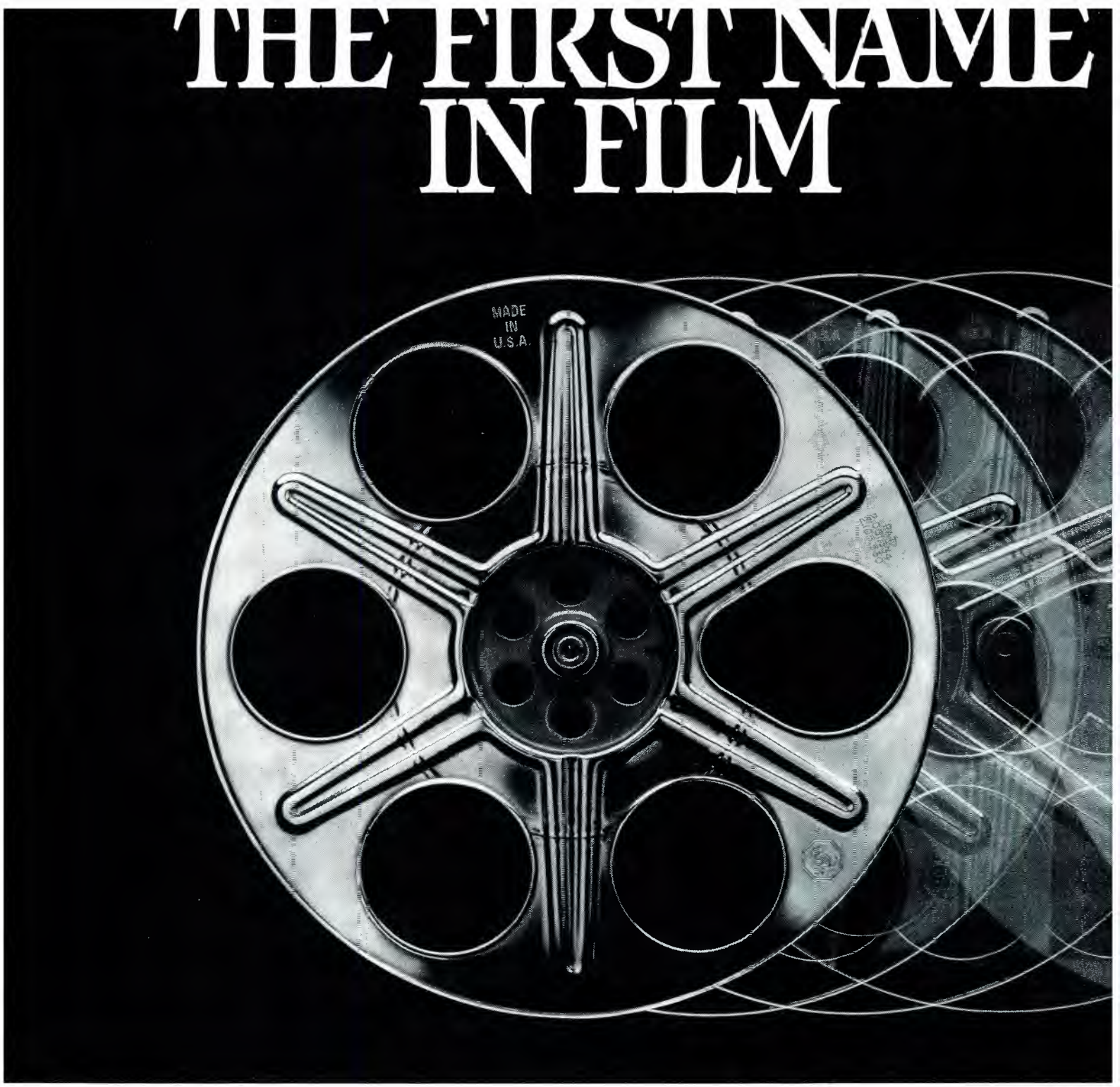

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EASTMAN Professional Video Tapes

Kodak

Continued from page 126

ABC's Julius Barnathan (left) receives the 1982 Engineering Achievement Award at NAB-'82/Dallas from Tom Keller, NAB senior vice president, Science and Technology.

Distinguished Service Award

Before a packed house of friends and colleagues, Vincent T. Wasilewski, former NAB president, received the NAB's Distinguished Service Award, the industry's highest honor, at NAB-'83/Las Vegas.

The award, established in 1953, is presented to a person who has made "a significant and lasting contribution to the American system of broadcasting by virtue of a singular achievement or continuing service for or on behalf of the industry."

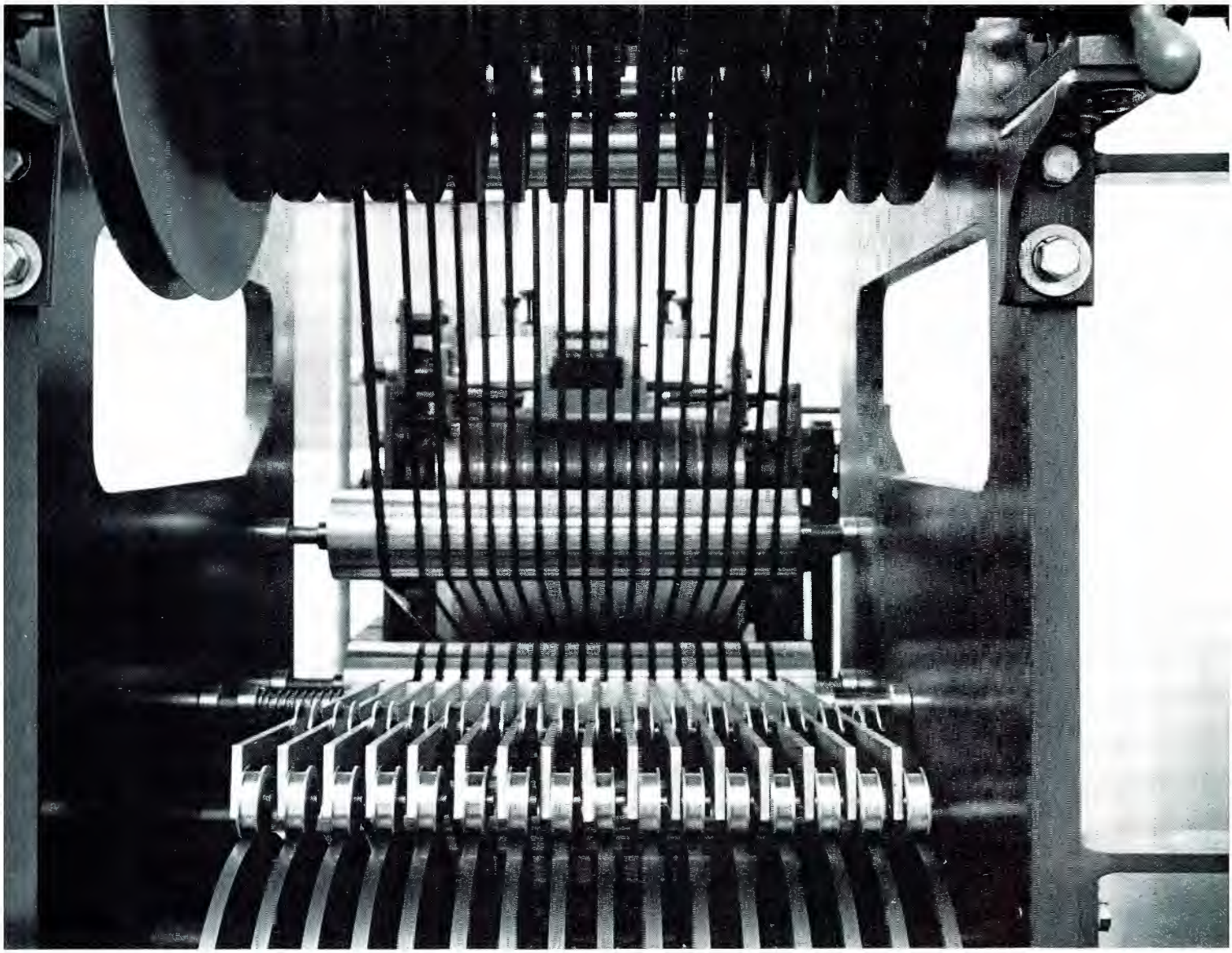
As reported in our March and April 1984 issues, this year's award winner is Elton H. Rule, vice chairman, American Broadcasting Companies, New York. The roster of recipients for the NAB Distinguished Service Award is shown in Table I.

Table I.
Distinguished Service Award recipients.

1953:	David Sarnoff
1954:	William S. Paley
1955:	Mark Ethridge*
1956:	Robert E. Kintner
1957:	Herbert Hoover
1958:	Frank Stanton
1959:	Robert W. Sarnoff
1960:	Clair R. McCollough
1961:	Justin Miller*
1962:	Edward R. Murrow
1963:	Bob Hope
1964:	Donald H. McGannon
1965:	Leonard H. Goldenson
1966:	Sol Taishoff
1967:	Chet Huntley/David Brinkley
1968:	Lowell Thomas
1969:	John Fetzer
1970:	Rosel Hyde
1971:	Neville Miller*
1972:	Billy Graham
1973:	Ward Quaal
1974:	Richard W. Chapin
1975:	George B. Storer
1976:	Julian Goodman
1977:	Harold Krelstein
1978:	J. Leonard Reinsch
1979:	Jack Harris
1980:	Arch Madsen
1981:	Donald Thurston
1982:	Walter Cronkite
1983:	Vincent T. Wasilewski*
1984:	Elton H. Rule

*Former NAB president.

Continued



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Continued

Edward O. Fritts (left), NAB president, presents Vincent T. Wasilewski, former NAB president, with the 1983 Distinguished Service Award.

Wasilewski: "A healthy skepticism and unity is necessary for the future of broadcasting."

his many accomplishments are leading the move to mount the transmitting facilities tower on top of the World Trade Center to improve broadcast transmission in New York, and developing gen-lock to allow pictures to incorporate a signal from a remote location.

Keller (left) presents the 1983 Engineering Achievement Award to Joseph A. Flaherty of the CBS Broadcast Group.

Joining Flaherty (left) at the NAB-'83/Las Vegas award reception (from left) are: Hartford Gunn of Satellite Technology Corporation, guest speaker at the 1982 NAB awards luncheon; Wallace Johnson of Moffet, Larson & Johnson, recipient of the 1981 Engineering Award; and Robert Flanders of McGraw-Hill Broadcasting, recipient of the 1979 Engineering Award.

Grover C. Cobb Award

The Cobb Memorial Award was created in 1975 by the NAB Television and Radio Political Education Committee to honor Grover C. Cobb, former NAB senior vice president for government relations. It is given annually to a broadcaster or public servant who demonstrates unusual dedication to improving broadcasting's relationship with the federal government.

Last year's recipient, Jack Rosenthal, president, Broadcast Division, Harriscope Broadcasting Corporation, received the Eighth Annual Grover C. Cobb Memorial Award at NAB-'83/Las Vegas.

Previous winners of the Cobb Award were former Sens. Sam Ervin of North Carolina and John Pastore of Rhode Island; Sen. Robert Packwood (R-OR); the late Thad Sandstrom, prominent Kansas broadcaster; David C. Adams, former NBC board chairman; Everitt H. Erlick, senior vice president and general counsel, American Broadcasting Companies; and the late William Carlisle, longtime NAB vice president.

As this issue goes to press, the NAB is announcing this year's award winner: Peter Kenney, NBC Washington (retired).

How Boston took advantage of us.

Boston is the home of a wealth of history: Paul Revere, the Boston Tea Party, and Harvard University. But respect for all that tradition didn't stop WNEV-TV from seeking equipment from other than the traditional suppliers.

After a thorough examination of the transmitters available today by the station's Engineering group led by Karl Renwanz, Vice President of Engineering and Operations, WNEV-TV decided to take advantage of the sophisticated simplicity of Larcan's Model "F" transmitter. They chose a pair of 30 kW TTC30000FH transmitters in parallel, backed up by a single TTC30000FH.

In today's competitive environment, a station such as WNEV-TV needs the performance and reliability that is designed into every Larcan transmitter. It also needs the back up and commitment to the business which Larcan, a company that specializes in RF, can provide.

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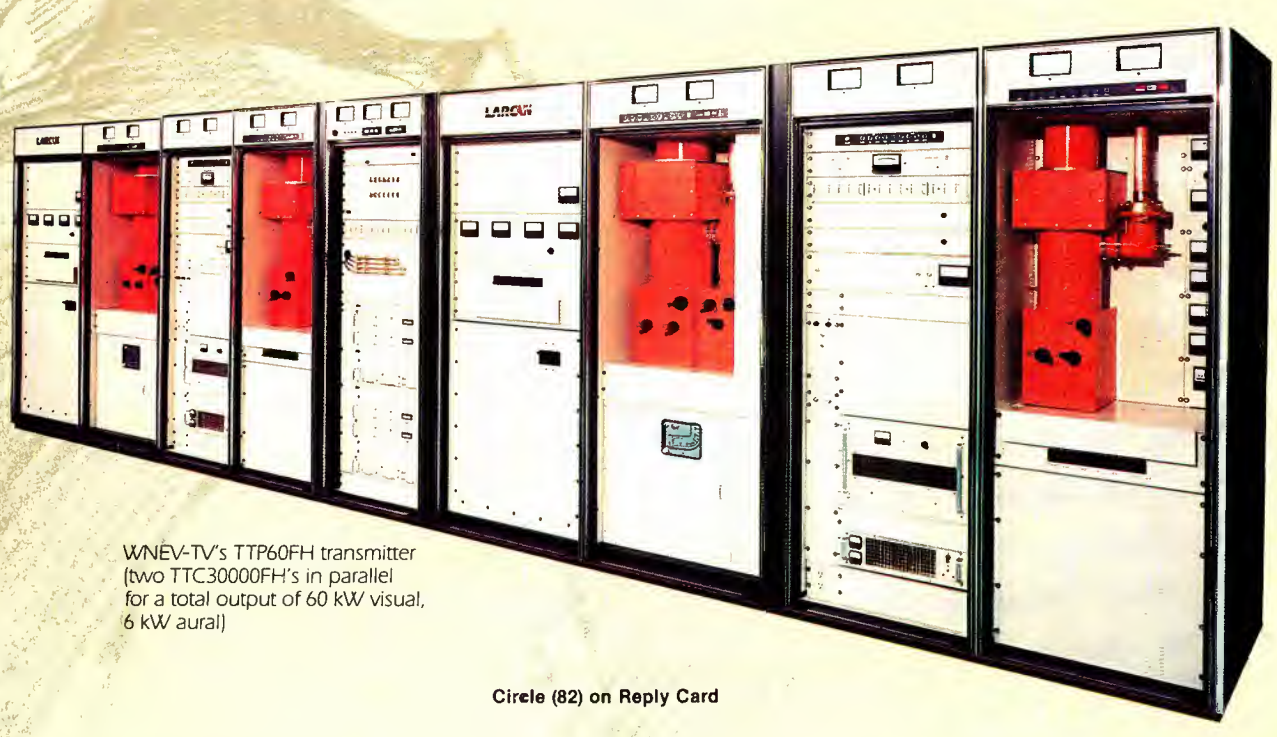

WNEV-TV's TTP60FH transmitter (two TTC30000FH's in parallel for a total output of 60 kW visual, 6 kW aural)

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Table I.
Recipients of the NAB Engineering Achievement Award.

1959: John T. Wilner, vice president, Engineering, Hearst Corporation, Baltimore.

1960: Commissioner T.A.M. Craven, FCC.

1961: Raymond F. Guy, consultant.

1962: Ralph N. Harmon, vice president, Engineering, Westinghouse Broadcasting, New York.

1963: Dr. George R. Town, dean of engineering, Iowa State University, Ames, IA.

1964: John H. DeWitt Jr., president, WSM, Nashville, TN.

1965: Edward W. Allen Jr., chief engineer, FCC.

1966: Carl J. Meyers, senior vice president and director of engineering, WGN Continental Broadcasting, Chicago.

1967: Robert M. Morris, staff consultant, engineering department, American Broadcasting Companies.

1968: Howard A. Chinn, director, general engineering, CBS Television Network, New York.

1969: Jarrett L. Hathaway, senior project engineer, NBC Television Network, New York.

1970: Philip Whitney, general manager, WINC, Winchester, VA, and supervisory engineer for Richard F. Lewis radio stations.

1971: Benjamin Wolfe, vice president, Engineering, Post-Newsweek Stations, Washington, DC.

1972: John M. Sherman, director of engineering, WCCO, Minneapolis.

1973: A. James Ebel, president, president and general manager, KOLN-TV/KGIN-TV, Lincoln, NE.

1974: Joseph B. Epperson, vice president, Engineering, Scripps-Howard Broadcasting, Cleveland.

1975: John D. Silva, director, research and development, Golden West Broadcasters, Los Angeles.

1976: Dr. Frank G. Kear, consulting engineer, Washington, DC.

1977: Daniel H. Smith, senior vice president, Engineering, Capital Cities Communications, Philadelphia.

1978: John A. Moseley, president, Moseley Associates, Goleta, CA.

1979: Robert W. Flanders, vice president and director, Engineering, McGraw-Hill Broadcasting, Indianapolis.

1980: James D. Parker, staff consultant, telecommunications, CBS Television Network, New York.

1981: Wallace E. Johnson, executive director, Association for Broadcast Engineering Standards, Washington, DC.

1982: Julius Barnathan, president, Broadcast Operations and Engineering, American Broadcasting Companies, New York.

1983: Joseph A. Flaherty, vice president, Engineering and Development, CBS Broadcast Group, New York.

1984: Otis S. Freeman, director, Engineering, Tribune Broadcasting, and senior vice president, Engineering, WPIX, New York.

Editor's note:
BE adds its congratulations to this distinguished group for its dedication to broadcasting. Many of these recipients have contributed over the years to editorial and industry news in **BE**.

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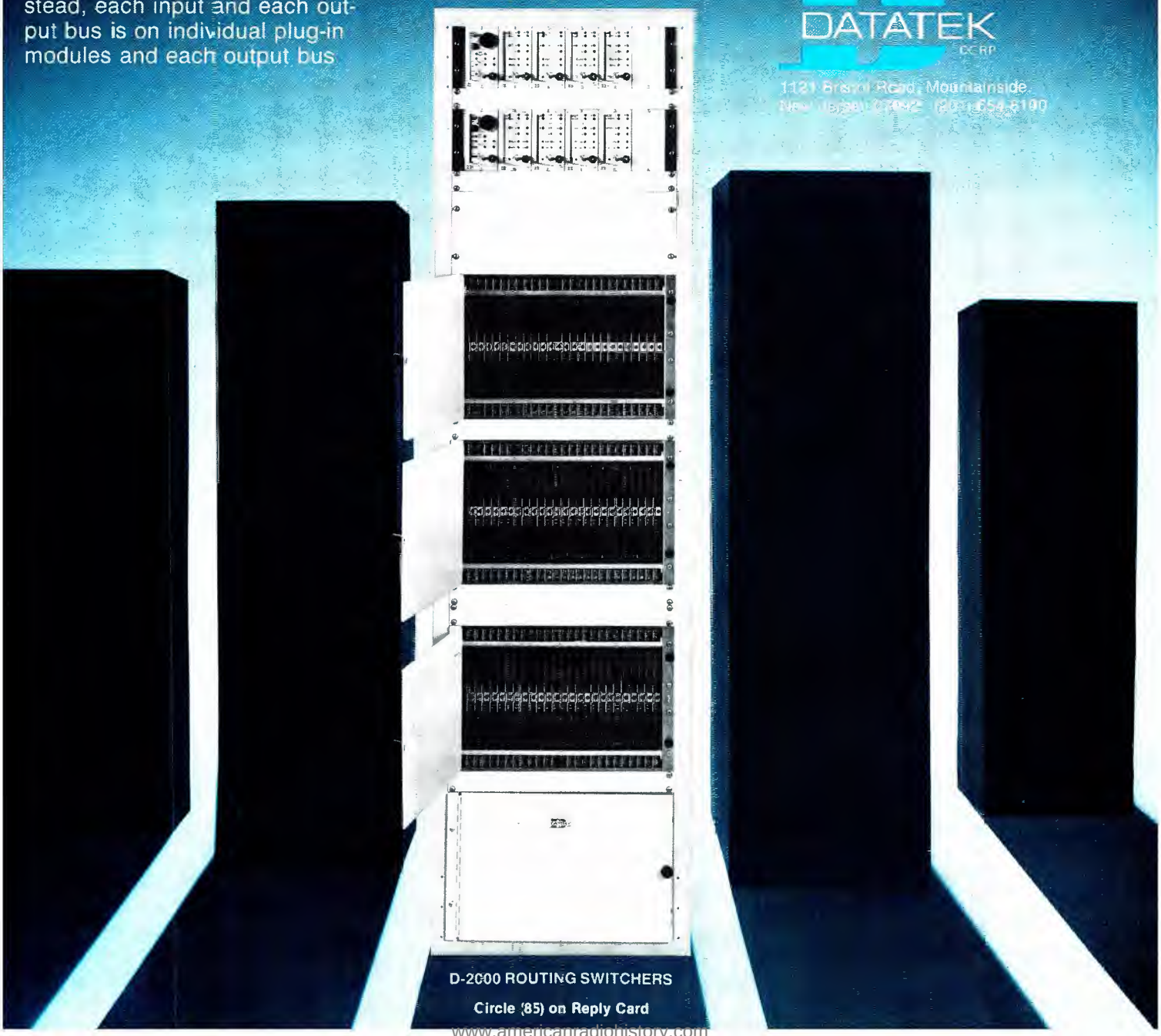

D-2000 ROUTING SWITCHERS

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National Radio Broadcasters Association

The National Radio Broadcasters Association (NRBA) does not give an award dedicated to engineering achievements. However, it does give the Golden Radio Award for broadcasting, and it participates in the Armstrong Awards presentations.

In past issues, **BE** has presented some of the Golden Radio Award recipients. In our December 1978 issue on page 62, NRBA president Jim Gabbert is shown presenting the award to Rep. Lionel Van Derlin for his courageous efforts toward maintaining a free radio broadcast system. In our November 1979 issue on page 22, Eric Severeid, celebrated news commentator, is shown receiving the award in recognition of pioneering years in radio news reporting and analysis.

More recent Golden Radio Award recipients include the following: 1980—Gene Autry, for his pioneering efforts in broadcasting, as an entertainer and station owner; 1981—Gordon McLendon; 1982—Paul Harvey, radio news commentator; and 1983—Walter Cronkite, CBS news commentator. Earlier winners include Lowell Thomas, Sol Taishoff and Harold Kassens.

As previously mentioned, the NRBA also participates in presenting the Armstrong Awards. The Armstrong Memorial Research Foundation was organized by friends and associates of Maj. Edwin H. Armstrong (1890-1954), whose revolutionary inventions included FM radio. The foundation strives to honor Armstrong's memory by perpetuating the principles that guided him in a life devoted to the perfection of electronic communications. This standard led the foundation to establish the Armstrong Awards in 1964 to encourage and reward quality standards in radio broadcasting.

The Armstrong Awards are given for excellence and originality in creating and presenting AM and FM radio programs of the greatest possible benefit to the audience to which they are directed. These awards are the only one of their kind exclusively for radio. They are administered by the foundation, which is based at Columbia University, where Armstrong made many of his discoveries. NRBA executive vice president Abe Voron is on the foundation's board of directors.

The traditional award categories are *Music, News, News Documentary, Public or Community Service, Education, and Creative Use of the Medium.* Also, from time to time awards are presented for *Technical Achievement in Broadcasting.* The following entries are from data submitted by respondees other than the Armstrong Foundation, which did not submit material.

Eric Severeid (left) receives the 1979 Golden Radio Award from Sis Kaplan, newly elected NRBA president, in recognition of his pioneering years in radio news. In his acceptance address, Severeid recounted the hardships and physical dangers in the early years of reporting, and told how hungrily the world awaited news from reliable reporters. Helping Kaplan present the award is Robert Herpe, NRBA chairman of the board.

Wayne Hetrich, senior engineer, NPR.

- In 1972, Renville H. McMann Jr. received the Armstrong Medal (through the Radio Club of America) in recognition of his "outstanding contributions to the application of communication techniques to TV systems."

One of today's leaders in television, McMann was associated with Armstrong in his early years in broadcasting. McMann worked initially at Armstrong's experimental radio station in Alpine, NJ, and later at the Hartley Research Laboratory at Columbia University, a laboratory financed by Armstrong. In 1952, McMann moved on to the field of television, first with NBC and later (in 1955) with CBS.

- According to National Public Radio records, Wayne Hetrich, senior engineer, NPR, received the 1980 Armstrong Award for "significant research toward implementation of major developments in the state-of-the-art broadcast electronics technology." Hetrich was cited as a pioneer in radio technology for designing and implementing a cost-effective, high quality, multiple-channel satellite distribution system, the first created for a radio network.

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Introducing "Snapshot" from MCI/Quantel. Only 12¼ inches high by 19 inches—including removable cartridge Winchester disk drive!

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You can even include MCI/Quantel's Paint Box as one of the workstations. So you can create the finest electronic graphics ever seen in television and have them instantly available for on-air use as well as library storage.

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National Society of Professional Engineers (1934-1984)

The National Society of Professional Engineers (NSPE) gives awards in a wide range of engineering disciplines. In 1983, 10 awards were given. Of these, the development of the automated field operations and services (AFOS) will be noted here.

With the completion of the AFOS, the United States enjoys almost instantaneous weather communications. AFOS allows communication in less than 30 seconds between any two National Weather Service stations. The new system combines minicomputers with graphic display consoles, and increases the rate of communication by 30 times—from 100 to 3000 words/minute.

The backbone of this computerized network is a nearly 12,000-mile-long, telephone-quality dedicated line. This network connects more than 200 Weather Service offices, including 12 river forecast centers, throughout the United States. These stations serve as entry points for the closed-loop system. Each station can receive and store data and forecasts, retrieve information from anywhere along the line, and disseminate information across the country.

AFOS was designed by the National Weather Service, National Oceanic and Atmospheric Administration, and US Department of Commerce. Ford Aerospace and Communications was the prime contractor for the system. It was nominated for an achievement award by the Cincinnati Chapter of the Ohio Society of Professional Engineers.

Society of Motion Picture and Television Engineers

Continued

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The Society of Motion Picture and Television Engineers (SMPTE) is devoted to advancing the technologies of the film and TV industries. Over the years, the society has implemented a number of special awards to recognize the contributions of individuals and organizations whose efforts have significantly furthered these technologies.

Certain practices and rules are common to all the awards. Award committees consist of five honorary, fellow or active members of the society appointed annually by the president and confirmed by the board of governors. The Journal Award committee is appointed by the editorial vice president. Membership in the society is not a prerequisite for an award. Awards are presented by the president at the national conference of the society following approval of the award by the board of governors.

The *Progress Medal* is the society's premier medal award. The *Agfa-Gevaert Gold Medal*, the *Eastman Kodak Gold Medal*, the *John Grierson International Gold Medal Award*, the *Journal Award*, the *Herbert T. Kalmus Gold Medal*, the *Outstanding Service to the Society Award*, the *Photo-Sonics Achievement Award*, the *Alexander M. Poniatoff Gold Medal Award*, the *David Sarnoff Gold Medal* and the *Samuel L. Warner Memorial Award* recognize achievement in special fields of accomplishment.

Progress Medal Award

This award recognizes outstanding technical contributions to the progress of engineering phases of the motion picture and/or TV industries. Table I is a partial listing of Progress Medalists from 1959 to the present. This listing deletes those whose works were limited mainly to motion picture contributions, thus emphasizing progress in television and advances in technical photography that might be adapted to facets of TV production.

Alexander M. Poniatoff Gold Medal

This award recognizes outstanding technical excellence of contributions in the research or development of new techniques and/or equipment that have contributed significantly to the advancement of audio or TV magnetic recording and reproduction.

The committee awards the medal to an individual. A development or invention in which a group has participated is considered only if the individual to be honored has contributed the basic idea or has contributed substantially to the development of the idea. Preference is given to work that has reached completion

Table I.
Progress Medal recipients.

1959: Harold E. Edgerton, for high speed photography.

1960: Otto H. Schade Jr., for technical contributions to the progress of engineering phases of the motion picture and TV industries.

1961: Cyril J. Staud, for research and development that resulted in significant advances in the development of motion picture and TV technology.

1962: Frank G. Back, for work resulting in the successful development and use of the zoom lens.

1963: Arthur C. Hardy, for pioneer work in motion picture sound recording and later work on the theory of color reproduction.

1964: Rudolf Kingslake, for many contributions, improvements and inventions in the field of geometrical optics and lens design.

1970: Peter C. Goldmark, for contributions to the TV industry and the record industry, and for the development of the electronic video recording system.

1971: Rodger J. Ross, in recognition of his energies in the improvement of films made for television, the adoption of sound engineering practices in TV film operations, and the continuing education of TV and film personnel.

1973: Wilton R. Holm, for contributions to progress in several technologies in the motion picture and TV field.

1975: W.T. Wintringham, in recognition of the broad spectrum of his technological contributions to progress in the motion picture and TV fields.

1977: E. Carlton Winckler Sr., in recognition of his outstanding career since the early 1930s as a lighting consultant to theatrical and TV productions, and for contributions toward the improvement of color TV programming through the use of proper lighting techniques.

1978: Robert E. Gottschalk, for engineering developments for the Panaflex camera and other equipment.

1979: Donald G. Fink, in recognition of his many years of continuous and significant contributions to the TV field as an engineer, author and editor.

1981: Daan Zwick, in recognition of his extensive research into the image structure properties and emulsion design of color films. Also, for his leading role in the development of national and international standards for color film intended for television, and in developing test materials for telecine alignment.

1982: Frank Davidoff, in recognition of his outstanding contribution to the motion picture and TV industries, for his work in directing and motivating the development of a sound technical approach to digital video specifications.

1983: Dr. Ray M. Dolby, for his contributions to theater sound and his continuing work in noise reduction and quality improvements in audio and video systems. Also, in recognition of Dolby as a prime inventor of the videotape recorder.

Table II.
David Sarnoff Gold Medal recipients.

1959: W.R.G. Baker, for work as chairman of the National Television System Committee.

1962: Pierre Mertz, for development of a mathematical theory of scanning in television and for studies of the effects of noise and echoes on the quality of TV pictures.

1963: Henry N. Kozanowski, for engineering accomplishments in the field of television and for his sustained drive to improve the quality and practical operation of TV studio and film camera equipment.

1964: Robert G. Neuhauser, for contributions to the development of new techniques or equipment contributing to the improvement of camera tubes and the engineering phases of television.

1965: Alfred C. Schroeder, for contributions to the fundamental concepts and decisions that have gone into the development and refinement of color picture tubes and the NTSC color system.

1966: Dr. Edward F. de Haan, for contributing many fundamental concepts and refinements in the development of photoconductive camera pickup tubes.

1967: Alda V. Bedford, in recognition of his contributions to the development of black-and-white and color television.

1969: Peter C. Goldmark, for continuing stimulus and contributions in the conception, development and usage of significant innovations in television, video recording, and the application of TV technology in the fields of aerospace, education, printing and medicine.

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EIMAC backs its quality products with the industry's most comprehensive warranty program:

Warranty time for each EIMAC tube type is specified in writing and runs from the industry standard of 1,000 hours or 12 months to as high as 10,000 hours and 24 months.

Specific warranties for some popular tube types are:

4CX5000A	10,000 hours/24 months
4CX10,000D	10,000 hours/24 months
4CX15,000A	10,000 hours/24 months
4CX35,000C	10,000 hours/24 months
3CX2500A3	5,000 hours/12 months
4CX1500A	5,000 hours/12 months
5CX3000A	5,000 hours/12 months

Fourteen other EIMAC types have these extended use-time warranties. Specific warranties for each tube type are available from the Varian EIMAC worldwide sales organizations.

In all cases, EIMAC tubes are 100% warranted to be free of manufacturing defects. And, don't forget, EIMAC has a "carcass credit" return program for real savings on replacement tubes.

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More information is available on EIMAC tubes and warranty program from Varian EIMAC, or any Electron Device Group worldwide sales organization. See your distributor or contact Varian EIMAC today.

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Continued

1970: Charles H. Coleman, for many original inventions, in particular for time domain electronic signal correction, making possible direct recovery of color signals for videotape, and for the conception and development of highband color videotape recording, now accepted throughout the world as standard in TV broadcasting.

1971: Walter Bruch, for contributing to the development of the PAL system for color TV broadcast transmission, now standardized in many countries, and for his continuing efforts toward the improvement of color television.

1972: Peter Rainger, for his pioneering development of all-electronic TV standard conversion techniques, with numerous other important contributions to TV technology.

1973: Arch C. Luther Jr., for major contributions to magnetic video recording, including development of the broadcasting industry's first quadruplex videotape cartridge recording system, and for contributions to the national and international standardization of quadruplex recording.

1974: Joseph A. Flaherty, for major contributions to the planning of complex network TV production centers, to the evolution of electronic newsgathering techniques, including the use of highly mobile color TV equipment and to the concept of computer-controlled videotape editing systems.

1975: John L.E. Baldwin, for his personal contributions and as leader of the team that developed the first operational field-store TV standards converter using digital processing techniques.

1976: Adrian B. Ettlinger, for contributions to the application of computers to on-air TV station switching control; for conceiving the application of videodisc stop-action systems to sports broadcasts; and for contributions to computer control of studio lighting systems and videotape editing systems.

1977: Renville H. McMann, for pioneering work in TV signal digital noise reduction, image enhancement, color masking, and encoded signal color correction; for his leadership in the development of the first high quality portable color camera and many other contributions to TV technology.

1978: Masahiko Morizono, for his leadership and engineering achievements in the development of TV electronic newsgathering (ENG) equipment, especially in the development of portable helical-scan VTR systems with associated versatile editing capabilities.

1980: Maurice Lemoine, in recognition of his leadership in and technical contributions to digital equipment design that have led to the introduction of digital time base correctors for several videotape recorders and, more recently, to the achievement and public demonstration of high quality videotape recording.

1981: Takashi Fujio, for leadership and significant engineering contributions to the continuing development of a high definition television system and related technologies.

1983: Frank Davidoff, for his efforts in liaison with the European Broadcasting Union as chairman of the SMPTE Task Force on Component Digital Coding. Also, for his past contributions in TV signal synchronization; for specifications of the 4-field color signal, particularly with respect to SC/H-phase relationships; and for the design of a successful Rubidium standard, wire-lock, synchronizer for remote TV signals.

within five years of the date of the award.

Past winners include the following: 1982—Ray M. Dolby, for advancement of magnetic sound and video recording, particularly for his work in the design and application of noise reduction systems for use in sound recording; and 1983—Michael O. Felix, for contributions to the advancement of magnetic video recording. Felix analyzed and implemented the principles of highband recording systems, resulting in a quantum improvement in the quality of color video recordings.

The Presidential Proclamation

This award recognizes individuals of outstanding status and reputation in motion picture and TV industries worldwide. Awards thus far are as follows: 1982—Norman R. Grover, in recognition of his technical leadership in the CBC and for his many years of support in SMPTE activities; and, also in 1982—Carlo Terzani, for his leadership in expanding the interchange of technical information between the European Broadcasting Union and SMPTE, thereby increasing opportunities for achieving compatible worldwide TV standards.

David Sarnoff Gold Medal Award

This award recognizes outstanding contributions in the development of new techniques or equipment that have contributed to the improvement of engineering phases of television, including theater television. Preference is given to developments or inventions likely to produce the widest and most beneficial effect on, or improvement in, television. Past winners are listed in Table II.

Special mentions

While preparing this issue, we uncovered historical factors not easily covered in the established categories initially set up for this issue. Back issues of **BE** and responses to our call for historical data were the sources of this information. This special mention section reports these tidbits of history.

Angenieux

For historical highlights, Angenieux records the following "firsts" for its organization:

1950: First Retrofocus lens.

1956: First zoom lens industrially produced in the world, a 4X zoom lens for newsgathering.

Continued

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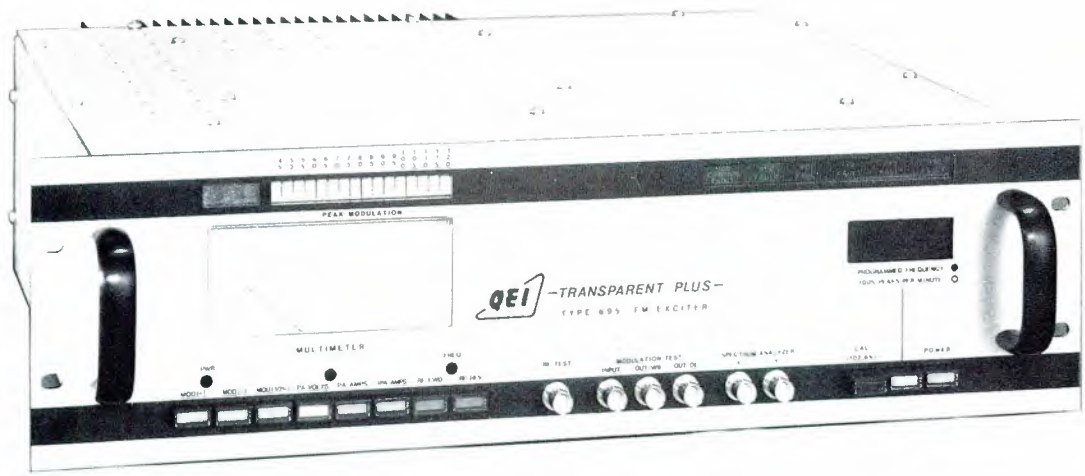

Circle (93) on Reply Card

Continued

1960: First zoom of 10X range for expanded TV news work.

1964: NASA chose Angenieux lenses to equip its Ranger missions, the world's first TV lenses to perform in the outer space environment. (Between 1964 and 1984, NASA selected Angenieux TV zoom lenses for all space TV missions.)

1983: Francois Mitterand, president of France, presents the French Excellence in Quality Workmanship Award to Jean Moret, general manager of Angenieux.

1983: Bernard Ollagnier, director of marketing for Angenieux, presents Jack Lang, French minister of culture, with the highest quality zoom lens ever produced by Angenieux.

1969: The first man on the moon, television through Angenieux.

1976: Skylab TV coverage.

1980: The largest zoom range ever developed, the 42X lens was selected for the 1980 Olympic Games.

1981-1984: NASA space shuttle television for science, mission monitoring and public television through 21 special wide-angle, space-qualified Angenieux zoom lenses.

1983: The Pan American Games, in Venezuela, selected Angenieux zoom lenses.

1980: SMPTE receives RTS award

At its annual convention in 1980, the SMPTE received an award from the Royal Television Society (RTS) of Great Britain for its outstanding society services. Phil Sidey (left) of the BBC addressed the luncheon gathering, praised the SMPTE activities and delivered the award to Robert Smith, SMPTE president. The award was a miniature replica of the Emitron camera that served the BBC from 1936-1954. TV pioneer Vladimir Zworykin visited the convention at this event. SMPTE officers showed him the award that *they* had received from the RTS. Zworykin, thinking that it was *his* award, promptly made off with it. He returned it, of course, but the incident added a touch of humor to the occasion. 25

The award receivers:
Broadcasters

BE asked the various networks to provide a list of their awards, especially those for advancing the technology of broadcasting. The following is a tabulation of their responses, according to their records, reported as received (with available pictures). Special notes are included in cases in which **BE**'s records differ from those of the networks.

ABC

1982. ABC's Julius Barnathan (left) receives honorary Ph.D. from Gallaudet College for his pioneering efforts in providing closed captioning to the hearing impaired.

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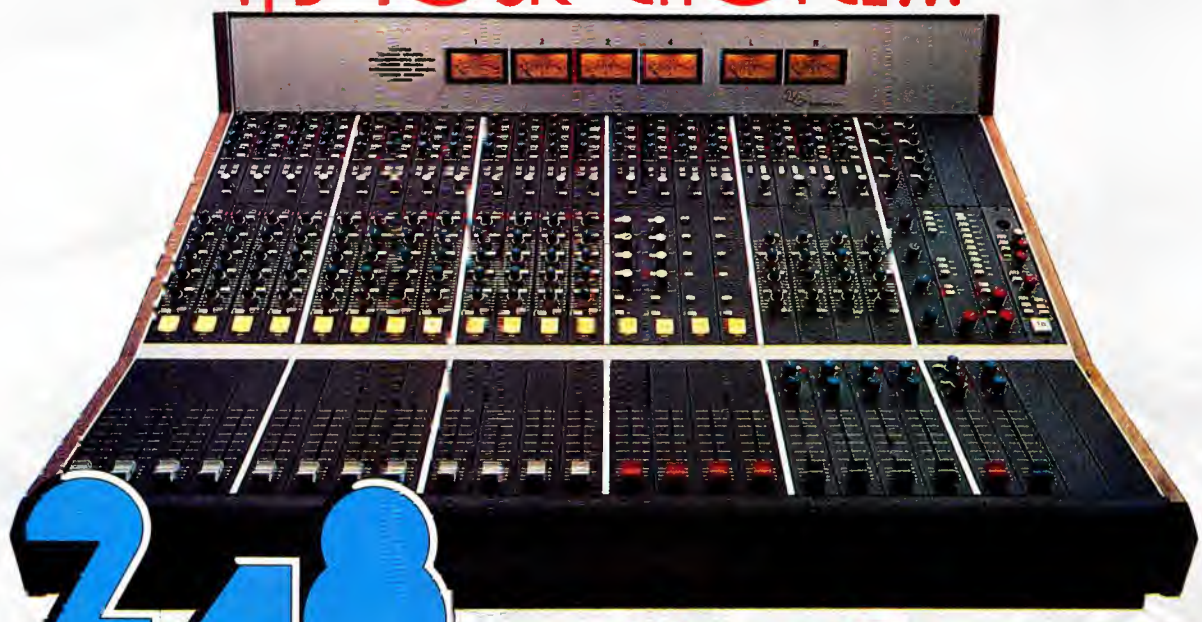

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As with all the major networks, ABC has applied new technologies in many areas to produce radio and TV programming for worldwide use. As a result, ABC has received numerous industry awards, many of which are for its programs. Table I highlights only those awards ABC received that dwell on technical accomplishments, and is limited to awards received since 1979.

Table I.
ABC technology awards.

1979: Commendation from the National Fraternal Society of the Deaf for efforts to adapt TV programming for the hearing impaired.

1980: ABC, PBS and the National Bureau of Standards shared a 1980 Primetime EMMY in the 32nd Annual Awards competition (ATAS) for designing program captions for the hearing impaired.

1981: ABC honored at the National Theatre of the Deaf Salute to Hearing Actors of America for its efforts with closed captioning for the hearing impaired; Julius Barnathan received New York ATAS Governors Award for "spanning more than a decade in response to the problems of the deaf and hearing impaired and their need to experience the full potential of television in words as well as pictures"; and Roone Arledge honored with the Distinguished Achievement Award from the Journalism Alumni Association of the University of Southern California, for being a pioneer in the creative use of broadcast technology.

1982: Barnathan received 1982 NAB Engineering Award; two special assignment reports on ABC's *World News Tonight* won National Society of Professional Engineers' Electronic Media Awards; Barnathan received honorary Ph.D. from Gallaudet College for "his significant contributions to deaf people through the development and use of closed captioning"; and ABC received Virginia Hood Memorial Award from Rockland County Association for the Hearing Impaired of New York.

1983: Roone Arledge received IRTS Gold Medal for many years' innovation; ABC honored by six major deaf-service organizations for providing closed-captioned television; ABC received Connecticut Association of the Deaf's Gold Hand Award for closed captioning; ABC received Alexander Graham Bell Award for providing closed captioning; and *The American Sportsman—Triumph on Mount Everest* won an EMMY for innovative technical achievement for microwave transmission from the summit of Mount Everest (David Breshears, Randy Hermes, Allan Weschler, John Wilcox, Nick Pantelakis, Peter Pilafian and Steve Marts).

BBC

The history of the BBC is rich in innovations in broadcast technology and programming. When **BE** staff members were in China, we discovered that many Chinese people learned their English from BBC radio broadcasts. When we toured stations in England, we noted that the British take special pride in two areas: the quality of the delivered signal, and innovative techniques to improve radio and television.

Among its many technological innovations, the BBC lists the information in Table II as engineering achievements over the past 25 years. Also during this 25-year period, the BBC received numerous engineering awards. Table III shows the BBC's record of these industry recognitions (excluding awards for *papers*).

Table II.
BBC engineering achievements (1959-1984).

1959: First use of Cablefilm system (slow speed scanning) to transmit film for television over trans-Atlantic telephone cable; and optical field-standards converter used to produce 525-line videotape of Western Summit Conference held in Paris.

1960: BBC Television Centre opened. At that time, it was one of the few buildings in the world designed solely for TV production.

1961: First Western viewing of live television from Russia; BBC viewers saw Moscow welcome for Yuri Gagarin, world's first *spaceman.*

1963: Electronics line-store (625-405 and 405-625) standards converter developed.

1964: New service (BBC 2) opened on UHF 625 lines (black and white).

1965: TV apparatus for the rectification of inferior film (TARIF) equipment introduced to improve color rendering of televised films.

1967: Digitally coded signals (for engineering use) introduced into the vertical blanking interval of the TV waveform; the BBC coordinated *Our World,* an exchange of programs from 40 different countries around the world; first regular color transmissions in Europe began on July 1, from Wimbledon, using the PAL system; and first program use of the world's first electronic field-store standards converter for trans-Atlantic color television via "Early Bird" communication satellite.

1968: More advanced versing of the electronic field-store standards converter brought into service in time for the Mexico Olympic Games.

1970: Digital video transmission over Post Office waveguide; and ANCHOR electronic character generator introduced into service.

1971: Digital video transmission over STC optical fiber; first public demonstration of digital sound recording using multitrack heads; and demonstration of the world's first stereophonic digital audio stationary-head tape recorder.

1972: Sound-in-Syncs (a digital method of conveying the sound component of the program within the vision waveform) brought into service, thus obviating the need for separate sound lines; and PCM 13-channel transmission system introduced to carry high quality stereo sound programs between studios and transmitters.

1973: First demonstration of monochrome 625-line solid-state telecine (512-element photo-diode array).

1974: CEEFAX (BBC's teletext system) introduced into regular service; and first demonstration of digital TV recording (at IBC). *Continued*

1984. The BBC receives its third Queen's Award to the Industry, presented jointly to the BBC Engineering Directorate and the IBA's Engineering Division for their pioneering work on the development and transmission of teletext. Shown (from left) are: Peter Rainger, BBC deputy director of engineering; Bryce McCrirrick, director of engineering; and Lord Hamilton of Dalzell, who presented the award. Rainger first laid the framework of the teletext system in 1970 and became one of the co-patentees in 1972.

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1975: The BBC's first Monitoring and Information Centre entered service at Kirk O'Shotts in Scotland.

1976: First program use of near instantaneously companded audio multiplex (NICAM), which allows a reduced bit rate to be used for the digital transmission of sound programs, without decreasing quality; and world's first digital PAL TV and digital audio transmission by satellite (Intelsat IV over Indian Ocean).

1978: Demonstration of solid-state 625-line broadcast-quality color telecine.

1979: 4-field TV standards converter (ACE) entered service.

1980: Electronic zone plate introduced to measure temporal as well as spatial frequency characteristics of TV systems.

1981: The BBC mounted the biggest-ever outside broadcast coverage, seen in 74 countries, during the Royal Wedding of Prince Charles and Lady Diana Spencer.*

1982: First public broadcast of high quality still pictures on CEEFAX; first transmission of TV signals over optical fiber link between two 625-line TV studio centers using the internationally agreed coding standard; and first broadcast of live TV program with instant teletext subtitles for the hearing impaired using Palantype system. (See also 1981, above.)

1983: Telesoftware service introduced (programs for home computers transmitted on teletext pages); and first program use of 68Mbit/s bit rate reduction system.

*BBC records do not reflect another technology landmark at this event. **BE** records show that this is the *second* time in history that the transmission contained real time subtitling for the hearing impaired. The *first* such transmission occurred in 1980 at President Reagan's inaugural address.

Table III.
BBC engineering awards.

1950: Karl Heinrich Gyr and Heinrich Landis Commemorative Prize of the IEE to Martin Weston for the electronic zone plate.

1964 and 1968: Geoffrey Parr Award of the Royal Television Society to Peter Rainger for TV standards conversion.

1967: EMMY to Rainger for TV standards conversion; Geoffrey Parr Award to Eric Rout for TV standards conversion; and Pye Award to R.E. Davies for TV standards conversion.

1968: Geoffrey Parr Award to Bill Wood for TV apparatus for the rectification of inferior film (TARIF); and SMPTE Commendation to Wood for TARIF.

1969: Queen's Award to Industry for TV standards conversion.

1972: David Sarnoff Gold Medal to Rainger for developments in electronics; J.J. Thomson Premium of the IEE to Rainger and Rout for TV standards conversion; and Geoffrey Parr Award to Chris Dalton and Richard Sanders for Sound-in-Syncs.

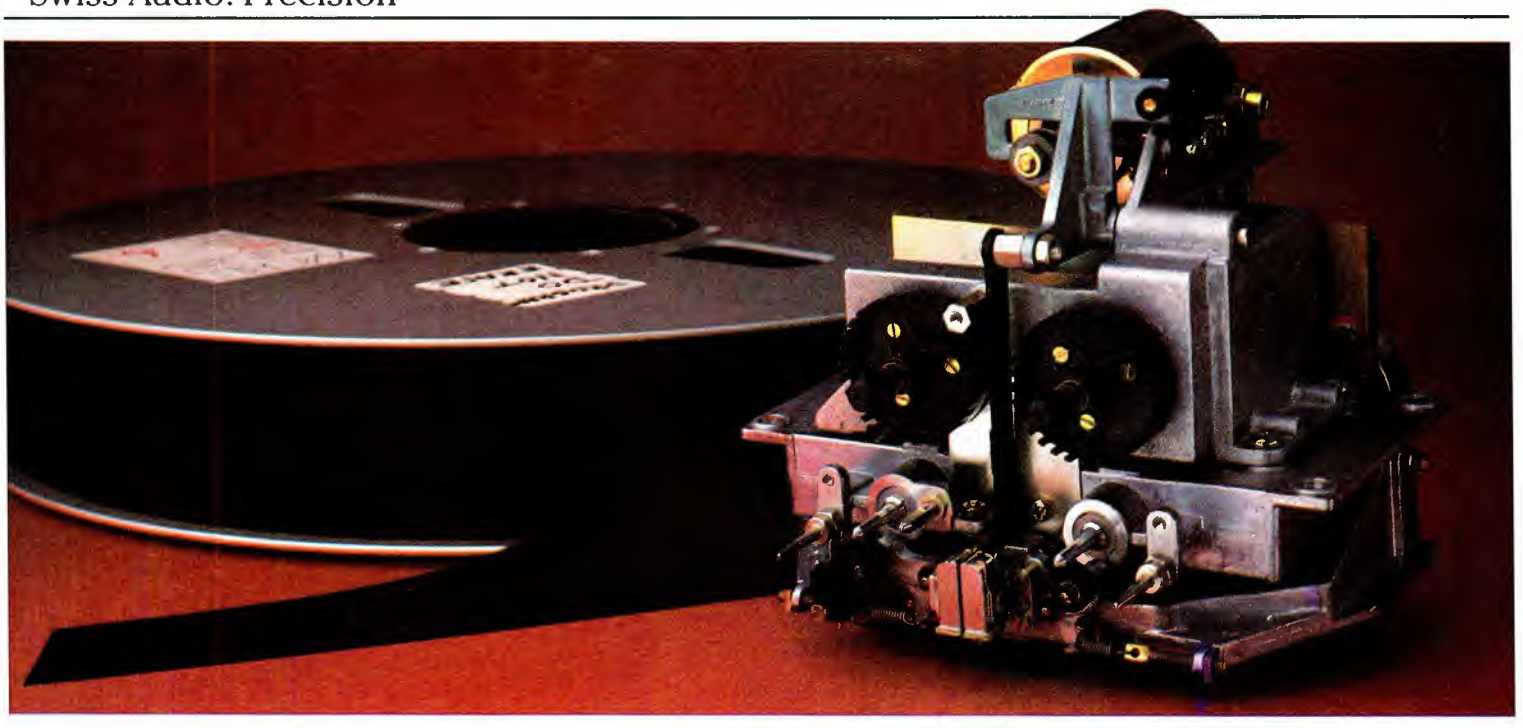
1974: Queen's Award to Industry for Sound-in-Syncs; IERE Clark Maxwell Premium to V.G. Devereux for digital television; and Geoffrey Parr Award to John Shelley for transmitter automation.

1975: Karl Heinrich Gyr and Heinrich Landis Commemorative Prize to R.A. Belcher for audio measurement.

1976: Geoffrey Parr Award (joint award) to the BBC/IBA/BREMA team responsible for the published specification for teletext; and BKSTS President's Award to A.H. Jones for digital TV recording.

1979: Phil Berkeley Award of the BKSTS to Sanders for film and TV technology.

1983: Queen's Award to Industry jointly with the IBA for teletext.



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In designing a transport for the Studer A710 and the Revox B710 MKII cassette decks, our engineers worked with the same principles established for our professional open reel decks. No cost-cutting compromises were permitted. For example, the Studer Revox cassette transport is built on a die-cast aluminum alloy chassis, not on stamped metal. This is the only way to assure precision machining and long term stability.

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CBS

For many years CBS, through its powerful combination of network operations and laboratories, has formed a dynamic organization spearheading new technologies for broadcasting—new equipment and new standards. Almost no facet of broadcasting has not been touched upon by this duo, and the awards that CBS has received are tributes to the organization and its people.

Table IV.
Some CBS awards.

1956: EMMY Award for development and application of Ampex videotape.

1968-1969: EMMY Citation for the development of digital control techniques used in the Minicam miniature color camera.

1970-1971: EMMY Award for development of the color corrector.

1972-1973: EMMY Award to CMX Systems, a CBS/Memorex Company, for the development of a videotape editing system using a computer to aid the decision-making process, store the editing decisions and implement them in the final assembly of takes.

1974-1975: EMMY Award for spearheading the development and realization of the electronic newsgathering (ENG) system.

1977-1978: EMMY Award for the development of the digital noise reducer.

1980-1981: EMMY Award for the original concept, assisting in the development and on-air use of the first digital electronic still-store system.

1982-1983: Primetime EMMY Award for engineering and development, in conjunction with Ikegami Electronics, of the EC-35 electronic camera.

A partial listing of the CBS awards are shown in Table IV. In addition to awards presented to CBS as an organization, the CBS staff has separately received professional recognition through society awards. Table V shows major awards of this type.

Table V.
Individual awards/CBS.

1954: SMPTE Journal Award to Richard S. O'Brien, managing director, planning, Engineering and Development, CBS Broadcast Group, for his paper, "CBS Color-Television Staging and Lighting Practices."

1974: SMPTE David Sarnoff Gold Medal for progress in TV engineering to Joseph A. Flaherty, vice president, Engineering and Development, CBS Broadcast Group.

1979: Montreux Symposium Achievement Gold Medal to Flaherty for the development and operational implementation of ENG.

1983: NAB Engineering Award to Flaherty.

NBC

NBC has received technical awards stretching back more than 33 years, which are listed in Table VI.

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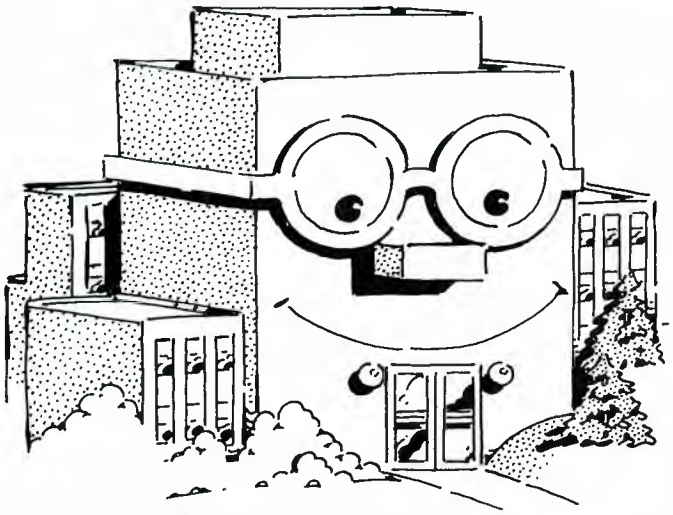

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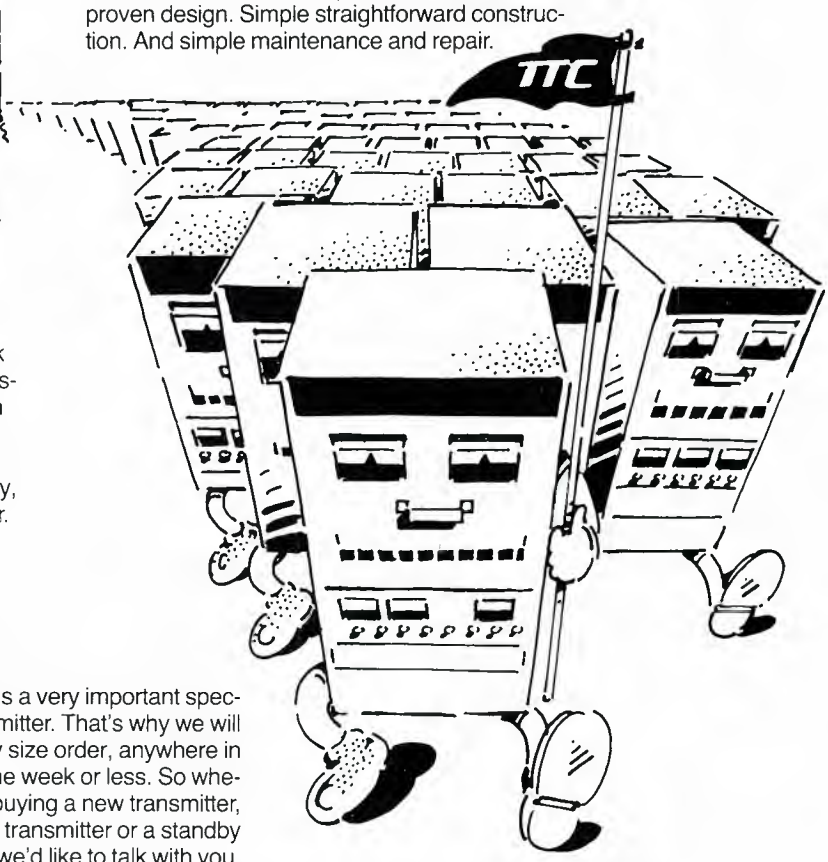

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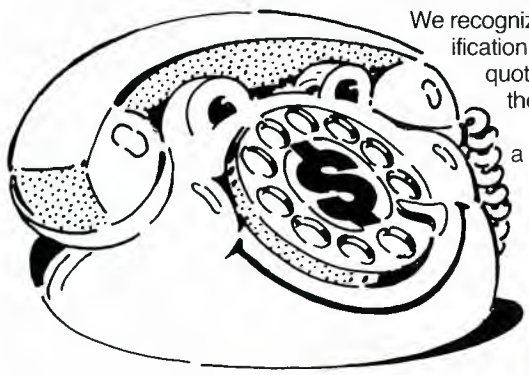

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Table VI.
NBC technical awards.

1951: EMMY, technical achievement, for the Orthogram TV amplifier by KNBH-NBC.

1952: EMMY, Special Achievement Award, to Jack Burrell of KNBH for the development of an independent TV transmission mobile unit.

1955: EMMY, best technical achievement, to John West of NBC for color TV policy and Burbank Color; and EMMY, best engineering effects, to Robert Shelby for 4-quadrant screen (1954 national election coverage).

1958: EMMY, best engineering or technical achievement, for engineering and camera techniques on *Wide Wide World.*

1959: EMMY, best engineering or technical achievement, for industry-wide improvement of editing of videotape as exemplified by ABC/CBS/NBC.

1980: Sports EMMYs, special classification of outstanding program and individual achievement, to Jerry Caruso and Harry Smith, creators of the radio frequency golf cup microphone on the *Bob Hope Classic.*

1981: NATAS Sports EMMY for the louma camera crane used in the *Friday Night Fights.*

1982: NBC Technical Excellence Award to Jerry Caruso.

1983: CART Directors Award to NBC Sports, which televised the first race sanctioned by Championship Auto Racing Teams (CART) in March 1979.

1983: OTC Power Team, Bearings—Harry Billheimer, director, scenic services, NBC-TV Network, was honored with the plaque for making creative use of a hydraulic lift system, a Ram hydraulic unit for moving the *Go* game show sets from the warehouse to the stage and back, quickly and easily, reducing time and manpower.

NPR

National Public Radio (NPR) established the Edward E. Elson Award in 1979 to recognize individuals who have made outstanding contributions to the public radio system.

Wayne Hetrich, NPR's senior engineer for research and development, was the 1983 recipient of this award. Hetrich was honored for his significant contributions to public radio's satellite program distribution system.

Hetrich, who joined NPR in 1971, is the architect of the network's satellite system. He was responsible for the design of small satellite earth terminals capable of multichannel, high quality, high fidelity sound.

Hetrich also is a recipient of the Armstrong Awards. 25

Wayne Hetrich, recipient, 1983 Edward E. Elson Award.

The award receivers: Manufacturers

A fascinating aspect of broadcasting is the cooperation between broadcasters and manufacturers of equipment used in stations. Whether the initial idea for a new piece of hardware (or software) comes from a broadcaster or from a manufacturer is almost irrelevant. What is significant is that the final product usually is the result of a cooperative effort between the broadcaster(s) and the manufacturer to produce exactly the type of system that meets a broadcaster's needs.

For this reason, **BE** makes a concerted effort for the major conventions (especially for the NAB show) to

clarify the status of what is new: prototype, experimental, production run, etc. Furthermore, for experimental setups and prototypes, **BE** tries to establish when production runs/shipments are anticipated.

For their part in developing new technology for broadcasters, many manufacturers have received industry awards. In preparing this issue, **BE** asked all manufacturers in the industry to tabulate their awards and provide graphics as appropriate. The following information is a compilation of responses. Other manufacturers have received awards, but did not respond to our inquiry, and thus are not included.

Amperex

For its leadership in perfecting pickup tubes for TV cameras, Amperex has received two awards: 1966—SMPTE's David Sarnoff Gold Medal to Dr. E.F. deHaan for development of the Plumbicon™—and other contributions to the advancement of photoconductive TV camera pickup tubes; and 1967—EMMY from NATAS for development of the Plumbicon camera tube.

Ampex

From its rich tradition of serving the audio and video industries, including broadcasting, Ampex filed the longest list of industry awards for equipment and technology development, as shown in Table I.

1957. The Ampex engineering team that developed the first practical videotape recorder poses with two early versions of the machine and the EMMY awarded to Ampex.

1957. Charles P. Ginsburg, who led the Ampex engineering team that developed the first practical videotape recorder, poses with the EMMY awarded to Ampex by the ATAS.

Table I.
Ampex awards.

1957: EMMY from the Academy of Television Arts and Sciences (ATAS) for development of the first practical videotape recorder.

1961: Oscar from the Academy of Motion Picture Arts and Sciences (AMPAS) for the advanced multipurpose theater sound system (Todd-A-O).

1967: EMMY from the National Academy of Television Arts and Sciences (NATAS) for development of highband color videotape recording.

1979: EMMY from the NATAS for co-development of Type C helical-scan broadcast format; EMMY from the ATAS for development of automatic scan tracking (AST) technology; and Geoffrey Parr Award from the Royal Television Society for development of AST technology.

1981: EMMY from the NATAS for development of first digital video (still-store) production system.

1983: EMMY from the NATAS for development of Ampex Digital Optics (ADO) system; a Citation from the ATAS for development of the ADO system; and a Monitor Award from the Videotape Production Association for development of the ADO system.

1979. Ampex received three prestigious awards: an EMMY from the NATAS for co-development of the Type C format; an EMMY from the ATAS honoring the development of automatic scan tracking (AST) technology; and the Geoffrey Parr Award from the Royal Television Society, also for the development of AST technology.

1979. Donald V. Kleffman (left) of Ampex accepts an EMMY for co-development of the Type C format from the NATAS.

1983. One of three awards given to Ampex for development of the Ampex Digital Optics (ADO) system was this EMMY from the NATAS. Shown (from the left) are: Charles Steinberg, executive vice president, Ampex; John Bloomfield, engineering project leader for ADO; John Cannon, president, NATAS; Mark Sanders, vice president and general manager, Audio-Video Systems Division; and Roy H. Ekrom, Ampex president and CEO.

Aurora Systems

BE first became acquainted with Dr. Richard Shoup, founder of Aurora Systems, through his early papers at SMPTE conventions. Those papers described a system used to produce spectacular, animated graphics for NASA missions. Later, after he founded his company, Shoup provided several graphics for **BE** covers, either directly or through his customers.

1983. Dr. Richard Shoup (right) receives an EMMY from John Cannon, NATAS president, for the "concept and development of the first electronic graphics system."

Robert Bosch

Founded in 1929, Robert Bosch GmbH is celebrating its 55th year of service as **BE** celebrates its 25th anniversary. From Bosch's records, Table II lists awards received in recognition of technical development for television.

In addition to these awards, Heinrich Zahn was elected as a Fellow of the SMPTE in 1978, and cited for his contributions to helical VTR recording.

Table II.
Bosch awards.

1981: Geoffrey Parr Award from the Royal Television Society to Dieter Poetsch for work on the FDL 60, the first telecine with CCDS; Richard Theile Gold Medal by Fernseh- und Kinotechnische Gesellschaft E.V. (FKTG) to Frithjof Rudert for early color TV developments and participation in PAL standardizations; and Agfa-Gevaert Gold Medal to Heinrich L. Zahn for the mechanical design of TV equipment.

1982: Richard Theile Gold Medal to Hans R. Groll for pathfinding work in the field of German TV broadcast studio technology; Rudolf Urtel Prize by the Fernseh- und Kinotechnische Gesellschaft E.V. (FKTG) to Dr. Ulrich Reimers for scientific and technical work in TV and cinematic engineering; and EMMY Citation (1981-1982) from the NATAS to Robert Bosch for exceptional work in TV technology.

Cinema Products

Cinema Products has received awards as shown in Table III.

Table III.
Cinema Products awards.

1968: Class II Scientific/Technical Award by the Academy of Motion Picture Arts and Sciences for the silent pellicle reflex conversion of the Mitchell BNC.

1971: Class III Scientific/Technical Academy Award for the design and engineering of the J-4 Joystick servo zoom control; and Class III Scientific/Technical Academy Award for the design and engineering of a lightweight crystal-controlled motor for the hand-held ARRI 2C 35mm camera.

1978: Class I Scientific/Technical Academy Award (the first such Oscar granted by the academy in 10 years) shared with inventor Garrett Brown for design and development of the STEADICAM film/video camera stabilizing system.

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FUJI.

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1978. On stage during the ABC-TV live telecast of the 50th Academy Awards presentation, operator Mayo Partee demonstrates the Oscar-winning Cinema Products STEADICAM system with NEC's MNC-71CP video camera, as Smokey DePetro follows him with portable microwave transmitter....an Academy Awards telecast *first*.

Dubner Computer Systems

According to Dubner, the company has received only one technical award, an EMMY received jointly with ABC for the development of its videographics generator. A story on this system, with cover, appeared in **BE's** February 1982 issue, seven months before the EMMY was awarded.

1982. ABC and Dubner Computer Systems jointly receive the Primetime EMMY Award for their outstanding engineering development related to the Dubner CBG-2 videographics generator. Shown at the ceremonies (from the left) are: Max Berry, director, Audio Video Systems Engineering, ABC; John Mitchell, president, ATAS; and Harvey Dubner, president, Dubner Computer Systems.

EEV

The year 1961 marks the Silver Jubilee celebration of British Television. It is also a significant year for EEV because the company received an EMMY, the first company outside the United States to be so honored.

EEV's roster of awards is as follows: 1961—EMMY Award for development of the 4½-inch image orthicon TV camera pickup tube; and 1968—Queens Award to Industry for development of the image isocon.

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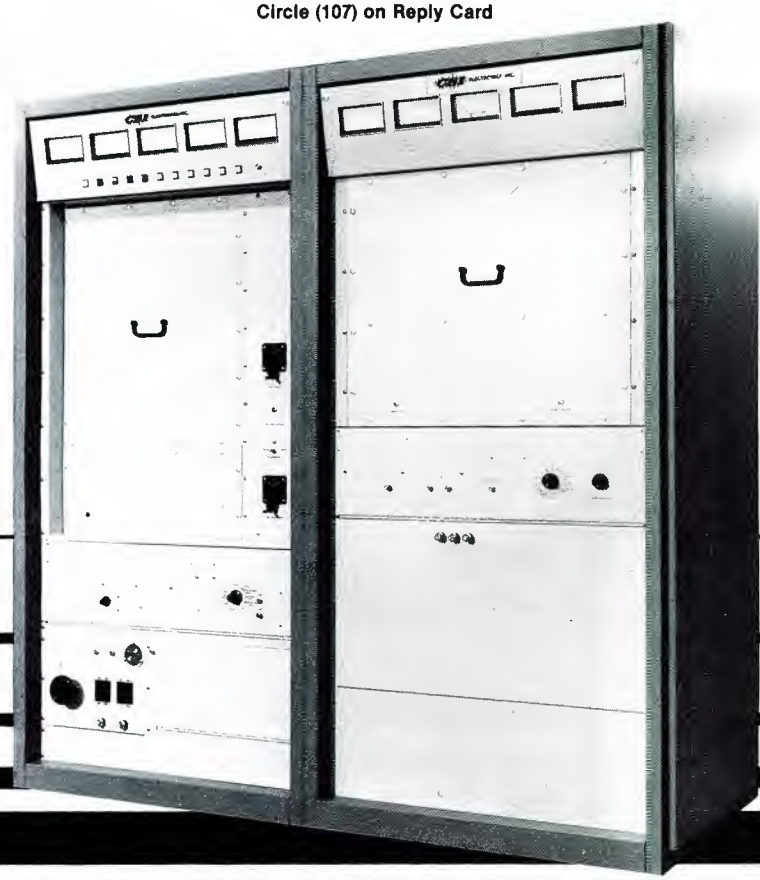

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1961. EEV receives the EMMY Award for its pioneering role in the commercial development of the 4½-inch image orthicon TV camera tube.

Harris

Because of its dedication to broadcasting over the years, it is difficult to encompass the scope of Harris Broadcast Division's contributions to broadcasting. Its records show that in 1974, Consolidated Video Systems (now the Harris Video Systems operation) received the EMMY Award for development of digital video techniques applied to the time base corrector. Also in 1974, Consolidated Video Systems received a Special Achievement Award from the International Industrial Television Association (ITVA) for its TBC development.

1974. The EMMY Award is presented to Consolidated Video Systems for digital video techniques applied to the time base corrector.

Fuji Photo Film

The year 1984 is a significant one for Fuji as well as for **BE.** As **BE** celebrates its 25th anniversary, Fuji is enjoying a similar celebration for the 25th anniversary of its first magnetic products and the opening of its first US office in New York City. Furthermore, this marks the 50th anniversary of the founding of the parent company in Japan. Fuji's sponsorship of the 1984 Summer Olympics adds even more meaning to this special year.

Fuji's records unveil the following awards for technical developments: 1982—the EMMY Award and Oscar Award for technical achievements in developing ultrahigh speed color negative film, becoming the first company to receive these top honors from both motion picture and TV industries; and 1982—the SMPTE Herbert T. Kalmus Gold Medal Award to Hiroto Ueda for his role in the development of Fuji's negative and positive photographic materials.

1982. Ueda (right) receives the SMPTE Kalmus Gold Medal from Charles Anderson, SMPTE president, for his efforts in developing color films.

1982. In September Hiroto Ueda (right) of Fuji Photo Film received the EMMY from John Cannon, NATAS president, for his contribution in developing color negative and positive materials. In March, Fuji won an Oscar for the same achievement, becoming the first company to earn these top honors from both the motion picture and TV industries.

JVC Company of America

In recognition of the development of its low cost professional video camera, JVC received the 1983 ITVA Technical Achievement Award. Dan Roberts, vice president, Professional Video Division, accepted the award for JVC.

1983. Lexicon receives the Video Production Association's Monitor Award for Engineering Achievement in recognition of its contributions to digital processing and for the introduction of its time compressor. Shown receiving the award (from the left) are: Ronald P. Noonan, president, and Charles Bagnaschi, vice president and director of engineering.

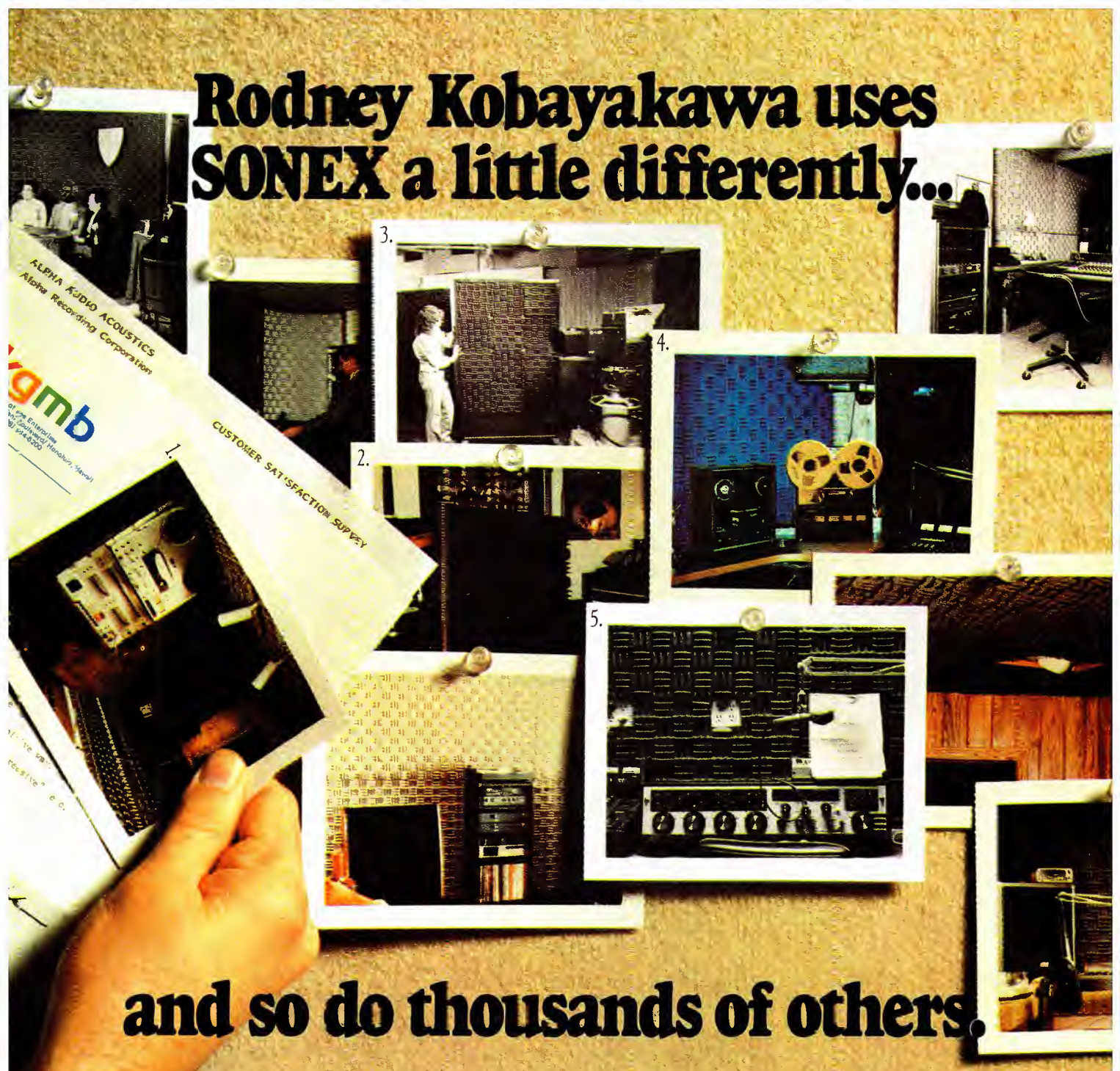
Lexicon

For its contributions to digital audio signal processing, and for the introduction of its model 1200 time compressor, Lexicon received the 1983 Video Production Association's Monitor Award for Engineering Achievement.

NEC

NEC reports that it has received the following awards: 1975—an EMMY Award for engineering excellence for the development of TV frame synchronizers (NEC's FS-10 frame synchronizer was introduced at the 1974

Rodney Kobayakawa uses SONEX a little differently...



and so do thousands of others.

Just Listen — 1. You might even say that Rodney Kobayakawa's use is off-the-wall. He lines the ceiling of KGMB-TV's remote video truck with SONEX. "Controls the high ambient noise...Close speaker mounting caused problems with sound orientation...and they look so nice! White audiofiles match the chrome look of our equipment." He's the Audio Engineer at KGMB, Honolulu.

2. "Musicians are always impressed by your SONEX products." Dennis Scott of Chelsea Entertainment Organization, who won a Grammy in 1981 for **Sesame Country**, an album featuring Crystal Gayle, Loretta Lynn, Glen Campbell and the Muppets.

3. "Takes the 'ping' out of hard walls." Don Bachmeier, KFYR-TV, Bismarck, N.D. uses SONEX on wheeled, portable panels to kill voices on adjoining news sets.

4. "Delighted with SONEX's effectiveness...pleasing aesthetics... audio professionals notice reduced standing waves...increased soundproofing." Sherrie Thomas, Producer, recording studio for the General Conference of Seventh-Day Adventists, Washington, D.C.

5. "Good!...in radio station's master control and production room." Craig Fakenstine, WJCF, Morgantown, W.V.

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NAB show in Houston) and 1980—an EMMY for outstanding engineering achievement for developing the DVE system, the first digital special video effects system on the market. First introduced in 1977, NEC's Digital Video Effects system developed out of the pioneering work done by NEC in frame synchronizers and digital video technology.

3M

1979. 3M receives the Maker of the Microphone Award. Oliver Berliner (left), grandson of Emile Berliner, presents the award to Marshall Hatfield, vice president of what then was the 3M Mincom Division.

The 3M Company, as one of the pioneers in magnetic tape development in the United States, dates back to early works of John T. Mullin and Bing Crosby's first broadcast recordings on tape. Two of 3M's awards for its efforts are as follows: 1979—Maker of the Microphone Award; and 1983—EMMY for pioneering the development of videotape.

1983. John Cannon (center), NATAS president, presents an EMMY to Edoardo Pieruzzi (right), vice president of 3M's Magnetic Audio/Video Products Division, for the company's pioneering the development of videotape. George Hegg, group vice president of 3M's Memory Technologies Group, looks on.

3M received the Maker of the Microphone Award for outstanding contribution to the world of sound. Specifically, the division was commended for its development of a practical digital audio recording system with electronic editing and disc-mastering interface.

The award is a trophy presented in memory of Emile Berliner, who invented the microphone, the disc record, the disc record player (gramophone) and the method of mass producing discs from a single master record.

Sony

In recent years, Sony has accelerated its attention to the broadcast industry, especially in digital video technology. As a result, Sony has played a prominent role in **BE's** conference reports in the United States, Canada, England and Switzerland. For its many and varied achievements, Sony has received the awards listed in Table IV.

1979. Sony received an EMMY Award, jointly with Ampex, for its part in the development of a compatible 1-inch Type C videotape format. Shown at the ceremonies (from the left) are: John Cannon, president, NATAS; Masahiko Morizono, then managing director, Sony Video Products Division; Kiochi Tsunoda, then president, Sony Corporation; and Robert Wussler, chairman, NATAS ceremonies.

Table IV.
Sony awards.

1973: EMMY Award from the NATAS for development of the Trinitron color TV system.

1976: EMMY Award from the NATAS for the U-matic videocassette concept and design.

1978: SMPTE David Sarnoff Gold Medal Award to Masahiko Morizono for engineering achievements in developing ENG equipment, especially for a portable helical-scan VTR system.

1979: EMMY Award, jointly with Ampex, for the engineering development of the 1-inch Type C videotape format. An additional engineering citation was presented to the SMPTE for overseeing the establishment of technical standards of compatibility between the VTR designs from both companies.

Special merit awards

There is a class of honors in broadcasting that deserves special consideration, one that gets little attention from the press but means so much to recipients. This class of awards is given by manufacturers to their staff members in recognition of outstanding technical achievement.

In preparing for this *Anniversary Issue*, initially we did not plan to include these awards. Consequently, we did not specifically ask manufacturers to provide this type of information. Thus, this section is not intended to provide comprehensive coverage of these awards. Rather, only information submitted in the course of preparing this issue is included.

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Amperex Electronic Corporation

In 1983, Amperex honored Dr. N.V. Rao, technical manager, Imaging Products Group, with a bronze plaque for his invention and development of the diode-gun pickup tube for TV cameras. The plaque reproduces Rao's patent No. 4,388,556, for which application was made in 1977 and granted in June 1983.

The first production diode-gun was introduced at NAB-'78/Las Vegas. It immediately revolutionized the TV broadcast industry because of its improved resolution, lag performance, handling of highlights and dynamic range.

1983. Dr. N.V. Rao (left), Amperex, receives a bronze plaque from vice president L.A. Arpino for being awarded a US patent for development of the diode-gun TV camera pickup tube. In the background is the "super clean" room where the Plumbicon™ tubes are manufactured.

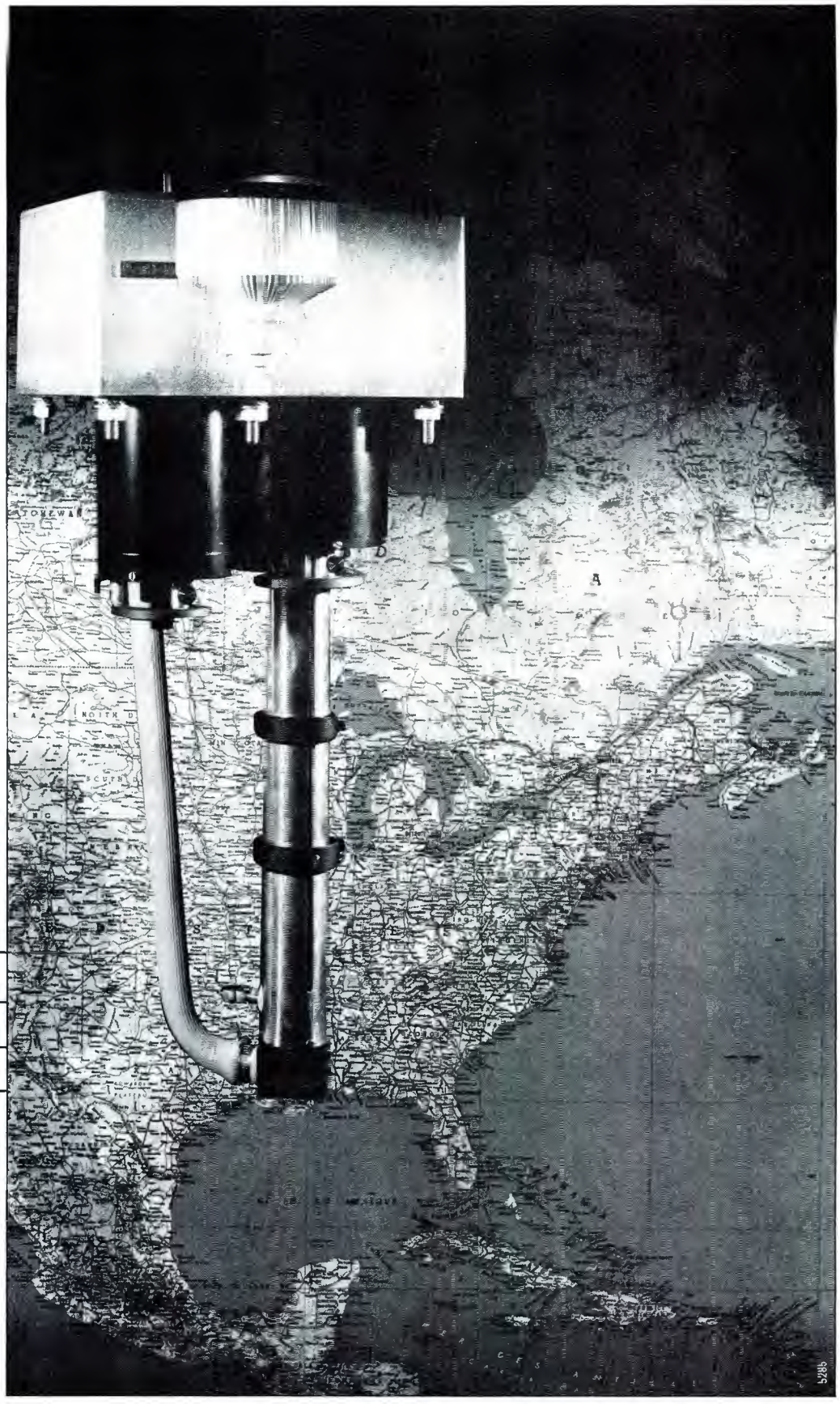
RCA

1984. Of the RCA team that helped create San Francisco's famous Mount Sutro broadcast tower, these men still work at RCA. Shown (from left) are: John W. Barbour, who served as program manager; Douglas J.H. Frank, the mechanical design engineer who integrated the antennas, transmission lines, etc., with the tower; and Ralph Pschunder, who developed the mathematical program for seismic disturbances with respect to the tower. They are holding their David Sarnoff Award Medals.

In July 1983, the staff at the Mount Sutro tower in San Francisco celebrated the 10th anniversary of the completion of that monumental broadcasting facility. **BE** featured a picture of the tower on the cover of its September 1983 issue, and briefly reported the history of the tower's development.

It is noteworthy that this tower still stands as an example of outstanding engineering achievement. Many organizations contributed to the tower's design, planning and construction—tasks that strained engineering and manufacturing capabilities because of designs that were at the leading edge of technology.

In recognition of its staff's exceptional contributions to this engineering marvel, RCA awarded wall plaques to those who participated on the team that erected the Mount Sutro tower. The plaques read: "For outstanding team effort....in the conception, design, analysis, development, and installation of an array of television and FM antennas on a single tower serving the San Francisco Bay area." Members of the team also received the RCA David Sarnoff Award Medal, RCA's highest engineering award. Team members included John W. Barbour, Douglas J.H. Frank, Ralph J. Pschunder, Richard L. Rocamora, Matti S.O. Siukola and Henry W. Westcott. 25



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25th ANNIVERSARY Rewards of technology

Station/network growth

The formation of national networks and their growth through advertising revenue is an exciting chapter in the history of broadcasting. The growth and prosperity of networks was linked tightly with the number of potential affiliates, as shown in Figure 1.

The giant RCA organization was the first company to recognize that the development of broadcast technology and management of broadcast services could best be performed by an independent organization. Accordingly, RCA set the trend in network formation by creating the National Broadcasting Company in 1926. The Columbia Broadcasting System (CBS) was formed a year later.

In 1934, the Mutual Broadcasting System was created to serve the increasing number of radio stations in existence at that time. During the 1940s, two additional radio networks were founded, the DuMont Network and the Liberty Broadcasting System. They played an important role in the broadcast industry of their time, but later bowed to the giant networks and their well-established affiliates.

In 1943, Edward J. Nobel bought the NBC Blue Network (one of two radio networks operated by NBC) and renamed it the American Broadcasting Company. In 1953, the company was merged with Paramount, and ABC—as we know it today—was born.

The development of satellite technology has made possible the creation of many new radio and TV networks, including CNN, RKO, Bonneville and NPR. Satellites also have reshaped the concept of a network from a complex wire-connected system to a simple point-to-point group of affiliates that picks off feeds from various channels or satellites as needed.

The satellite age also has greatly expanded the influence of CATV systems. Although cable television has been around since 1950, its impact on broadcasting has been felt only within the last decade. As Figure 2 shows, cable penetration has increased from just more than 11% in 1973 to 30% in 1983. Much of this growth can be traced to the increased program services offered by *super stations* and specialty networks formed on the basis of satellite interconnection.

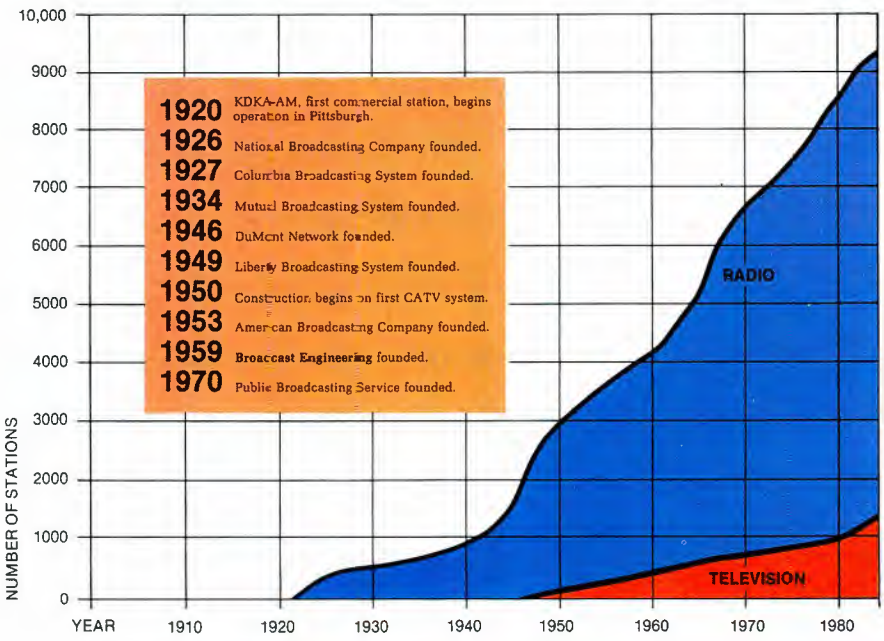

Figure 1. Chart of station/network growth.

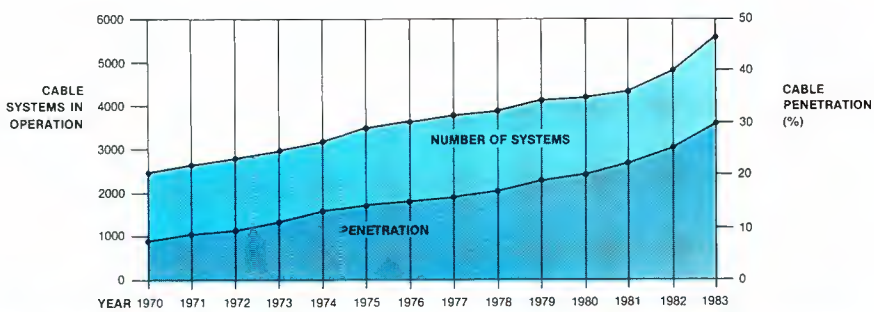

Figure 2. The growth of CATV services since 1970. Note the dramatic increase in cable penetration within the last decade.

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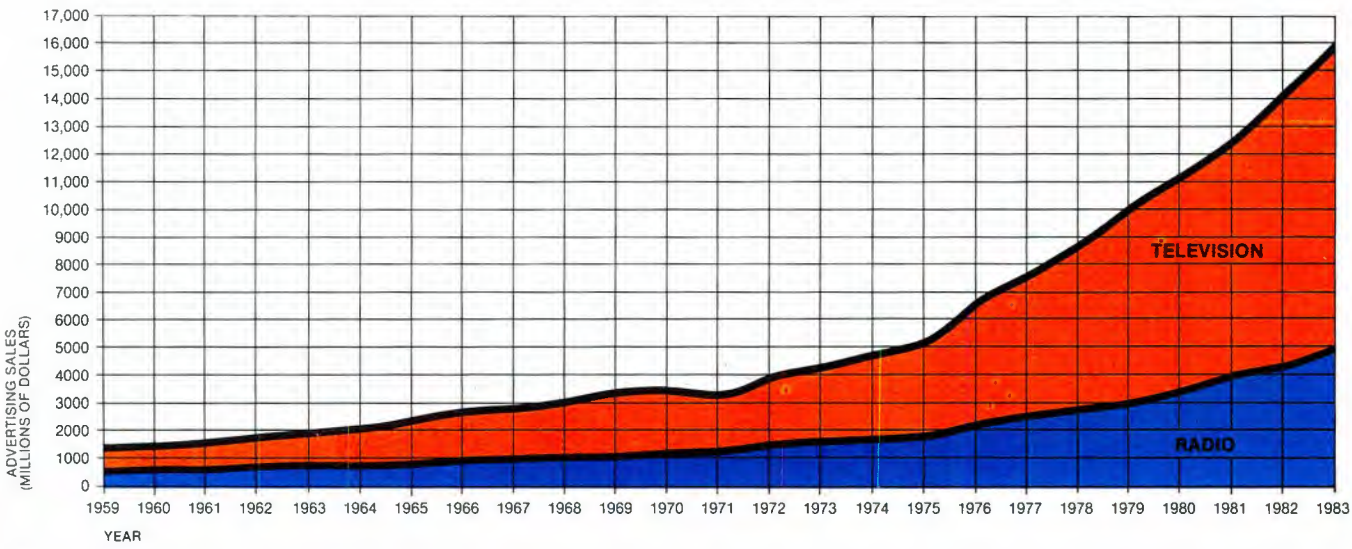


Figure 1. The growth of advertising revenue over the last 25 years. Note the dramatic increase in TV income since 1975.

*Radio advertising sales based on data from the Radio Advertising Bureau.

When **Broadcast Engineering** was founded in 1959, the amount of advertising money spent on broadcasting was just more than $2 billion annually, as shown in Figure 1. At that time there were 4153 radio stations and 609 TV stations on the air. Last year, combined radio and TV advertising sales amounted to slightly more than $21 billion, while the number of stations had risen to 9407 (radio) and 1414 (television).

Thus, over the period in which **Broadcast Engineering** has been serving the industry, the number of stations on the air has increased by a factor of two, while advertising revenues have jumped by a factor of more than nine. The data presented in Figure 1 show a dynamic, healthy industry.

Growth: The byword in television

Taken over the period of about 24 years, or roughly 1959-1983, the TV industry has done little but grow. Excluding sales of black-and-white receivers, only per-year decreases have occurred in some areas shown in Table I. Data to create the table were provided by the FCC and the Television Bureau of Advertising.

Growth: The byword in radio

During the past 25 years, the radio industry has grown in numbers and

Table I.
Growth trends in television.

	1959	1983	% Change
TV stations (total)	510	1401[1]	174.7
Commercial (full power)	510	862	69.0
VHF	433	531	22.6
UHF	77	331	329.9
Educational	.....	287	.....
VHF	.....	114	.....
UHF	.....	173	.....
Low Power[1]	.....	309[1]	.....
VHF	.....	242	.....
UHF	.....	67	.....
US households (X1000)	51,150	84,940	66.1
TV households (X1000)	43,950	83,300	89.5
Multiset homes (X1000)	4200	45,400	980.9
Color set homes (X1000)	250	73,890	29,456.0
TV receivers in homes (X1000)	48,500	148,910	207.0
TV receivers sold (X1000)	6368	16,406[2]	157.6
Monochrome	6278	4922[2]	(–21.6)
Color	90	11,484[2]	12,660.0
Advertising in US			
Total ad dollars (millions)	11,270	66,580[2]	490.8
TV ad dollars (millions)	1529	14,329[2]	837.1
Station finances			
Revenues (millions)	725.4	4948.6[3]	528.1
Expenses (millions)	535.1	3623.0[3]	577.1
Incomes (millions)	190.1	1325.6[3]	596.6
Viewing hours	(In 1976)		
Average hours/day per TV household per year	6.3	7.03	11.6

Includes off-air, CATV and VCR recording times, but not VCR viewing and electronic games).

[1]The number of LPTV facilities varies per data source.
[2]Based on 1982 totals.
[3]Based on 1980 totals; revenues include total time sales less commissions plus talent and program sales; incomes before federal income tax.

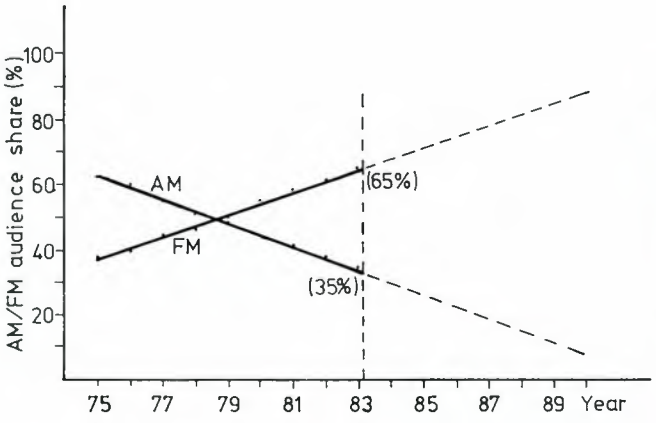


Figure 2.

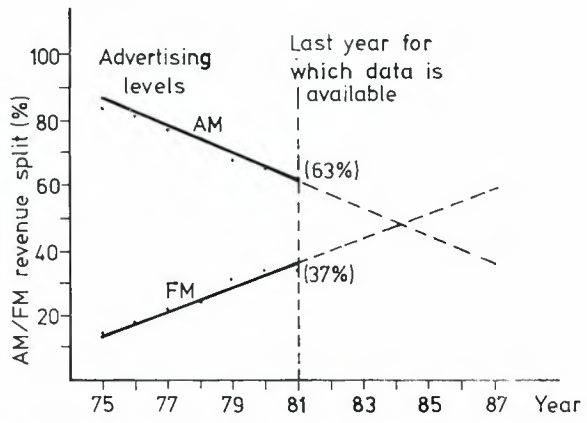


Figure 3.

Figure 2. The growth of FM audience vs. AM audience, showing the dramatic shift in listener preference over the last eight years, and projections of what the future may hold.

Figure 3. The division of AM vs. FM advertising dollars. If our linear projections are correct, the turning point for the radio industry will come during this year.

influence. Radio continues to be a strong advertising and entertainment medium, with an estimated 470 million radio sets currently in use in the United States. That number is up 47% from the 1970 figures and calculates to about 5½ radios per household. The Radio Advertising Bureau estimates that listeners (male and female ages 12 and up) spend an average of almost 3½ hours per day with radio. Men aged 18-24 spend the most time with radio, at just more than four hours per day.

The radio industry has seen in the last decade an unusual turnaround in the public's listening habits. As Figure 2 shows, there has been a steady trend of audience shares away from AM radio and toward FM. There are many reasons for this change, the most obvious being the improved audio quality available from stereophonic FM transmission.* Advertising sales also have followed the move of audience shares from AM to FM, as Figure 3 shows. Most readers can remember when FM radio was treated as a stepchild. It was a long, hard climb, but FM has now grown up.

*See the **BE** *Editorial*, "AM Radio: Where Do We Go From Here?", February 1984, page 10.

World

By Carl Bentz, television editor

The use of transoceanic cables continues to account for a significant part of international communications requirements. The greatest portion of world telecommunications, however, is carried via the INTELSAT global satellite system. More than two-thirds of international needs are linked through the multisatellite system operated by the 109-member-country International Telecommunications Satellite Organization (INTELSAT). The traffic load includes voice and data transmissions, as well as nearly all international TV transmissions. C-Band and Ku-Band frequencies are used in the system.

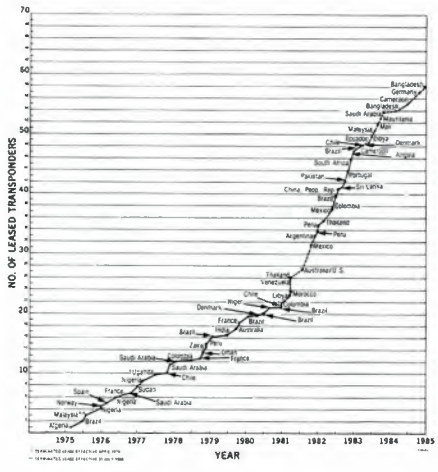


Figure 1. Growth of INTELSAT domestic transponder leases.

An example of growth in international communications can be seen in the capacities of the various types of satellites in the system or planned for the system. One INTELSAT IV-A satellite carried 6000 telephone circuits, plus a TV channel. The first INTELSAT V, launched in December 1981, increased the capacity to 12,000 telephone circuits with two color TV channels. INTELSAT VI satellites, planned to be launched and operational in 1986, will carry more than 30,000 telephone calls simultaneously with several TV programs.

Some of the INTELSAT V satellites also are involved with the International Maritime Satellite Organization (INMARSAT). Four carry the Maritime Communications Subsystem (MCS), which has a capability of approximately 30 telephone calls, receiving from and transmitting to ships on L-Band frequencies, 1.6GHz area. Interconnections to the INMARSAT shore stations are handled through normal INTELSAT C-Band facilities.

Along with handling international needs, INTELSAT provides domestic services for individual countries. As of 1982, more than 20 countries used INTELSAT transponders to aid internal communications, particularly for governmental and educational reasons. India, in particular, has been progressive in using the facilities to transmit educational materials into remote areas to help raise its population's literacy and general educational level. The number of countries using INTELSAT domestic services is expected to be at least doubled by 1985 if demands for such services can be met.

Other operators

Space limitations in the Clarke geosynchronous orbit require coordination between INTELSAT and other operators. EUTELSAT, a Paris-based organization, intends to provide telecommunications, TV and business services primarily within Europe. Current agreements between EUTELSAT and INTELSAT run until 1988, when activities will be reviewed to see if needs and requirements still are being met.

Additional coordination agreements are needed to cover transborder business and TV communications when the footprint of the satellite crosses international boundaries. Such a condition is well-known between the United States and Canada. Some satellites involved in US-Canadian agreements include the ANIK series; Advanced WESTAR I and II; SATCOM I-R, II-R, III-R and IV; SBS I, II and III; and WESTAR IV and V. Those agreements will be reviewed in 1987. 1982 agreements also cover future plans for the Australian AUSSAT system, the Japanese BS-2 operation, Luxembourg's LUXSAT, Switzerland's HELVESAT, the UK's UNISAT and Italy's SARIT.

A further shrinking of the world is

communications

Book review:
Ascent to Orbit

For thousands of years, men have sought their future in the starry sky. Now this old astrological superstition has at last come true, for our destinies do indeed depend upon celestial bodies, those that we have created ourselves.
Arthur C. Clarke

Ascent to Orbit—A Scientific Autobiography, The Technical Writings of Arthur C. Clarke reveals many interesting facets about a man who could be described as being ahead of his time.

When Clarke suggested a global satellite system in "Extra-Terrestrial Relays" *(Wireless World,* October 1945), he said, "Many may consider the solution proposed in this discussion too far-fetched to be taken seriously. Such an attitude is unreasonable, as everything envisaged here is a logical extension of developments in the last 10 years."

He then said that if German A10 trans-Atlantic rockets had been fully developed, their velocity would have been more than half that required to place them into an orbit. The formal article followed a letter to *Wireless World* in February 1945 on the subject of the German V2 long-range rocket with a second stage for increased velocity as a means to do ionospheric research. An instrumented payload placed in orbit by the rocket could circle the earth perpetually outside the limits of the atmosphere and broadcast information as long as its batteries lasted. The operational life of the system could be prolonged with thermocouples and photoelectric elements, because the satellite would be in brilliant sunlight for half its orbit.

The letter ended predictively by "mentioning a possibility of the more remote future—perhaps half a century ahead." According to Clarke, "An 'artificial satellite' at the correct distance from the earth would make one revolution every 24 hours; i.e., it would remain stationary above the same spot and would be within optical range of nearly half the earth's surface. Three of the repeater stations, 120° apart in the correct orbit, could give TV and microwave coverage to the entire planet."

A memorandum to mutual friends of the British Interplanetary Society in May 1945 more fully explained how three satellites, provisionally located at 90° west longitude, 30° east longitude and 150° east longitude, would be interlinked by a microwave beam to transmit information for worldwide coverage. "Assuming the use of a frequency of 3000Mc," he wrote, "a reflector only a few feet across would give a beam so directive that almost all the power would be concentrated on earth. Arrays a meter or so in diameter could be used to il-

Continued

Continued
luminate single countries if a more restricted service was required." Small parabolas about a foot in diameter would be used for receiving at the earth end and would give "a very good signal-to-noise (S/N) ratio."

These papers, published in honor of the Marconi International Fellowship, an award that Clarke received in 1982, give credence to INTELSAT's name for Clarke as the father of satellite communications. He prefers the term *godfather,* however. A better understanding of the Clarke (or geosynchronous) orbit also is possible from reading the many items covering rocketry, astronomy and astronautics, as well as a predictive semitechnical survey of literature on the *space elevator,* from *Advances in Earth Orientated Applications of Space Technology,* 1981.

Of interest also is reflective humor from an address to the United Nations (May 17, 1983) for World Telecommunications Day. In his keynote comments, "Beyond the Global Village," Clarke recalls the story when news of Bell's telephone reached the United Kingdom, "The chief engineer of the British Post Office noted that Americans have need for the telephone, but we do not. We have plenty of messenger boys..." And a second story tells of an enthusiastic mayor of an American city who "thought the telephone was a marvelous device and ventured the prediction, 'I can see the time,' he said solemnly, 'when every city will have one.' "

Clarke said he thinks that "the long-heralded global village is almost upon us, but it will last for only a flickering moment in the history of mankind." As our satellite communications system grows, he said, "Before we even realize that it has come, it (the village) will be superseded—by the global family."

As you read each of the articles in *Ascent to Orbit* with accompanying recently written introductory prefaces, gaining insight into the man behind *2001: A Space Odyssey* and *2010: Odyssey Two,* Clark continues his work in space science and physics. Much of his personal communications from the University of Moratuwa, Colombo, Sri Lanka (where he serves as chancellor), is handled via a Kaypro II computer, modem and the Indian Ocean satellite. He admits that, although he has preached the advent of a communications-united world, he remains amazed at our progress.

Editor's note:
This 240-page book, published by John Wiley & Sons, New York, is now available.

An unusual test of speed through the INTELSAT system occurred on July 20, 1982, in conjunction with ground-breaking ceremonies for INTELSAT's new home in northwestern Washington, DC. From the building site, a signal was uplinked via a portable COMSAT earth station to the satellite system. C-Band and Ku-Band circuits were involved as the signal proceeded around the world, uplinked and downlinked through the 16-satellite system to the Jamesburg, CA, earth station site. Then the signal was directed to retrace its path back through the system, finally arriving at the building site to activate an automatic-relay-detonated ground-breaking explosion. All went well, with the total time in traversing the 395,000-mile distance coming in at just less than three seconds.

The new INTELSAT headquarters building is scheduled for completion in October, and at press time is on schedule. Based on a pod-atrium concept, the building is designed to make effective use of natural illumination. Extensive use of new technology in heat recovery and heating/cooling load minimization is expected to reduce significantly energy costs for the building. Heat generated during daytime hours by computers, lights and other equipment will be stored, then used for heating the building at night. Also included in the plans is a computer-controlled energy management system.

INTELSAT Business Service

Figure 1. INTELSAT IBS C-Band coverage from 53° west longitude is shown by the unshaded circled areas on the map. Ku-Band spot beams, indicated by the striped areas, are steerable over a wide range that could include the West Coast of North America.

During the September 1983 board of governors' meeting, a new range of business services was approved by INTELSAT, and initiated one month later. Totally digital in format, INTELSAT Business Service (IBS) is planned eventually to operate with small earth stations located on or near a customer's premises. Video, teleconferencing, high/low speed facsimile, high/low speed data, packet switching, voice telephony, electronic mail, telex and other communications modes are among its capabilities.

The service will be worldwide through cross-connections on board modified INTELSAT V-B satellites planned for launch in 1986. Information through an on-premise uplink in Chicago, for example, could be received simultaneously in London and Berlin via Ku-Band, while Lagos, Nigeria, and Caracas, Venezuela, would receive the C-Band. Interconnections through other satellites in the INTELSAT system would expand the coverage via C-Band to the Pacific and Indian Ocean areas.

Point-to-point and point-to-multipoint services are possible, as well as full connectivity. Depending on the requirements, individual bit streams of 64kbit/s, 128kbit/s and 256kbit/s handle low/medium speed data transfer, facsimile and digital voice needs. Bulk-rate bit streams of 1.544Mbit/s and 2.048Mbit/s rates are suitable for full-color, full-motion video teleconferencing, etc.

The service was initiated on Oct. 1, 1983, in response to demands for it between the United States and Europe. Currently handled by existing satellites, the service eventually will be handled by higher powered satellites placed at 53° west longitude, 40.5° west longitude and 18.5° west longitude. Primary areas to be served by the system will be the United States, Europe and the Middle East.

INTELSAT expects worldwide IBS demand to reach a 43.5Mbit/s capacity in 1984-1985. Growth of IBS operation by 1990 is predicted to reach 275Mbit/s.

The satellites used by INTELSAT and other communications organizations are not alone in the sky. Also in geosynchronous orbit are various systems for NASA and government security purposes, among others. Additional satellites are circling the earth in non-equatorial orbits. One such series of satellites is used for the hotline between Washington and Moscow. Because the non-Clarke-type units are not in the geosynchronous orbit, they must *oscillate* between the Northern and Southern Hemisphere to stay in orbit. A series of these satellites is used so that one of the group is always available for emergency communications.

Another major use of non-Clarke type satellites is for weather and geological purposes. Primarily in polar orbits, these systems are used by NOAA and other weather organizations, as well as geological groups, to study the meteorological patterns for weather predictions. Through such systems, research is done to detect petroleum and other resources.

now provided by a US-to-Australia link for Sydney's Channel 7. Carried via COMSAT World Systems, an INTELSAT subsidiary, the link is the first use of multiplexing two TV signals through one transponder for international transmissions.

DBS activities

The advent of DBS services in the United States, Japan and Europe has caused some countries to express concern about transborder reception. The concern is mainly political, particularly in Europe, where the satellite signal spills well beyond the small geographic areas of individual countries. An additional discussion topic involves international copyright on some program material that might be transmitted through the satellites into other countries.

DBS became a reality in late 1983 when United Satellite Communications began using ANIK C-II to relay the service for the United States. Eight other organizations currently hold permits to launch DBS services, with most expected to begin operation in 1986. Some people believe that too quick an initiation of DBS transmissions will endanger the potential implementation of new TV technologies, including HDTV and enhanced or extended definition television.

The much-discussed multiplexed analog components (MAC) systems are of major interest for DBS operations. The use of C-MAC, developed by the UK's Independent Broadcasting Authority (IBA), is still in question, however. At one point it was thought that C-MAC could be a standard for European DBS activity, but French and German objections have been voiced regarding C-MAC, and an extended PAL format also is under consideration.

For American activities, a B-MAC format is being considered. The B-MAC concept, stressed heavily by Digital Video Systems, a subsidiary of Scientific-Atlanta, will offer video without subcarrier-caused interference. Also available with B-MAC are up to eight digital audio channels, videotex/teletext data, message services, and enhanced or high definition imaging, along with tiering and subscriber addressability for Pay TV purposes. Although the integrated circuitry for the B-MAC system is expected to be available by late 1984, decisions on the new format must be made soon if implementation is to be possible by the 1986 launch date suggested by various DBS proponents.

An out-of-this-world news conference via the spaghetti network

Dec. 5, 1983, will remain an important date in the annals of communications as having one of the most involved conference calls. Linked for the event were President Reagan from the White House in Washington, DC; West German Chancellor Helmut Kohl, at a conference in Athens, Greece; three astronauts aboard the orbiting Columbia space shuttle; and journalists in The Hague, Brussels, Bonn, London, Geneva, Paris and Rome. Also listening in was the European Space Agency in Cologne, West Germany.

Spearheaded by the US Information Agency Television and Film Service, with four days notice, the linkup involved five communications satellites, multiple earth stations, several video standards conversions and language translations. According to Jim Davis, head of USIA-TV's Technical Division, hundreds of technicians and thousands of miles of cable also were needed to produce the masterpiece. (See Figure 1.)

In cooperation with the ERT Network in Athens, satellite links were ordered from Athens to the Indian Ocean satellite, then to the INTELSAT ground station in Raisting, West Germany, in the Bavarian Alps. Conversion from PAL to NTSC was made before the signal was linked to the Atlantic Major One satellite and downlinked to the COMSAT station in Andover, ME, then sent via land and microwave circuits to the USIA-TV headquarters in Washington, DC. Live translations from German to English were added for the signal to the White House.

Meanwhile, pictures from the Spacelab cameras, sent to NASA's TRDSS satellite and received at White Sands, NM, were converted from a field-sequential format to NTSC, uplinked to SATCOM F1-R and received again at the NASA Johnson Spaceflight Center in Houston, from which the signal was relayed via land and microwave circuits to the USIA office and the White House.

Pictures and sound from the Oval Office were sent to the USIA location via a CBS press pool camera, combined with pictures from Greece and Spacelab, and sent to the COMSAT station at Etam, WV, for uplinking to the INTELSAT Atlantic Primary satellite. One downlink went to London, another to Raisting, West Germany, for distribution through to Frankfurt, West Germany, to the US European diplomatic missions via land circuits, while another downlink was received at the Fucino, Italy, earth station, converted to 625-line SECAM and passed through the European Broadcasting Union circuits to Athens, allowing Kohl to see and hear Reagan and the astronauts.

The only tense moment resulted from Kohl's tight time schedule, complicated by a storm front that hampered his helicopter landing at the TV studio in Athens. All turned out well, however, when the program began exactly at 9:30 a.m. EST, with both heads of state appearing *live* on camera at 9:45 a.m. Reagan's comment that "this is one heck of a conference call" described the connection aptly.

Editor's note:
Information for this sidebar is courtesy of Steven Friedman, USIA Television and Film Service.

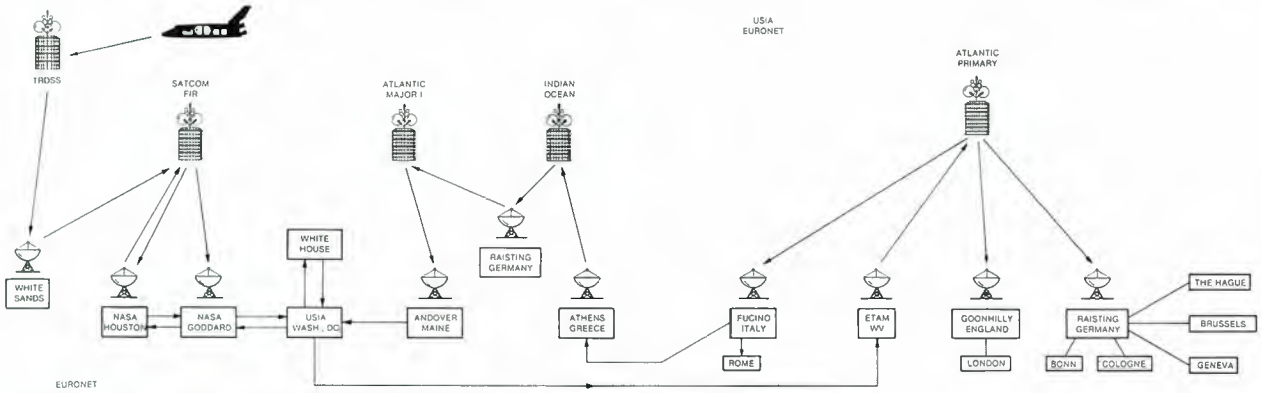
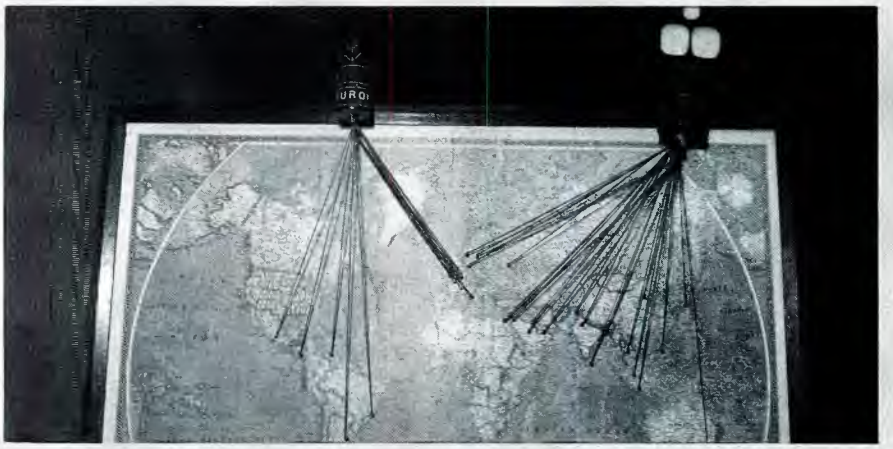


Figure 1. This diagram shows the complexity of the USIA hookup for the conference call.

Photo: Bill Fitz-Patrick

From the Oval Office, President Reagan talks live to West German Chancellor Helmut Kohl (left monitor) and orbiting Columbia space shuttle astronauts (right monitor) during the WORLDNET program.

The map shows the WORLDNET system linking Washington with Central America, South America and the Caribbean (ARNET); Geneva, London, Paris, Rome, Bonn, The Hague, Brussels, and occasionally Stockholm (EURONET); the Middle East and Near East; and the Pacific, Far East and Africa.



Acting as the hub, the USIA-TV control room linked the White House, ERT Greece, the Columbia Space Shuttle and seven European locations, including the European Space Agency headquarters in Cologne, West Germany. 25

Spec Book contest

Collins

On March 2, 1984, with the few incorrect responses removed, a **BE** staff member reached into a large box that contained the multitude of correct entries to pick a winner. Marv Collins, chief engineer for KFI-AM/KOST-FM, Los Angeles, was the lucky person. The prize for properly identifying each product item on the cover of the 1983 *Spec Book* was a Sony CDP-101 digital compact disc player. Collins said he was enjoying the unit and was particularly excited about being the winner because he had begun building a library of compact discs even before entering the *Spec Book* contest.

In broadcasting since 1954, Collins has seen many changes occur. He has been involved in one of the latest major changes, with KFI-AM, a 50kW clear-channel station, being one of the pioneering AM stereo stations in the Los Angeles area. He said he has received calls about the stereo and its sound quality from as far away as Hawaii and Oregon. KFI-AM first used Harris equipment, but because of planned promotional activities changed to Motorola when the FCC temporarily removed approval from the Harris system. 25

FCC update

Continued from page 6

ly upon any failure that prevents the changes from being made from the remote-control point.

• Finally, under the proposed rules stations would be permitted to establish remote-control points at any location under their control that is accessible at all times.

The FCC said that although the proposed rules would give licensees much greater flexibility in the design and operation of their transmitting facilities, deficiencies in design, operation or maintenance of remote-control systems will not be accepted as an excuse for violations of a station's license or of technical regulations. 25

Satellite update

Continued from page 10

and West) is out of the question for aesthetic reasons alone, and the individual home roof-mounted Ku-Band antenna is questionable for cost reasons alone, so the situation may necessitate a reasonable compromise, which may become the model for future urban delivery systems. 25

new products

Color weather displays

Alden Electronics offers three display systems. The C2000R color radar system receives and displays color weather radar pictures from the government remote radar weather display system (RRWDS) transmitters. The C2000S color satellite system displays satellite pictures and weather graphics, such as temperature charts and surface maps. The C2000R/S color weather system receives RRWDS radar, weather graphics and satellite pictures. All systems feature RGB, NTSC, RF outputs and gen-lock inputs for on-air synchronization.

Circle (400) on Reply Card

Megohmmeter

The HV15 from *Hipotronics* tests electrical apparatus and cable. Features include a regulated output to prevent meter fluctuation, an input line stabilizer to provide accurate readings by minimizing meter fluctuations caused by line changes, and continuously variable test voltage control from 0-15kV.

Circle (401) on Reply Card

Electronic flash system

Toko America of Skokie, IL, offers the PM-900 electronic flash video system. Manually or automatically triggered, the PM-900 uses a strobe and high resolution color imaging device, captures and holds the desired image in a digital frame memory, and displays the frozen image on an RGB video monitor.

Circle (402) on Reply Card

Computer standards converter

The *Cox Electronics Ltd.* CVP100 allows recording of computer-generated images to either 625- or 525-line standard signals.

Circle (405) on Reply Card

Gitzo fluid heads

Karl Heitz makes available the 580 fluid head 5 for cameras up to 50 pounds and the 680 fluid head 6 for cameras up to 100 pounds. Each offers 100% fluid panning and 100% fluid vertical tilts (45° front and 45° rear), plus adjustable counterbalance. They may operate from −75°F to 390°F.

Circle (406) on Reply Card

New usage

AT605 audio insulators from *Audio-Technica*, used to isolate phono turntables from acoustic feedback, may also help prevent laser pickup mistracking in CD players. Each insulator consists of four round energy absorbers, each of which is a multistage vibration/shock absorption device encased in a brushed chrome housing.

Circle (404) on Reply Card

Graphics character generator

The K100 Chromafont from *Knox Video Products* features a font memory that has the capacity for more than five full multiple-size, proportionally spaced fonts that can be mixed on the screen and individually colored, underlined and flashed. Fonts are loaded into the K100 with plug-in modules.

Circle (403) on Reply Card

TV sync test generator

The *Philips Test & Measuring Instruments (PTMI)* PM5634's monochrome output signal has variable horizontal frequency in steps of 1% to 8% above or below the nominal frequency. The picture on the screen indicates whether the applied frequency is nominal, below or above nominal.

Circle (407) on Reply Card

Console

The Raven from *Harrison Systems* consists of a 40-position mainframe that accommodates 36 input modules. It is supplied with 28 input modules and three master modules. A console expansion kit including four input modules, a 4-input module motherboard section and a power cable is available.

Circle (410) on Reply Card

Radio communication receiver

Marconi Instruments' Eddystone 1650 may call up features with a single keying action. It covers the 10kHz-30MHz frequency range in synthesized 5kHz steps. Seven bandwidths can be made available.

Circle (408) on Reply Card

Teletext system

A full-channel teletext system from *Jasmin Electronics Ltd.* has 16,000 pages of information and gives access in 16ms. Maximum access time is 1s/1000 pages. Systems may be designed and installed to buyers' specifications.

Circle (409) on Reply Card

Keypad generator

The *Visual Information Institute* 2501 multiple scan rate keypad generator allows horizontal sync and timing parameters to be entered by keypad. Non-volatile storage is provided for up to 69 separate raster structures.

Circle (411) on Reply Card

Still-frame converter

EECO has announced the AVC-300 still-frame audio/video converter. A compression technique allows up to 10 seconds of audio to be stored into a single video frame on interactive discs. Voice, music and sound effects may accompany still-frame or full-motion video for slide, filmstrip and text screen presentations.

Circle (412) on Reply Card

SCAMP modules

Audio + Design offers the S30 expander/gate and S31 compressor/limiter. The S30's features include hold circuit, log/anti-log release network, 60dB attenuation range and pre-emphasis in side chain. The S31 offers ratios of 1:1 to 20:1 (continuously variable), separate limiter threshold, side chain access and computer control mute input.

Circle (413) on Reply Card

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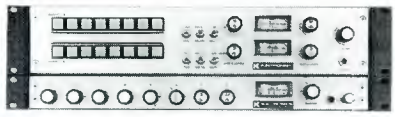
Circle (130) on Reply Card

Video/audio switching system



The video/audio switching system from *Kaitronics* is a new version of the VAS-MK II switcher and the AM8000 audio mixer, in 5¼ inches of rack space. Vertical interval switching for eight video inputs, with automatic level selection of mic or line audio follows, allows 1-button preview or program feed. The VAS and AM-8000 are stand-alone pieces of equipment.

Circle (414) on Reply Card

Combiner

The E-Flex combiner with line chroma-key from *NEC America* is an option that combines the video outputs and key signals of two separate E-Flex systems, enabling the special effects editor to treat their combined output as one video output with one key signal. It includes a digital line chroma-key adapter and digital mixer-keyer.

Circle (415) on Reply Card

Record cleaning system

The *Nitty Gritty* PRO features double hemicylindrical lips for simultaneously scrubbing and vacuuming both sides of a record, capstan record drive, fibrous cloth lip liners, solid wood cabinetry with internal rubberization and optional acrylic dustcover. Each PRO comes with a pint of PURIFIER 2 record cleaning fluid, which contains a degreaser, static neutralizer, algaeside, mild detergent and wetting agent.

Circle (416) on Reply Card

Videocassette rewinder

The 619 from *Audico* features plug-in modules that allow users to rapidly interchange between U-matic, VHS and Beta cassettes. Sixty-minute U-matic cassettes are rewound in less than two minutes.

Circle (417) on Reply Card

Wow-and-flutter meter

The 1035 from *B&K-Precision/Dynascan Corporation* features a built-in 4-digit frequency counter; push-button selection of JIS, NAB, CCIR and DIN measurement standards; crystal-controlled oscillators for 3kHz and 3.15kHz signals; and auxiliary output jacks to hook up oscilloscopes and strip chart recorders.

Circle (421) on Reply Card

Backgrounds

Studio Props offers a 60-inch-diameter background, available in nine shades, that collapses and fits into a 22-inch-diameter pouch. The fabric is crease-resistant and light-absorbent.

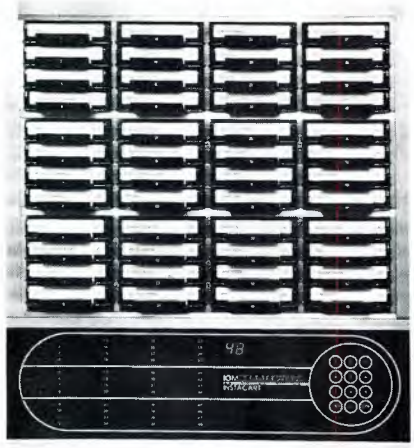
Circle (422) on Reply Card

RF transfer standard

Weinschel Engineering's 1807 houses a temperature-stabilized feedthrough-type bolometric power standard, PIN attenuator/modulator and switch. The 1807 provides additional stability for the power standard test port, which facilitates the use of a torque wrench to ensure connector repeatibility.

Circle (423) on Reply Card

Updated radio automation



IGM Communication's updated and improved Instacart offers new features, including the following: 12-, 24-, 36- or 48-cartridge capacity; mono or stereo; NAB or IBA specifications; wide track heads as an option; microprocessor-controlled front panel that opens for service; touch pad switches for manual operation; and new modular power supplies.

Circle (418) on Reply Card

Audio noise/level meter

The *Valley People* Advantage model 310 offers isolated, balanced, trans-Amptm differential inputs; 10Hz-100kHz wideband filter; 20Hz-20kHz multiple-pole filter; 400Hz-20kHz multiple-pole filter; "A" weighting filter; CCIR weighting filter; average detector response; RMS detector response; peak detector response; dual-scale analog meter; full-scale range select; detector output; and pre-amplifier output/return.

Circle (425) on Reply Card

Camera platform

The Cartop from *Birns & Sawyer* attaches and detaches quickly with self-adjusting supports that fit any roof contour, and evenly distributes the load. It can handle two operators and equipment.

Circle (424) on Reply Card

Audiotape recorder

The *LJ Scully* LJ-12 features three advanced microprocessors that digitally control the transport and analog audio signals; non-volatile memory of CAL/EQ/BIAS settings; glass-bonded ferrite heads; gold-plated connectors; lifetime Hall-effect transport switching; SMPTE compatibility; and 4-speed operation variable from 3-36ips in 0.01 increments.

Circle (419) on Reply Card

Synthesized signal generators

Texscan offers the SSG-1000, which covers from 10Hz-1GHz, and the SSG-2000, which covers from 10Hz-2GHz.

Circle (420) on Reply Card

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CHANNEL #40 RCA UHF FILTERPLEXER, Model MI-19086-F-40 for sale. Make offer. Contact Ben Miller, Director of Engineering, Trinity Broadcasting Network, P.O. Box "A", Santa Ana, CA 92711, (714) 832-2950.. 5-84-2t

WE OVERSTOCKED on UHF loop antennas for promotion during our sign-on. Good quantity of UHF loop antennas for sale at our cost. Contact George Sandoval, (303) 831-8831. 5-84-3t

EQUIPMENT FOR SALE (CONT.)

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ALASKA BUSH PUBLIC BROADCAST TV & AM Station has an opening for a maintenance engineer. FCC General License and two years TV broadcast maintenance experience. Salary in the mid 20's, DOE, housing option, great benefits. Contact Chief Engineer, KYUK, P.O. Box 468, Bethel, Alaska 99559, (907) 543-3131. EOE. Closing Date May 25th, 1984. 5-84-2t

HELP WANTED (CONT.)

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5-84-1t

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NEW HAMPSHIRE PUBLIC TELEVISION — DIRECTOR OF ENGINEERING. New Hampshire Public Television seeks senior manager to oversee $815,000 budget, staff of 23, three transmitters (one VHF, two UHF), statewide microwave network, heavily utilized mobile unit and studio facilities. NHPTV is heavily involved in production and post-production for itself and outside clients. Requires demonstrated technical ability and a minimum of ten years broadcast experience and five years administrative and supervisory experience in commercial or non-commercial television. Director is responsible for all capital purchases, long term planning, grant applications, and will help design new studio facilities scheduled for completion in 1986. NHPTV is a growing organization which has just completed a $2.2 million capital refurbishment with another planned in 1985-86. Headquarters are located in Durham, on the New Hampshire Seacoast, 65 miles north of Boston. Salary range: $28,760-$44,930 D.O.E. Send detailed resume to General Manager, NHPTV, Box 1100, Durham, NH 03824. Confidentiality will be honored. Deadline is April 23, 1984. AA/EOE. 5-84-1t

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The Sony Broadcast Company, a world leader in professional broadcast television equipment, has highly visible opportunities in Los Angeles, Dallas, Atlanta, New York and Chicago for qualified engineers.

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Sony offers a competitive starting salary excellent benefits including matched savings, profit-sharing and dental plans.

For prompt consideration, send resume including **preferred location and salary requirements** to:

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Broadcast Engineering
P.O. Box 12901
Overland Park, KS 66212

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HELP WANTED (CONT.)

TELECINE MAINTENANCE ENGINEER needed to fill early evening shift. This unusual position requires a Rank Cintel maintenance background, basic design and fabrication experience. Excellent opportunity to participate in state of the art video projects. Reply to: Personnel Director, Image Transform, P.O. Box 7760, Burbank, CA 91505. 5-84-1t

TELECOMMUNICATIONS ENGINEER responsible for two video production facilities B.S. degree program. Small state college (1,000 students), beautiful northeastern Vermont. Additional responsibilities: Chief Engineer 3,000 watt FM stereo radio station; limited teaching duties. Qualifications: FCC 1st Class or General License, extensive experience "hands-on" maintenance ½" and ¾" video format, 3-tube broadcast quality video cameras, microwave systems, radio production/broadcast equipment. Bachelor's electrical engineering or equivalent. College-level teaching experience. Salary range $16,000-20,000 for Coordinator II, Grade II, exempt position. Send letter application, resume, letters reference by May 28, 1984: Perry Viles, Dean of Academic Affairs, Lyndon State College, Lyndonville, VT 05851. EOE. 5-84-1t

MAINTENANCE ENGINEER. UHF-TV and production facility. Experience in all tape formats, cameras and other related equipment. Send resume to Christian Communications of Chicagoland, WCFC-TV, One North Wacker Drive, Chicago, IL 60606. E.O.E. 5-84-1t

22
WLFL-TV
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Growing UHF Independent In Top 50 Market Seeks Qualified Electronic Maintenance Technician.

Candidate should be experienced in the maintenance of VTRs, cameras, monitoring and other broadcast equipment.

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Dallas Lloyd, Chief Engineer
WLFL-TV-22
2410 Broad Street
Durham, North Carolina 27704

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BROADCAST MAINTENANCE ENGINEER for TV, AM, FM and production facility. Experience in the installation, maintenance and repair of the following is required: All broadcast format videotape recorders; Broadcast switching and terminal equipment; Digitally controlled studio cameras; and Digital video processing equipment. A thorough knowledge of digital logic is required. Also desirable are SBE certification, an FCC license and AM, FM and TV Transmitter maintenance experience. Area is a hunting and fishing paradise, just 30 miles from the beaches of the Gulf of Mexico. EOE. Send resume to Personnel Department, Tichenor Media System, Inc., P.O. Box 711, Harlingen, TX 78550. 5-84-1t

MAINTENANCE ENGINEER. Experience and general class license required. RCA equipment. WTVX-TV, P.O. Box 3434, Fort Pierce, Florida 33454. 5-84-1t

PASADENA CITY COLLEGE needs a Television Electronics Technician. Maintain and repair television radio and other audio equipment. Attractive benefits. Beginning salary range: $1,745 to $1,924 per month. Final date to file District application: May 1, 1984. Pasadena City College, 1570 E. Colorado Blvd., (818) 578-7388. EOE/AA. 5-84-1t

VIDEOTAPE OPERATORS. The Christian Broadcasting Network, Inc., an evangelical Christian ministry, has immediate openings for Videotape Operators. Applicants must have at least four years experience as a videotape operator and a strong technical background including a thorough knowledge of the television signal and its relationship to videotape. Current experience in 1", 2" and ¾" formats, including machine-to-machine editing, film-to-tape transfers and standards conversion is desired. If you feel led and want to serve, send resume in confidence to: Personnel Specialist, The Christian Broadcasting Network, Inc., CBN Center - Personnel Dept., Virginia Beach, VA 23463. CBN is an Equal Opportunity Employer. 5-84-1t

VIDEOTAPE EDITORS: The Christian Broadcasting Network, Inc., an evangelical Christian ministry, has immediate openings for Videotape Editors. Applicants must have at least four years experience in computer editing with overall experience in Videotape operations, including experience as a senior operator or supervisor. A strong technical background, including a thorough knowledge of the television signal and its relationship to videotape, is necessary. Current experience in CMX 340, Convergence 103 & 104 systems desired. If you feel led and want to serve, send resume in confidence to: Personnel Specialist, The Christian Broadcasting Network, Inc., CBN Center – Personnel Dept., Virginia Beach, VA 24363. CBN is an Equal Opportunity Emplyer. 5-84-1t

MAINTENANCE ENGINEER – Catholic satellite network, located in Sun Belt. Broadcast experience and FCC license essential. Responsibilities include maintenance of TK-46 cameras, RCA 2" and 1" VTR's, Vital switching. Salary commensurate with qualifications. Send resume to Matt Scalici, EWTN, 5817 Old Leeds Road, Birmingham, AL 35210. 5-84-1t

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MAINTENANCE TECHNICIAN – KBVO-TV, AUSTIN, TEXAS has career opportunity for quality oriented UHF maintenance technician. Excellent benefits and compensation with quality independent operation in the beautiful Central Texas Hill Country. Send resume to: Ernie Hartt C.E., KBVO-TV, P.O. Drawer 2728, Austin, Texas 78768, (512) 835-0042. E.O.E. 5-84-1t

TELEVISION MAINTENANCE ENGINEERS

WTBS **CNN**

The leading news and sports satellite communications network has career opportunities for broadcast maintenance engineers. Openings are now available in Atlanta for engineers experienced in studio and ENG equipment maintenance. Turner Broadcasting System offers an excellent benefit and compensation program. Interested maintenance engineers may call (404) 827-1638 between 9 A.M. and 5 P.M., Eastern Time, Monday – Friday, or send resume in complete confidence to:

TURNER BROADCASTING SYSTEM, INC.
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Atlanta, Georgia 30318
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PROJECTS ENGINEER

Large international broadcasting corporation headquartered in Munich seeks applicant with BSEE degree and five years minimum experience. Must have a thorough understanding of broadcasting techniques. Knowledge of German language is desirable, though not absolutely necessary.

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Good remuneration, furnished housing, pension, vacation, and other fringe benefits are provided. U.S. citizenship required. Candidates should submit resume (no phone inquiries please) in confidence with salary requirement to: Personnel Dept., **RADIO FREE EUROPE/RADIO LIBERTY INC.,** 1201 Connecticut Avenue N.W., Washington, D.C. 20036

RFE-RL INC

May 19

Organized and sponsored by the Hollywood Section of the Society of Motion Picture and Television Engineers (SMPTE), an all-day tutorial seminar on audio aspects of post-production will be held at Paramount Studios, Glen Glenn Sound and Warner Hollywood Studios. It will cover technological advances in audio monitoring and digital recording techniques as they affect film and videotape post-production.

Seminar participants will attend lectures and live demonstrations by Hollywood's top audio engineers and technicians. Registration fees (including lunch, parking and transportation to all studio facilities) are $35 for SMPTE members and $45 for non-members. For more information, contact Jack Spring, c/o Eastman Kodak, 6706 Santa Monica Blvd., Hollywood, CA 90038—213-464-6131; or Howard La Zare, c/o Consolidated Film Industries, 959 N. Seward St., Hollywood, CA 90038—213-462-3161.

May 23-25

The *Eighth Annual Conference on Teleconferencing and Interactive Media* will be held in Madison, WI. The program will report on the current status of and trends in teleconferencing, computer conferencing, videotex and other interactive systems. For more information, call 608-262-2569.

May

L. Matthew Miller Associates of New York will offer evening classes on basic video techniques and the use of video equipment. These include "The Basic Elements of Video"; "The Fundamentals of Video Production," which includes the proper use of cameras; and "Measuring Video," which covers waveform monitors and other instruments. For more information, contact Maia Nero at 212-741-8011.

July 17-19

The *Fourth Annual WOSU Broadcast Engineering Conference* will be held at the Fawcett Center for Tomorrow in Columbus, OH. Leading broadcast engineers and experts will present about 20 papers covering such topics as AM, FM, television, ITFS/MDS, LPTV, satellites, microwaves, maintenance and antenna systems. A joint SBE meeting, open to all registrants, will be held the evening of July 17.

This year a bound set of conference papers will be included in the registration fee of $115, if received before June 1, and $125 after that date. The fee includes seven meals and all coffee breaks. For more information, contact John H. Battison, director of engineering, WOSU Stations, 2400 Olentangy River Road, Columbus, OH 43210.

Sept. 16-19

The National Association of Broadcasters has canceled its annual *Radio Programming Conference* (scheduled for August in Atlanta) and will join the National Radio Broadcasters Association for the *Radio Convention and Programming Conference* in Los Angeles. Details are forthcoming. 25

PERSONAL COMPUTER QUESTIONNAIRE

Broadcast Engineering is interested in learning the extent of personal computer (PC) use in broadcast and production facilities. Your responses will be summarized in a future issue of **BE**.

A. Present PC users:

1. Is the computer owned

☐ Personally ☐ By the station

2. What brand(s)/model(s)? _____

_____

3. How many bytes of usable memory? _____

4. Do you

☐ Program it ☐ Use purchased software

5. If purchased software, for what functions? _____

_____

6. Programming language?

☐ BASIC ☐ CP/M ☐ FORTH ☐ FORTRAN

☐ ASSEMBLER ☐ Machine language

☐ Other: _____

7. Mass storage type?

☐ Cassette tape ☐ Disk

☐ Multidisk ☐ Bubble memory

8. Printer type?

☐ Dot-matrix ☐ Letter quality ☐ Tractor-feed

9. How are you using the system?

☐ Payroll records
☐ Program logging
☐ Automation
☐ Engineering calculations
☐ Inventory
☐ Equipment status
☐ Production titles
☐ Transmitter logging
☐ Maintenance/ testing
☐ Graphics
☐ Games
☐ Other: _____

10. Can the system interface ☐ or is it interfaced ☐ to the station business or automation system?

11. Is more than one PC in use at the station?

☐ Yes ☐ No

B. Future PC users:

12. If you are planning a PC purchase soon, what brands are being considered?

_____

13. Please indicate planned use in (9) above:

_____

_____

Title: _____

Call letters (optional): _____

THANK YOU!

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2 Please check the ONE type of facility or operation that best describes your business classification

19 ☐ Low power TV station
20 ☐ TV Station
21 ☐ AM Station
22 ☐ FM Station
23 ☐ AM & FM Station
24 ☐ TV & AM Station
25 ☐ TV & FM Station
26 ☐ TV, AM & FM Station
27 ☐ CATV Facility
28 ☐ Non-Broadcast TV including Closed Circuit TV (CCTV)
29 ☐ Recording Studio
30 ☐ Teleproduction Facility
31 ☐ Microwave Relay Station or Satellite Company
32 ☐ Government
33 ☐ Consultant (Engineering or Management)
34 ☐ Dealer, Distributor or Manufacturer
☐ Other _____ *(Please specify)*

3 If you checked 20 through 26 above, which of the following best describes your over-the-air station (Check only one)

A ☐ Commercial
B ☐ Educational
C ☐ Religious
D ☐ Campus Low Frequency
E ☐ Community
F ☐ Municipally Owned

4 Check the category that best describes your title (Check only one)

A ☐ **Company Management** – Chairman of the Board, President, Owner, Partner, Director, Vice President, General Manager (other than in charge of Engineering or Station Operation Management) and other Corporate and Financial Officials

B ☐ **Technical Management & Engineering** – Technical Director or Manager, Chief Engineer, Other Engineering or Technical Titles

C ☐ **Operations & Station Management/Production & Programming** – VP Operations, Operation Manager, Director, Station Manager, Production Manager, Program Manager, News Director and other Operations Titles

5 IMPORTANT Check the statement that best describes your role in the purchase of major communication equipment components and accessories

☐ Make final decision to buy a specific make or model
☐ Recommend make or model to be purchased
☐ Have no part in specifying or buying

SEND ME MORE INFORMATION about products or services I have circled.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64
65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96
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I have an immediate interest in the items I've indicated here. Please have a sales person call me.

No Postage Necessary if Mailed in the United States

BUSINESS REPLY CARD
First Class Permit No. 1810 Overland Park, KS

Postage Will Be Paid By Addressee

BROADCAST® engineering

P.O. Box 12901
Overland Park, KS 66212

TV Editor

PLACE FIRST CLASS POSTAGE HERE

Which one advertisement in this issue was of most interest to you?

Advertiser's Name _____ Circle No. _____

Comments on this issue:

BROADCAST® engineering

P.O. Box 12902
Overland Park, KS 66212-9981

READER SERVICE CARD For issue of May 1984 — Use until September 1, 1984

After that date please contact manufacturer direct.

BROADCAST® engineering

1. **IMPORTANT** Do you wish to receive/continue to receive BROADCAST ENGINEERING FREE?

☐ Yes ☐ No

Your signature is required *Date*

Please print or type:

Name _____

Title _____

Organization or firm _____

Street or box _____

City _____ State _____ Zip _____

Phone ( ) _____

SAVE TIME: Use peel off address label for faster service.

2. **Please check the ONE type of facility or operation that best describes your business classification**

19 ☐ Low power TV station
20 ☐ TV Station
21 ☐ AM Station
22 ☐ FM Station
23 ☐ AM & FM Station
24 ☐ TV & AM Station
25 ☐ TV & FM Station
26 ☐ TV AM & FM Station
27 ☐ CATV Facility
28 ☐ Non-Broadcast TV including Closed Circuit TV (CCTV)
29 ☐ Recording Studio
30 ☐ Teleproduction Facility
31 ☐ Microwave Relay Station or Satellite Company
32 ☐ Government
33 ☐ Consultant (Engineering or Management)
34 ☐ Dealer Distributor or Manufacturer
☐ Other _____ *(Please specify)*

3. **If you checked 20 through 26 above, which of the following best describes your over-the-air station (Check only one)**

A ☐ Commercial
B ☐ Educational
C ☐ Religious
D ☐ Campus Low Frequency
E ☐ Community
F ☐ Municipally Owned

4. **Check the category that best describes your title (Check only one)**

A ☐ **Company Management** – Chairman of the Board President Owner Partner Director Vice President General Manager (other than in charge of Engineering or Station Operation Management) and other Corporate and Financial Officials
B ☐ **Technical Management & Engineering** – Technical Director or Manager Chief Engineer Other Engineering or Technical Titles
C ☐ **Operations & Station Management/Production & Programming** – VP Operations Operation Manager/Director Station Manager Production Manager Program Manager News Director and other Operations Titles

5. **IMPORTANT** Check the statement that best describes your role in the purchase of major communication equipment components and accessories

☐ Make final decision to buy a specific make or model
☐ Recommend make or model to be purchased
☐ Have no part in specifying or buying

SEND ME MORE INFORMATION about products or services I have circled.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
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☐ Yes ☐ No

Your signature is required Date

Please print or type:

Name _____

Title _____

Organization or firm _____

Street or box _____

City _____ State _____ Zip _____

Phone ( ) _____

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FIRST CLASS
POSTAGE
HERE

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Comments on this issue:

BROADCAST engineering

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Overland Park, KS 66212-9981

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P.O. Box 12902
Overland Park, KS 66212-9981

WE LISTEN

The first step in communicating is listening. We communicate sound. We do it well-we've been listening since 1948 and continue to supply state-of-the-art consoles, intercoms, switchers and systems to the broadcasting media world wide.

We listen not only to sound, but to the people who produce it. People like you. We provide unrivalled performance, quality control, design, delivery and after sales service. Complete service. From an organization with everything at its fingertips.

Talk to us about your audio needs. Watch us listen... and listen to us perform. We deserve to be heard.

McCurdy Radio Industries

108 Carnforth Road, Toronto, Ontario, Canada M4A 2L4 Tel: (416) 751-6262 Telex: 06-963533
1051 Clinton Street, Buffalo, New York 14206 Tel: (212) 772-0719

Circle (1) on Reply Card

Significant Audio!

Destined to cover events of significance over the next few years, this custom Ward-Beck audio system will travel half way across the world before it reaches its permanent home at KGO-TV in San Francisco.

Designed in close collaboration with ABC engineers it is built to handle complex telecasts involving substantial numbers of remote audio feeds. Right now it is warming up for the 1984 Olympics.

WBS

First by Design.

Ward-Beck Systems Ltd.
841 Progress Avenue, Scarborough,
Ontario, Canada M1H 2X4.
Tel: (416) 438-6550.
Tlx: 065-25399.