BROADCAST® engineering

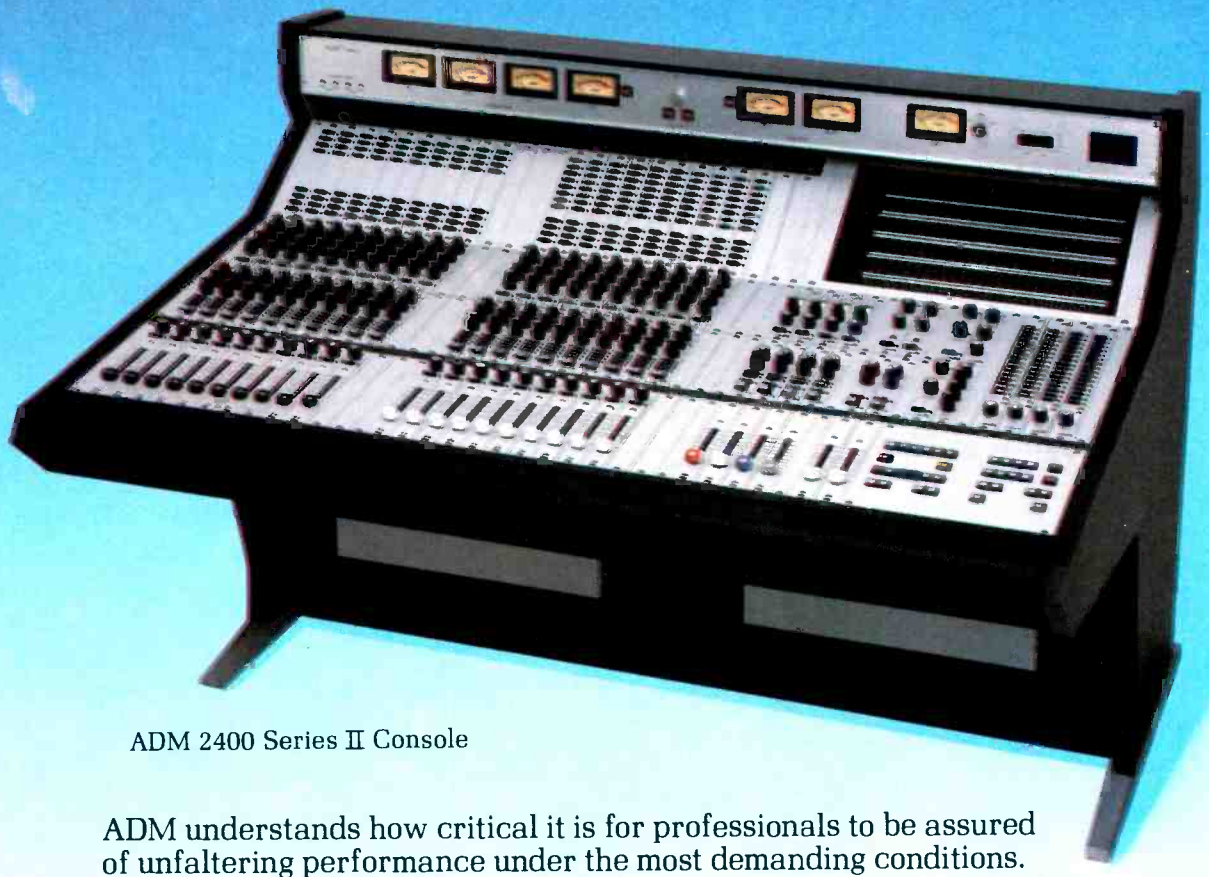
Oct[illegible]83

Automated weather forecasting

ENG microwave roundup

Quality, Reliability, Service...

Excellent Reasons for Choosing ADM®



ADM 2400 Series II Console

ADM understands how critical it is for professionals to be assured of unfaltering performance under the most demanding conditions. That's why everything we do at ADM—from initial concept to final production—is geared to providing consoles of unexcelled quality and reliability.

The finest of components are used in ADM consoles to assure long life and trouble-free operation. Our exclusive five-year warranty, the most generous in the industry, attests to this fact. Service—if you ever need it—is prompt and professional. Contact ADM Technology, Inc.

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Roseville, Michigan 48066
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ADM®

The Audio Company

THE IMAGE MAKER®

Imagine, an incredibly versatile disc recorder which can animate, store stills, and record and playback in real time (30 frames per second) to single frame. Or, at the touch of a button, 24 frames per second for film transfer. Add to this full random access, with preview, of up to 500 images on line and the ability to pre-set 64 locations, standard serial digital interface, and a built-in frame by frame editing/animation previewer. ☐ That's Arvin/Echo's total production tool: The Image Maker. Whether your requirement is to store still frames, produce exciting animation sequences or preprogrammed motion loops from 16 frames (or less) to 500 frames, this high band color recorder is capable of delivering direct or processed video. Rugged, reliable and portable, The Image Maker is the only real time random access recorder which doesn't break the bank. ☐ Remember, Arvin/Echo has more video disc recorders operating in the broadcast field than any other manufacturer. Based on this unique experience, we have built The Image Maker to meet the rapidly changing challenges of the professional television industry. Its potential is limited only by your imagination.

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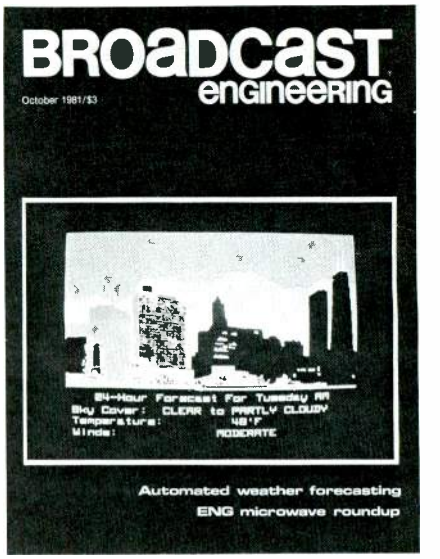
APPLIED TECHNOLOGY GROUP ATG ARVIN

Circle (2) on Reply Card

BROADCAST engineering

The journal of broadcast technology

October 1981 ☐ Volume 23 ☐ No. 10



THE COVER this month shows a TV screen with a cityscape from a color graphic computer supplementing an automated weather forecast. A story on this type of forecasting, titled "Automated Weather Forecasting: A New Tool," is included on page 68.

NEXT MONTH
The November issue includes the annual Satellite Emphasis coverage for broadcasters. An article by Dennis Ciapura will discuss broadcasters' changing environment in converting to satellite use. Additional coverage will be provided by articles from the Harris Corporation in designing TVRO systems and from Compact Video in using mobile vans for flexibility in remote productions, complete with satellite linkage. A supplement will provide a source guide to earth station antennas of special importance to broadcasters.

ISSN 0007-1994.

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

The Harris 630 Frame Synchronizer.

Now with compressor/positioner & digital noise reducer options!

Digital still store . . . digital graphics . . . real time picture analys s . . . whatever the future holds, the HVS-630, with its built-in digital I/O interface, is ready.

And, for today s needs, the 630 has both frame and field freeze, p us a built-in TBC that outperforms the best stand alone units. RGB (in and out) is also standard. Use it to do something special.

The key to the 630's performance is a unique system that processes the video signal in component—instead of composite—form. This technique is inherently immune to H-picture shift, cycle jump and color phasing. As a result, edits and hot switches are handled smoothly. Chroma and luma are processed separately to make maximum use of picture improvement technology.

An optional Compressor/Pos tioner/Effects unit provides even more versatility. Choose p.ushbutton and/or joystick controls. Also optional is a plug-in digital noise reducer that reduces noise by 12 dB, without motion artifacts and resolution loss.

So, for the best return on your synchronizer investment, invest in the synchronizer with a future: the HVS-630. For a demonstration, ca l or write.

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BROADCAST ENGINEERING

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

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TV test equipment from the inventors of the Plumbicon® tube.

At long last a new, reliable source of TV test equipment. One that offers fast, predictable delivery. One with a name all the world trusts—Philips. Four quick examples:

PM5565 Waveform Monitor

Enjoy the luxury of examining one line and one field at a time. On top of this, there's a convenient front probe input so you can use the monitor as a troubleshooting oscilloscope.

PM5567 Vectorscope

If you want more accurate decoding and the ability to have an external reference from composite video signals, choose our vectorscope.

Both waveform monitor and vectorscope mount side by side, fit all existing hardware and use less power than the competition.

PM5539 Color Analyzer

Take it on a quick trip through your studio or control room and adjust all monitors to the same color temperature in a matter of minutes.

With four different memories, there's no problem in quickly calibrating four different phosphors.

Variable full-scale, from less than set up to more than reference white, allows measurement of color tracking as a function of APL.

PM5534 Color Pattern Generator

Our universal pattern contains all the signals needed to verify overall system operation—directly from the picture. No wonder virtually every set manufacturer uses our pattern for their TV set alignment.

Of course our TV test equipment line doesn't end here. Today Philips offers a wide range of equipment including sync and pattern generators, VITS generators and analyzers, and TV modulators and demodulators.

For nationwide sales and service information call 800-631-7172, except in Hawaii, Alaska and New Jersey. In New Jersey call collect (201) 529-3800, or contact Philips Test and Measuring Instruments, Inc., 85 McKee Drive, Mahwah, New Jersey 07430.

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PHILIPS

Circle 10 on Reply Card

FCC update

October 1981

Rivera takes office as FCC commissioner

Henry M. Rivera was sworn in as a commissioner on Aug. 10. Chairman Mark S. Fowler administered the oath.

Rivera had resigned from the law firm of Sutin, Thayer & Browne, Albuquerque, NM, in which he had been a partner. In his practice of corporate and commercial law, he served as counsel to a number of small businesses and advised them on their development plans.

He has been vice president, president-elect and a member of the board of directors of the Albuquerque Bar Association. His term as president was to have begun next year. He also was a member of the New Mexico Supreme Court committee on rules of civil procedure and a trustee of the University of New Mexico Law School Foundation.

Commissioner Quello sworn in for another term

James H. Quello was recently sworn in for another term on the FCC. His new term will run to June 30, 1984.

Quello served as an executive for 25 years with Detroit radio station WJR, including four years as general manager and vice president. He served for 11 years on the Detroit Housing and Urban Renewal Commission in the 1950s and 1960s. Quello was appointed by four different mayors to serve on the Housing Commission from 1951 to 1972. He also served as a Veteran of Foreign Wars representative and a trustee of the Michigan Veterans Trust Fund from 1951 to 1974, appointed by four different governors.

Commission retains 10kHz AM channel spacing

The commission has reconsidered its position reordering US channel spacing for AM radio to 9kHz and voted to retain the existing 10kHz spacing.

A letter to the Department of State recommends that the United States withdraw its proposal for 9kHz channel spacing and advocate retention of 10kHz at the Region 2 (Western Hemisphere) Administrative Radio Conference, which will reconvene in Rio de Janiero in November. At the FCC's recommendation, the US delegation presented the 9kHz proposal at the first session of the conference last year in Buenos Aires.

The commission examined the entire record on the proposal, including all technical, economic and social factors. It concluded that the cost to the public and the industry, particularly in disruption of service, outweighed potential benefits.

Space WARC advisory committee to be established

The commission has voted to establish a public advisory committee to prepare for the International Telecommunication Union World Administrative Radio Conference on geostationary satellites, Space WARC, to be held in 1985 and 1987.

The conference is expected to consider and possibly change the international arrangements whereby nations and organizations use the geostationary satellite orbit for radiocommunication during the late 1980s and early 1990s. At approximately 22,300 miles above the equator, satellites can be placed in orbit at a speed that keeps them stationary to the earth and enables them to provide constant coverage of a particular area.

The committee was proposed in an inquiry notice, adopted in November 1980, that began a proceeding to prepare for the Space WARC; the committee would be an adjunct to that proceeding. The Space WARC may bring up difficult policy choices. The committee will help develop the factors to be considered in judging various ITU arrangements possible for satellite communication, the commission said. The committee is intended to bring together a broad range of persons who are knowledgeable about Space WARC issues.

The advisory committee would be expected to:

- estimate the demand for communication services for the late '80s and '90s and examine the types of facilities needed;

MARQUEE 2000
HIGH QUALITY CHARACTER GENERATION

MADE AFFORDABLE BY B.E.I.

FONT LIBRARY:
A wide range of character styles and sizes is available for the "2000", including a selection of language characters.

Fonts are being added in a continuing basis, and we will be happy to create and supply special fonts to customer specifications.

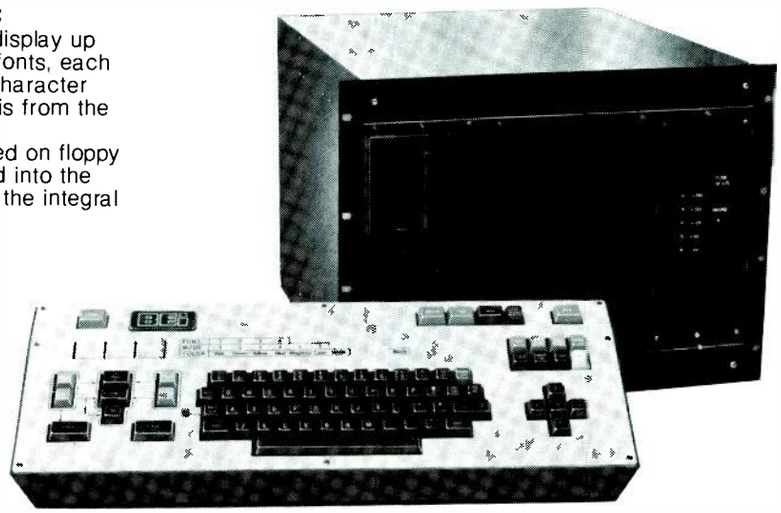
FONT STORAGE:
The "2000" will display up to four standard fonts, each selectable on a character by character basis from the font memory.

Fonts are stored on floppy discs and entered into the font memory, via the integral disc drive unit.

INTEGRAL FLOPPY DISC STORE: As well as carrying out the various font-loading functions, the integral floppy disc store provides fast memory access.

FONT COMPOSE UNIT (optional): The camera, Font Compose Unit provides the operator with the ability to create his own unique character sets, logos and graphic shapes.

RS-232-C INTERFACE:
A standard feature of the "2000" is its ability to receive asynchronous data from external data processors and computers, via its RS-232-C interface, 20mA current loop, or TTL level input.



COMPACT SIZE:
The "2000" mainframe, which includes the power supply and disc drive unit, measures only 19" (483mm) wide x 14" (356mm) high x 18½" (470mm) deep, and weighs only 61.5 pounds, making it ideally suited for use in a mobile unit.

INTERNAL COLORIZER:
Both background and text can be separately colorized by the internal colorizer in red, green, blue, cyan, magenta, yellow, white and black. Background color can be changed for each row, and text color can be changed for each word. An NTSC encorder is required.

EDGING:
Text, including logos, etc., can be displayed with either surround edging, drop-shadow edging or no edging on a line by line basis, each selectable from the keyboard.

BEI BESTON ELECTR

DOUBLE LOGOS:
A feature of the "2000" is its ability to display rows of characters immediately to the right of the logo or graphic symbol. Double logos are associated with 2 rows of characters.

LOGOS:
Logos and graphic symbols can be created to special order from customers' artwork.

CHARACTER RESOLUTION:
High-speed circuitry enables the "2000" to display characters having start-stop increments of 31.25 nanoseconds.

INTER-CHARACTER SPACING: In order to display captions of correct density and weight, each character is assigned a unique spacing element, ranging from 500 nano-seconds to 8 microseconds, in 31.25 nanosecond steps. In addition to this, individual characters can be shifted to the left in 125 nanosecond increments to achieve true character overlap.

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HR-200

Hitachi-5 Competition-0

That's the score in one-inch VTR technology.

We've gone the first generation of TYPE C machines *five* better ...to help you get all the potential of one-inch out of your video installation. Here's what the competition *doesn't* give you.

1. Retracting Tape Guide
Retracts for unequalled ease of threading; repositions with one micron accuracy for up to two million threadings. Provides the reliability of a quad thread system in a one-inch format.

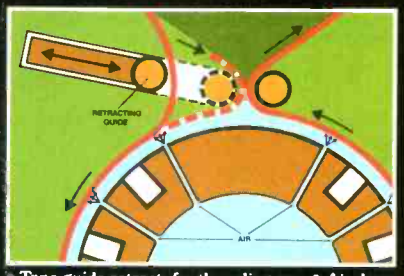
2. "PRO" Tape Path
The protective reverse oxide ("PRO") configuration of the tape path means *only* the video and audio heads touch the oxide surface. All other transport mechanisms guide the tape by its reverse side. Result: noticeably reduced dropouts; longer tape life.

3. Instant Head Replacement
Pre-aligned head design permits easy replacement of video heads in three minutes. No adaptors or jigs; no adjustments required.

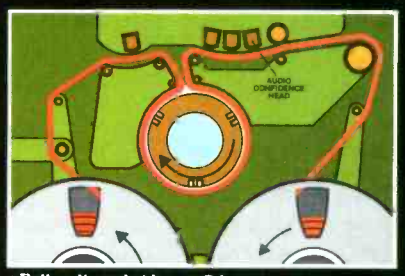
4. Audio and Video Confidence
The others only let you *see* what you're taping. We let you *see* and *hear* everything being recorded...simultaneously.

5. Non-contact Tape Shuttle System
In shuttle and standby modes, tape rides on a cushion of air. Increases head and tape life immeasurably. Cuts frictional resistance, yielding shuttle times of only 80 seconds end to end.

We could go on. With impressive features like microprocessor control; broadcastable slow motion; one-touch shuttle and jog; front access circuit boards; audio spot erase; and on and on. But why run up the score, when it's already no contest? See the Hitachi HR-200, it's equally impressive portable HR-100 model, and companion TC-200 Time Base Corrector.



• Tape guide retracts for threading ease • Air drum eliminates head contact in shuttle/standby modes



• Full audio and video confidence
• "PRO" tape path reduces dropouts

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Circle (8) on Reply Card

- indicate the impact of new technology on communications;
- consider the potential effects of various Space WARC outcomes;
- and most important, assess US options for the conference, considering such questions as which radio frequency bands, if any, should be planned? Are other ITU arrangements available? If a plan or planning process is to be pursued, what is to be its nature, what details are to be specified and on what basis? How is harm to US interests to be gauged and what remedies are appropriate?

The full committee will meet at least four times annually over the next 27 months, producing a final report by December 31, 1983.

Waiver authority granted to Broadcast Bureau Chief

Citing the lack of available transmitter sites in urban and residential areas, increased demand for educational FM facilities, the crowded nature of the educational FM band and the elimination of the 10W Class D Facility option, the commission recently decided to delegate authority to the chief of the Broadcast Bureau to waive, when warranted, interference *received* by noncommercial educational FM applicants when 5% or less of the proposed service area (1 mV/m contour) is affected. These waivers will only be granted when the applicant provides sufficient justification, such as a lack of alternative transmitter sites and/or frequencies. The commission said that this delegation would increase the efficiency of the FCC's FM processing area, increase the speed of service and provide applicants with technical flexibility in preparing their applications, but would not undermine the overall educational FM allocation scheme.

Commissioner Dawson sworn in

Mimi Weyforth Dawson was sworn in as a commissioner of the Federal Communications Commission on July 6.

Dawson was administrative assistant and chief of staff to Senator Bob Packwood of Oregon until her resignation following appointment to the commission.

Dawson was appointed press secretary to Senator Packwood in 1973. In 1975 she was named his legislative director. She has been Packwood's administrative assistant and chief of staff since 1976. As administrative assistant she directed the Senator's personal staff, and since January she has coordinated the majority of staff activities of the Senate Committee on Commerce, Science and Transportation.

Smith named bureau chief

The commission has appointed Richard M. Smith chief of the Field Operations Bureau, which became effective Sept. 1.

Smith, who has been FOB Deputy Bureau Chief since July 17, 1980, replaced James C. McKinney, who transferred to the position of chief of the Private Radio Bureau.

Smith has been with the FCC since 1963, holding positions of electronic engineer at the Los Angeles field office, assistant engineer-in-charge of the Baltimore field office, engineer-in-charge at Philadelphia, chief of the FOB Investigations Branch and assistant chief of the FOB Enforcement Division. He served as the FCC's representative to the Interagency Committee on Search and Rescue and currently is chairman of the commission's Engineers' Occupational Council. □

Picture shows Model 5315/32 TV Audio Console customized for WRC-TV, Washington, D.C.

Audio for TV Stations!

Simplicity, reliability and high performance are the parameters needed by TV broadcasters in the 1980's. And Neve delivers just *that* in its wide range of purpose designed TV audio consoles; consoles surprisingly price competitive and often available on short delivery. Our 542 series spans 6 to 16 in, ideally suited for video production facilities and TV audio sweetening. The 5315 and 5316 consoles are available in sizes from 12 to 36 in with 4 or 8 submasters for TV sound production and on-air applications. Please write or call for our comprehensive TV audio console information package, so you can put Neve in your budget now. You'll be joining the Neve world of excellence!

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Rupert Neve GmbH 6100 Darmstadt Bismarckstrasse 114, West Germany Tel. (06151)81764

Circle (10) on Reply Card

Canadian Telidon program under way

Canadian Communications Minister Francis Fox recently called for applications from private companies, crown corporations, non-profit groups and educational institutions that wished to start Telidon 2-way TV services with assistance from the Telidon Industry Investment Stimulation Program.

Under the program, the Canadian government will have 6000 Telidon terminals built by Canadian firms and will make them available for use in new Telidon systems operated by the private sector. To qualify for assistance, applicants must agree to provide at least an equal number of terminals and demonstrate the advantages of their proposals.

The government will spend $10.5 million on the Industry Investment Stimulation Program in 1981 and 1982, as part of the $27.5 million increase in Telidon funding announced by Fox on February 6, 1981.

At least 12,000 new terminals will be built under the program. This increased production will strengthen Canada's Telidon equipment manufacturing industry and accelerate the pace at which the price of Telidon equipment is declining. Leading experts in the videotext field have recently predicted that mass production of Telidon equipment will lower the price of a basic Telidon decoder to about $150 within 12 to 18 months.

The program will also help the private sector develop the skills and resources to operate and market commercially viable videotext services. A major goal of the program is to stimulate the growth of Telidon data bases and the creation of pages of information of sufficient quality and quantity to make the purchase of Telidon terminals attractive to both home and office users.

FCC names seven new direct service cities

International record/data service via ITT World Communications Inc. now costs less and is more convenient from seven cities in the United States as a result of the FCC's approval of additional "direct service cities."

A direct service city is one from which an international carrier can provide direct international communications such as telex, cablegram and leased circuits.

The newly approved points of operation are: Phoenix, AZ; Anaheim and San Diego, CA; Indianapolis, IN; New Brunswick and Trenton, NJ; and Charlotte, NC. Previously, the company was permitted to provide direct service from 26 cities in the continental United States.

Mural-display recognizes Canadian origins of broadcasting

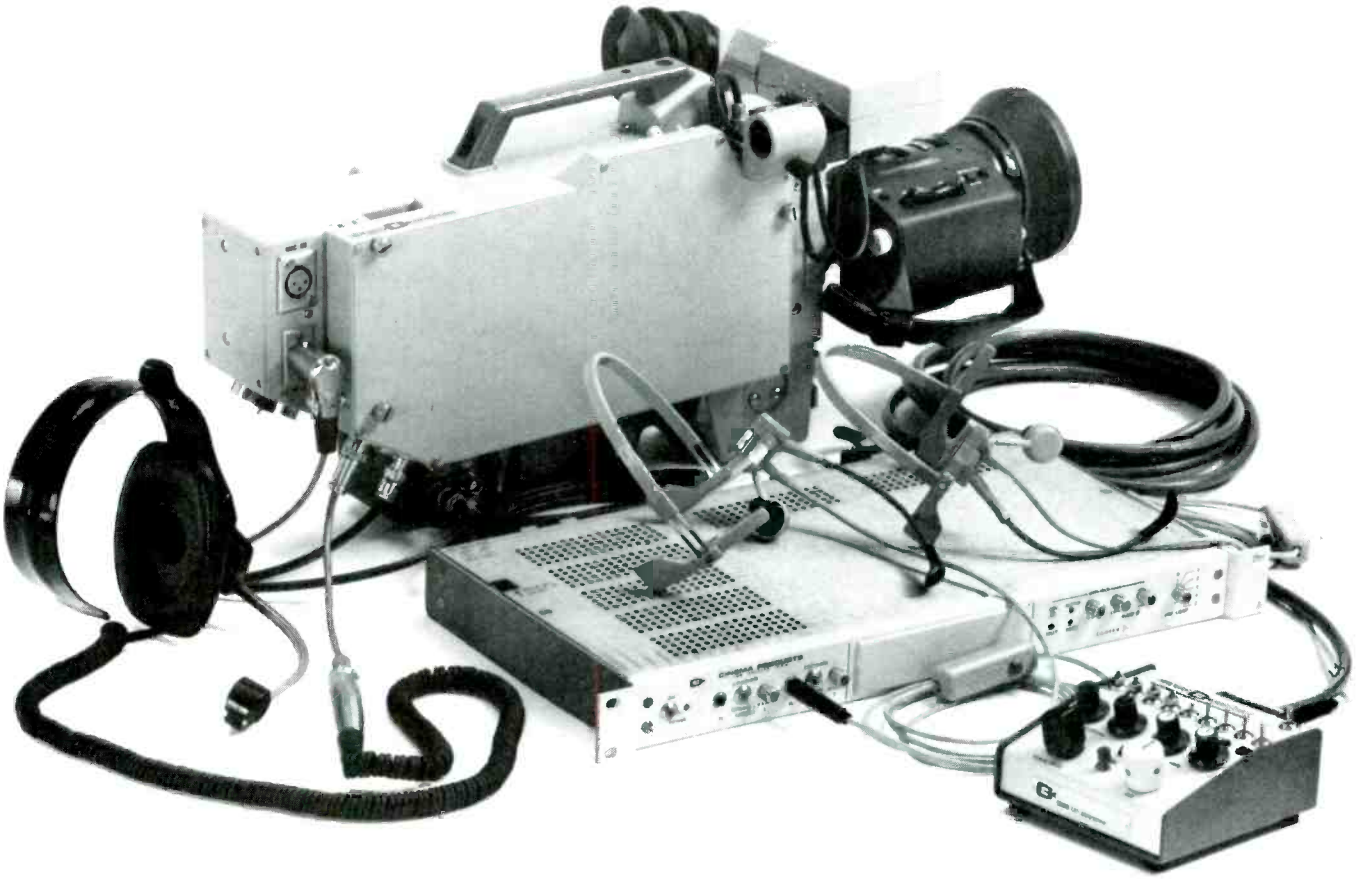
A mural-display went up at the National Press Club of Canada recently recognizing a Canadian "first" that has been relatively unnoticed for the past six decades.

The permanent exhibit, contributed by the Canadian Association of Broadcasters (CAB), promotes the fact that broadcasting on a regular basis started in Canada.

The mural-display mounted at the press club's quarters below Parliament Hill includes old photo blow-ups, engraved on back-lit plexiglass, of pioneer radio station XWA's 1919

Our Co-Ax Digital Remote Control system is now available for:

Sony BVP-300/BVP-330, Thomson MC-601/MC-701, Ikegami HL-77/HL-79A, RCA TK-76B/TK-76C, and NEC MNC-71CP ENG/EFP cameras.



- ☐ Cinema Products' exciting new co-ax digital remote control system provides dependable, studio-like remote control to ENG/EFP cameras in the field *at a fraction of the cost of other systems!*
- ☐ System consists of mini-CCU, analog-to-digital encoder, and digital-to-analog decoder.
- ☐ Permits control of all functions normally required in OB van, including genlock.
- ☐ Digital encoder (19" rack-mounted) designed to accommodate *two* mini-CCU's to control *two* cameras (each equipped with its own decoder).
- ☐ Lightweight, camera-mounted decoder features intercom capability. (Decoder is either side-mounted on camera door, or neatly "sandwiched" between camera body and door.)
- ☐ Digitally encoded control data relayed to camera-mounted decoder through a simple, lightweight and reliable coaxial cable.
- ☐ Eliminates the need for expensive, bulkier, multi-core or triax camera cable, and reduces to a minimum the risks normally associated with the use of such camera cables.
- ☐ Low-cost coaxial cable allows complete remote control and camera set-up functions from greater distances with greater safety and utmost reliability.
- ☐ The most affordable and reliable remote control system available on the market today, the CP co-ax digital remote control system is ideal for all extended shooting situations such as sports events, live concerts, political rallies, etc.

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studio in Montreal where broadcasting began, the old Marconi building that housed it and a batteryless radio receiver, another Canadian first.

Attending an official presentation of the exhibit were elected officers of the National Press Club of Canada and CAB officers from across Canada, in town to attend a regular board meeting of the association. The presentation, made by CAB Chairman John Ansell, president of radio station CJVI Victoria, was accepted by the club's president Rennie MacKenzie of Thomson Newspapers, Ottawa.

The CAB represents more than 400 private-sector radio and TV stations and networks broadcasting in English, French or other languages.

Library to install satellite communciations system

One of the nation's oldest public libraries, the Village Library of Farmington, CT, recently became the first to announce plans to install a satellite communications system as part of its services.

With the aid of a $75,000 grant from the Heublein Foundation Inc., the library will install an 'earth station antenna' that will enable it to receive signals from all the communications satellites over North America. The receiver will give library patrons access to video college courses, financial and weather reports and teleconferencing facilities, as well as all commercial channels.

The antenna will be in place by 1985 on the grounds of the new library complex that is to be largely completed by 1983. The original library was established in 1795.

The receiving station is part of a new audio visual department to be funded entirely by the Heublein grant.

The antenna will be used as part of a comprehensive audiovisual department that will include a 45-inch rear screen projection TV unit, four monitors and various amplification and switching equipment.

Growth expected in home videotext services

Home information videotext services are expected to be widely available within the next few years, with both CATV companies and telephone companies participating in their growth. A recently released forecast from International Resource Development Inc. predicts that subscribers will pay an average of $78 per month per household by the end of the decade for use of the new services. For their $78, subscribers will receive a variety of services and entertainment including video games, "teleshopping," bank-at-home, burglar/fire alarm monitoring and electronic mail services. Even if only 10% of US households decide to subscribe to these services, their total spending will exceed $9 billion. According to the 176-page report, newspaper publishers and TV networks are concerned that there will be a diversion of advertiser revenues from newspaper and TV advertising, and some observers expect that there will be a slight reduction in the average time consumers spend viewing conventional TV programs.

According to the report, the recent announcement by AT&T of its own videotext standard is a key event in the development of new consumer information services, and AT&T is expected to be a major manufacturer of videotext terminals based upon the new standard. The Presentation Level Protocol (PLP) is the first level of multi-level standard that will be a superset of the European and Canadian standards, Antiope, Prestel and Telidon. According to the report, when each has made the expected changes required to be compatible with PLP, an AT&T terminal will be able to work in most of the world's systems. □

AMPEX ON SWITCHING

Introducing The 4100 Series. More Switcher For Your Money.

The Ampex 4100 Series, an enhanced version of the highly successful 4000 Series switchers, puts even more capability at your command.

It's even more powerful than the previous series, yet it's easier to use. And when you measure its performance against price, you'll get a very pleasant surprise.

A Great Switcher Gets Even Better.
The 4100 Series' new Downstream Mixer/Keyer (DMK) now lets you mix between Program and Preset. It gives you keyboard control of up to ten key sources of any type and automatic transitions for keys and fade to black.

New RGB chroma keyers provide the same exceptionally high quality chroma keys for which the 4000 Series was famous, but now you can also add true, variable density shadows. The 4100 Series also allows unused RGB key sources to be used for additional, external luminance keys.

And all keys and keyers can be previewed on a separate output, without interrupting the Preview monitor.

Unequaled Multi-Level Video Power.
With optional Dual Bus Keyers, the 4100 Series provides full, unrestricted keying power. With three full capability keyers per M/E, you can control up to five levels of video on a single M/E. Transitions to and from keys, between backgrounds and keys, behind keys and more are all easily done. You get true multi-level capability because every keyer can perform any type of key. And because the 4100 operates in the straightforward A/B format, control is simple, logical and reliable.

The 4100 Series can be supplied with up to 100 wipe patterns. Each M/E also has its own independent pattern generator system. With other standard features like independent, dual-axis modulators, full operational status indicators, actual tally and independently programmable auto-transitions, the 4100 Series can give you the creative edge.

Committed to Excellence.
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SMPTE

Society of Motion Picture & Television Engineers

Conference scheduled Oct. 25-30

The SMPTE Conference scheduled to be held Oct. 25-30, 1981, at the Century Plaza Hotel in Los Angeles, will include five days of sessions involving the technical aspects of motion picture and TV industries. Julian Hopkinson, Agfa-Gevaert, is serving as program chairman for the conference. Associate program chairmen include: Chester D. Luton, MGM Labs Inc., topics on motion pictures; M. Carlos Kennedy, Ampex Corp., TV and video subjects; and John D. Mosley, Comtrak, sound.

A 329-booth exhibit featuring the latest TV and film equipment from the world's leading equipment manufacturers is planned. The equipment exhibition will be the largest SMPTE has ever had and will be open Oct. 27-29.

Further information regarding the conference and the exhibition may be obtained from SMPTE, 862 Scarsdale Avenue, Scarsdale, NY 10583.

AES

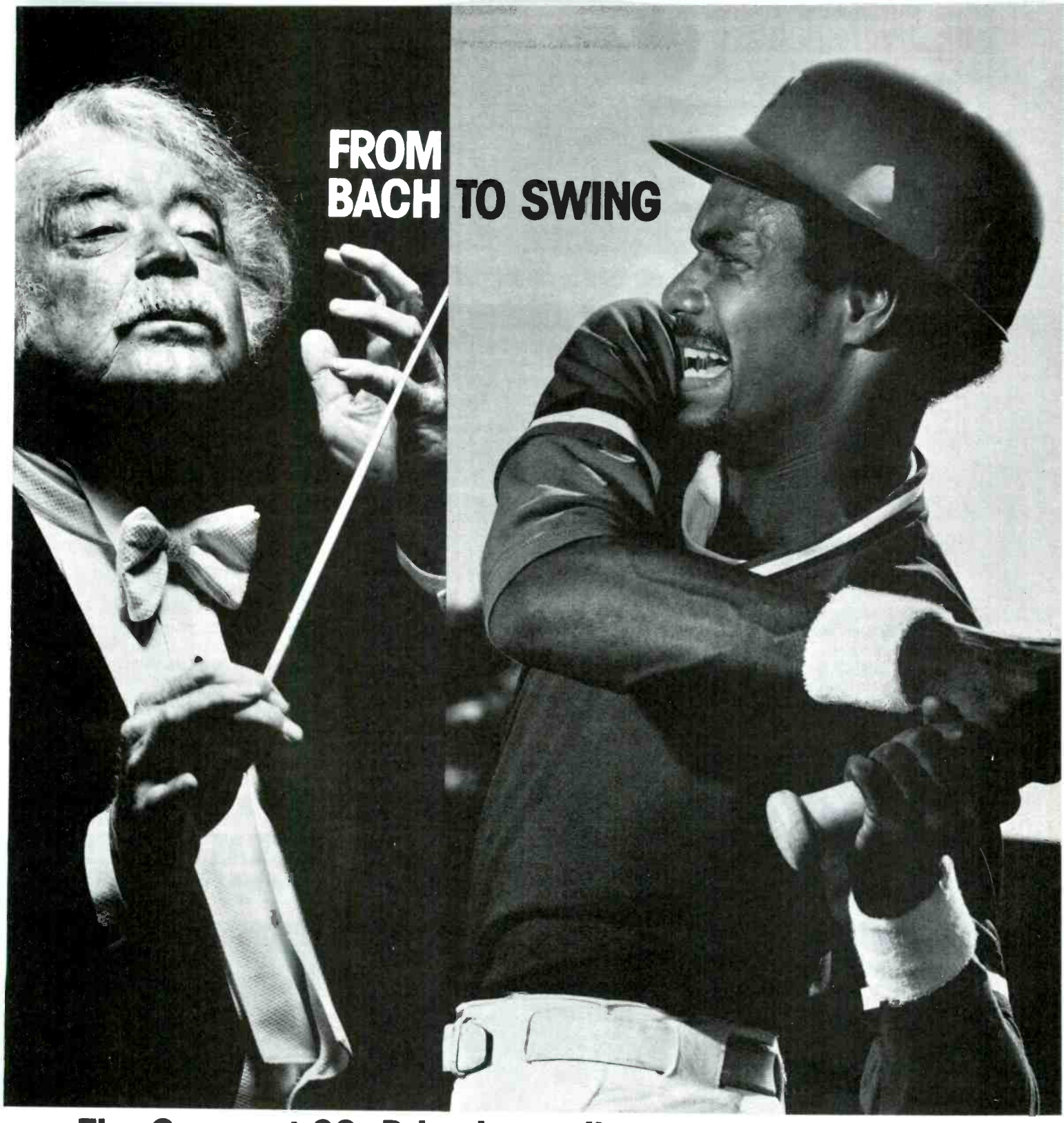
Upcoming AES convention to combine analog and digital

The Audio Engineering Society 70th Convention will be held Oct. 30—Nov. 2 at the Waldorf Astoria Hotel in New York City. It will feature four days of specialized technical papers, 75 in total; six floors of technical product exhibits from 185 manufacturers; four days of special workshops directed at the practical aspects of audio engineering; special tape machine maintenance clinic; and introduction of the Precis Poster Session concept.

The 70th AES Convention is directed at building a bridge to the effective use of both digital and analog technology through the presentation of more than 75 technical papers in the areas of recording and reproduction, sound reinforcement, instrumentation, signal processing, microphones, transducers, room acoustics and broadcast. These technical sessions will embrace both disciplines—analog and digital.

The sessions will include the following topics: signal processing; microphones, loudspeakers, listeners and rooms; transducers; sound reinforcement and room acoustics; studio technology; the standardization activity of the AES; electronic music; open meeting of ANSC S4 on audio engineering; digital recording, editing, reproduction and signal processing; analog recording and reproduction; circuit design and measurement; and disc reproduction and broadcast.

Parallel to the technical papers sessions, the convention will offer 10 workshops that will take the practitioners' point of view in using the latest in technical developments as presented in the technical papers sessions. □



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This versatile 22-foot mobile unit is in a league by itself. With four cameras and three VTRs, it offers big production capability at a price that earns rave reviews.

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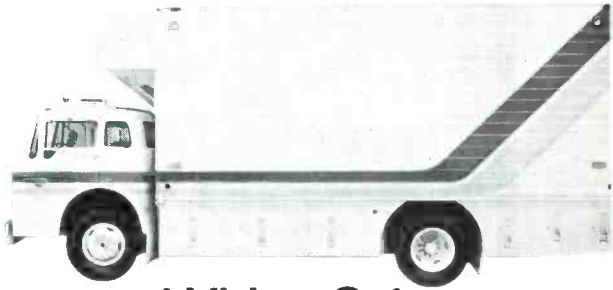

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Mitsubishi, AEG-Telefunken reach agreement

Mitsubishi Electric Corporation in Japan and AEG-Telefunken in West Germany have recently reached an agreement in the field of professional digital audio recording. AEG-Telefunken will join the Mitsubishi PCM format for professional PCM stereo and multichannel audio recorders on an exclusive OEM basis. By this exclusive OEM agreement, the Mitsubishi PCM format will be introduced under the AEG-Telefunken brand throughout Europe, except for Sweden.

CMX names Peirce-Phelps representative

The Video Systems Division of Peirce-Phelps Inc., a systems contractor/equipment supplier for Pennsylvania, New Jersey, Delaware, Virginia, Maryland and the District of Columbia. The company will be marketing the 340X large scale and The Edge medium-scale computer-assisted videotape editing systems, in a wide range of teleproduction applications within its exclusive geographic territory.

ISI appoints Mid-East distributor

Industrial Sciences Inc. (ISI), manufacturers of TV broadcasting equipment, has announced the appointment of Mercury Middle-East as its exclusive distributor in the Middle East. The announcement was made at the International Television Symposium and Technical Exhibit held in Montreux, Switzerland.

Jordan buys Marconi TV transmitters

Jordan Television Corporation, which operates a radio and TV network in the Middle East, has awarded the Broadcasting Division of Marconi Communication Systems Limited, Chelmsford, an order for more VHF TV transmitting equipment. The transmitters and associated equipment will be produced in the Chelmsford factory and installed in Jordan by Marconi engineers before handing over to the authorities in a satisfactory operating state. The equipment will be used for coverage of the 2-channel program transmissions that are part of Jordan Television Corporation's planned expansion.

Elcom Specialty Products moves

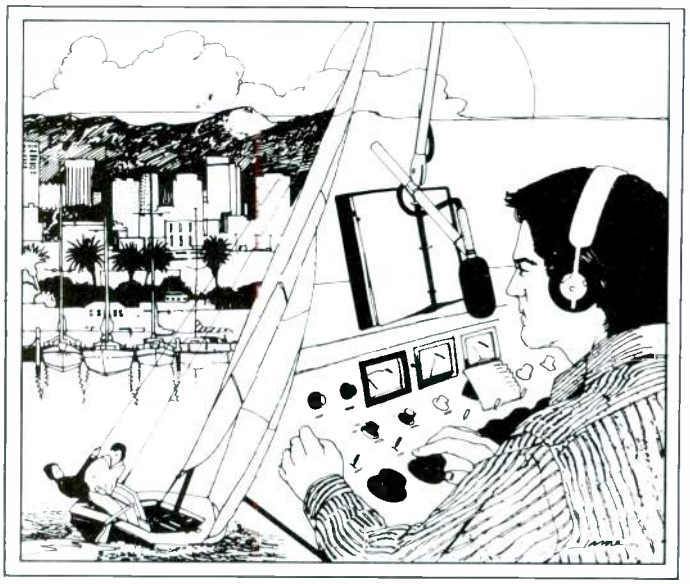
Elcom Specialty Products Inc., the new owner of the radio transmitter operation of the Cetec Broadcast Group, has moved to a 22,000-square-foot manufacturing facility in the Sacramento Industrial Park. All correspondence relating to the sales from broadcasters, engineering support, spare parts and service on Cetec, Sparta and Bauer transmitters should be directed to: 6199 Warehouse Way, Sacramento, CA 95826; (916) 381-3750 or Telex 377-331.

Ampex tape joint venture to invest $50 million

Ampex Corporation said recently that it is rapidly expanding its blank magnetic recording tape joint venture with Konishiroku Photo Industry Company Ltd., and that the joint venture plans to spend $50 million over the next three years to capture a

KCBQ/COUNTRY SOUNDS GREAT

ON THEIR NEW CONTINENTAL 50 KW TRANSMITTER



New 317C-2 transmitter gets high "EPM" rating from KCBQ.

When Charter Broadcasting went shopping for KCBQ's new 50,000 watt AM transmitter, they looked for cost-effective performance and reliability.

Working with their Broadcast Audio Specialist, they evaluated several transmitters before choosing Continental's new 317C-2.

KCBQ is the first AM station to go on-the-air with the new 317C-2 50 kW transmitter. With the Spring Sweeps behind them, Engineering, Programming and Management give Continental's 317C-2 very high marks.

Byron Bray, Chief Engineer at KCBQ, comments on the 317C-2: "Our station is country music, so I pump a lot of bass. We get very good audio. I would say our station has a superior sound; superior listening. The modulation is outstanding; reliability is excellent.

"Our engineering staff is very impressed with the construction of the 317C-2: and it is certainly state-of-the-art in audio performance.

"We have a critical antenna array with lots of traps. The 317C-2 works into the system beautifully. We sound great on the air. Our signal is superb. The transmitter is easy to tune; easy to maintain. And the Continental engineering service support is just outstanding."

Bob McKay is Program Director at KCBQ. He also gives the 317C-2 high marks:

"I'm very impressed with the sound we get from the 317C-2. I've had experience with several other brands, and, the 317C-2 is way way above and beyond the others in performance. We have a somewhat unique day/night pattern, and the 317C-2 performs very well. We get superb fidelity in all areas of the sound spectrum.

"We do a lot of audio processing, and the transmitter handles the processing very well. In my opinion, it does a superior job of covering the mammoth San Diego County. I think the 317C-2 is an outstanding performer for us. It's excellent equipment."

Continental's 317C is designed to give you faithful program reproduction: "AM Transparency". For complete information or to arrange a demonstration, call

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Box 270879
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Continental Electronics

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significant share of the consumer segment of the tape business. Ampex will discontinue marketing blank consumer audiotape domestically after August 8, 1981, relying instead on the joint venture company, Konishiroku-Ampex, to serve this market in 1982 or later.

The joint venture will take advantage of the growing consumer tape market by combining Ampex's technology with Konishiroku's extensive consumer marketing experience.

Ampex will continue to sell consumer videotape domestically through the company's own extensive US sales force, but will discontinue its consumer recording tape sales agreements with its US manufacturers representatives. Ampex will continue the present program of selling both consumer audio and video tapes in selected countries outside the United States.

Increased analog sales show commitment

Sales of Studer's A800 microprocessor-controlled 24-track recorder, up 400% in the last quarter of this fiscal year, seem to indicate a continuing commitment to state-of-the-art analog among many top studios.

Approximately 300 Studer A800s are now in use, with the bulk of sales in Europe, Japan and North America. The A800 is used for multitrack master recording and, increasingly, for audio sweetening in video post-production.

RCA files with FCC to operate DBS system

RCA American Communications Inc. recently filed with the FCC for authority to construct, launch, position and operate an experimental system of direct broadcast satellites and ground support facilities capable of providing television, audio and other services to individual and community receiving stations in the United States.

The complete DBS system will consist of four operational satellites, plus an in-orbit spare and an on-ground spare. A period of not less than four years will pass between the date of approval and the date of commencing transmission. The proposed system will require a total investment of $760 million.

Each RCA American DBS spacecraft will carry a total of six 230W K-band transponders, two of which are capable of being switched to carry broadband, high definition TV signals. Each channel has its own backup, on-board spare for 100% redundancy.

Andrew F. Inglis, president of RCA Americom, said an RCA study showed that a DBS system could be economically feasible in areas where cable TV was unavailable, at an installation cost of less than $500 per home. Such areas include not only rural or remote locations far removed from those served by either cable or off-the-air television, but also major metropolitan areas. In the latter instance, cable TV could be unavailable for various political or technical reasons.

To provide a greater degree of flexibility in programming offered to homes or communities equipped to receive DBS signals, the RCA Americom DBS spacecraft are designed to permit remote uplinking from any time zone. Major sport, political and other events can therefore be received in real time by DBS homes far removed from the site of the event.

The spacecraft communications system is also designed to provide superior signal quality to homes in all areas of the served time zones. Specifications call for a minimum signal of 58dBw from each regular transponder at the edge of its coverage area, which is 400 times more powerful than a signal delivered by today's conventional communications satellites. □

Thanks, Emmy. You've never looked better.

We're honored to have received the 1980 EMMY for the development of digital techniques in automatic camera alignment. We're pleased that so many stations have benefitted from faster studio and field setup as a result of this development. We thank the Academy for honoring us and our fine engineering staff for making this honor possible. Finally, we thank those who had the faith to use our cameras when we first pioneered these new techniques.

Ikegami

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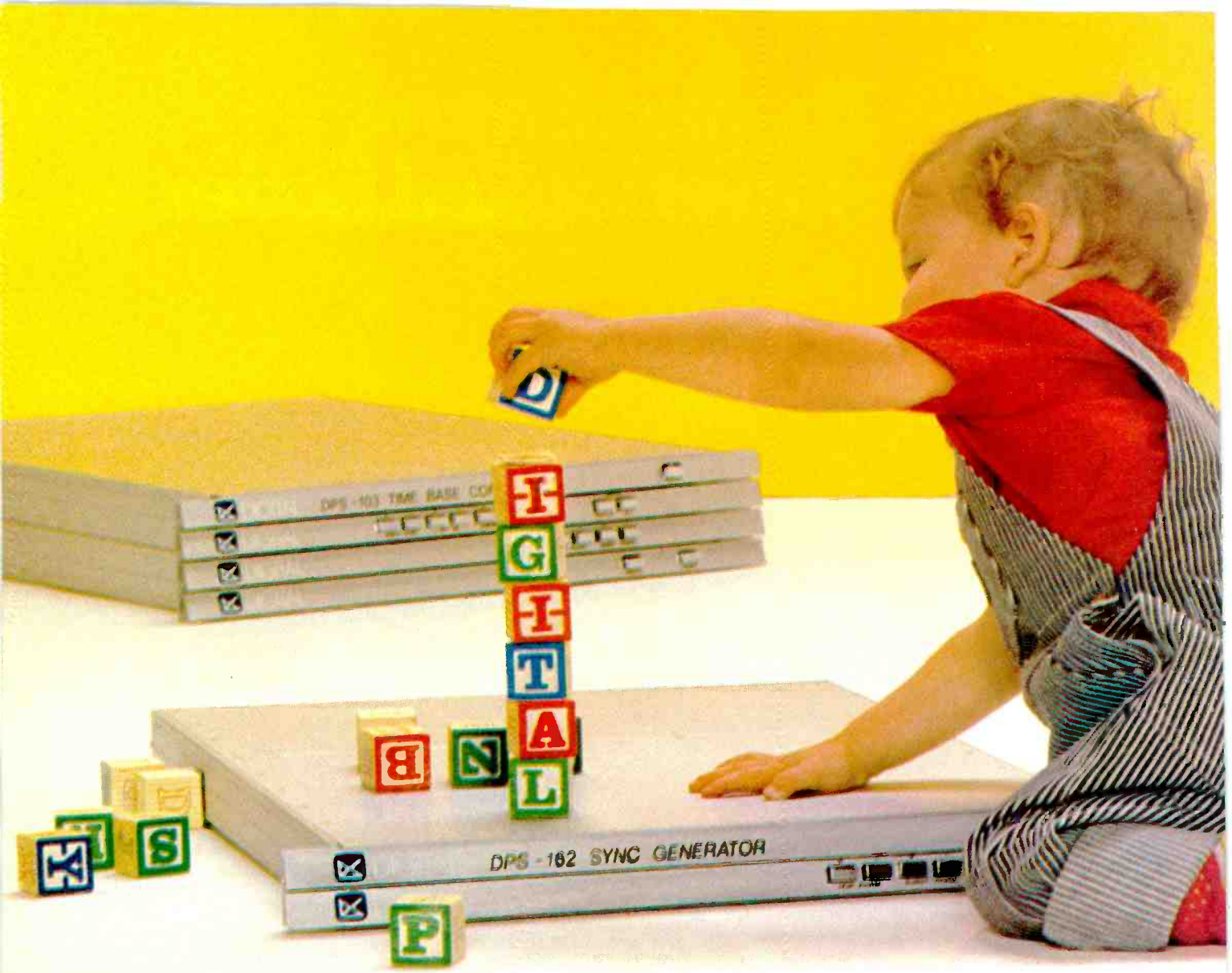


JOHN NEVER FORGOT LEARNED

Building blocks. Like all great inventions, they are simplicity itself. As long as you start with a good foundation, you can just keep building up.

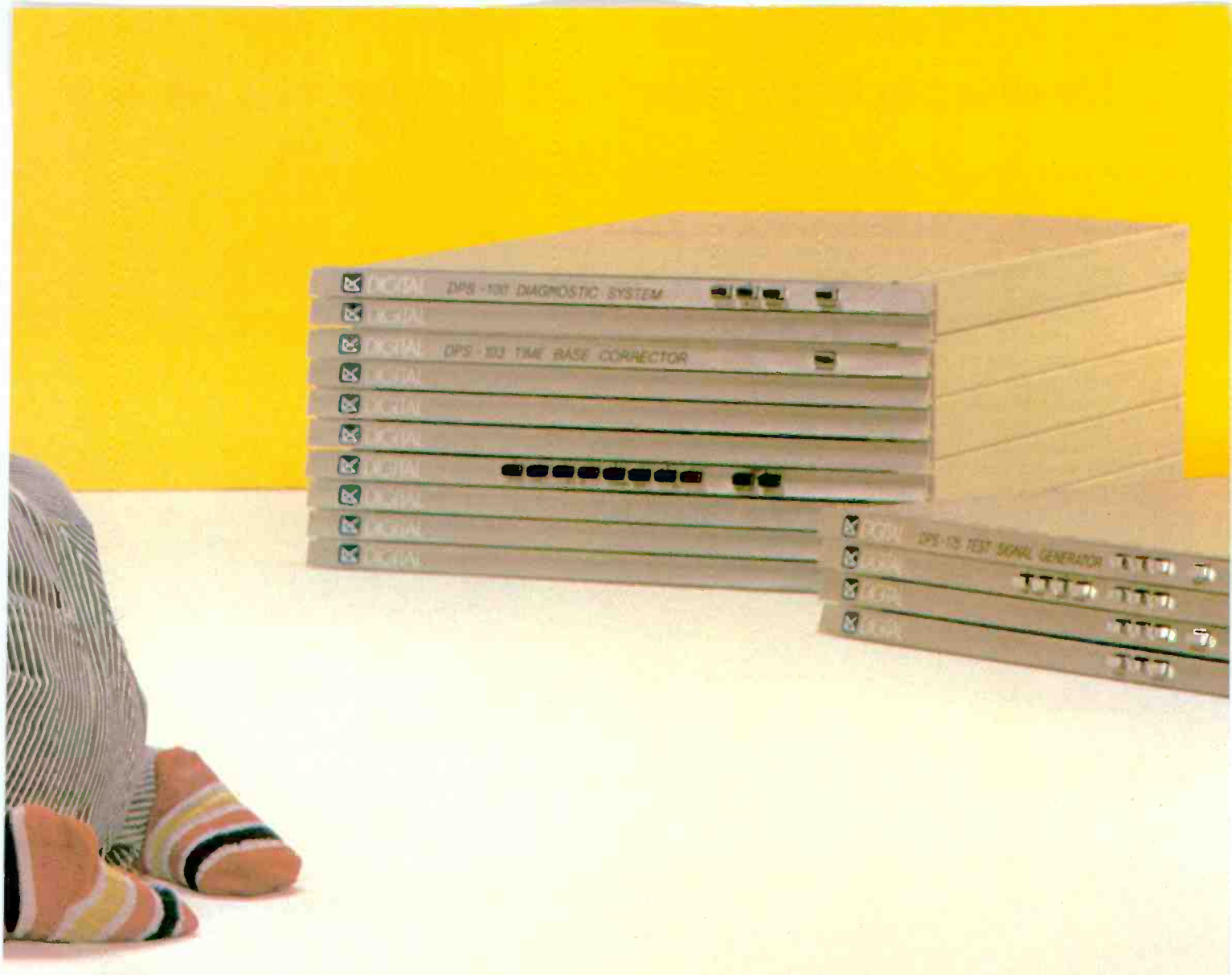
John Lowry figured this out before the age of two. Today, as President of Digital Video Systems, he's built that simple 'building block' idea into all of Digital's new family of products.

Our new DPS-100 series which includes all new stand-alone digital sync and test signal generators is a good example. We have been building digital sync and test signal generators for the DPS-1 for almost five years. And for almost five years, they have been the state of the art.

Now, in our new series, we've pushed the boundaries of that state even further into the future. Our new 15 inch square circuit board has triple the number of pin outs to handle tomorrow's component signals. This new series will expand vertically merely by stacking the circuit modules just like interlocking building blocks. And the whole thing becomes one unit. It will also interface beautifully with your DPS-1. It is available today. For today. And when your needs grow... for tomorrow also.

John recognized the potential of digital design long before others, and he directed his research and development team to create and produce totally digital products. None of our competitors succeeded in doing that. And all digital in our DPS-162 sync generator means that the SC/H relationship is precise within a half degree even when loaded to a non-RS 170A source. It is absolutely accurate and will never need alignment. These products are what the competition will be chasing for the next few years. We know that, because they haven't been able to offer features comparable to our 5-year old DPS-1 yet.

We don't sell you experiments. We sell proven products. We now put every product through the most comprehensive testing system in the industry. In our



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Breakthrough technology. Proven product. That's what Digital has always been about. And these products are now supported by an unbeatable research and development team, efficient production, dependable service and, finally, solid financing. John recently sold a large block of stock to create the capital base to build a strong future for Digital.

Now it's time to build. Find out all about our new products from any of our dealers in 50 cities from coast to coast. And if your dealer doesn't know, ask him to contact us.

All our blocks are now in place. And as John says, "With our new strong foundation, building Digital is...like child's play".

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The changing face of engineering management in the '80s

By Dennis Ciapura, general manager of telecommunications, Greater Media, East Brunswick, NJ

The broadcast industry is beginning to see the introduction of a new breed of manager whose existence has been spawned as much by changes in the economics of our business as by technological change. As broadcast property values continue to skyrocket, the stakes of the game grow larger and the industry as a whole becomes more fiercely competitive. Recent history has shown that the most successful players are those who have evolved good management teams.

No matter how small or large the broadcast station or group, there is an optimum management structure that will produce maximum efficiency, and the engineering element of that structure is critical. Broadcasters can no longer afford to treat their engineering departments as if they were service functions: maintenance alone is not of primary importance.

Unfortunately, there is no simple formula for success; each company must develop its own solutions based upon its own requirements. Most companies fail to recognize problem areas to begin with. After all, a problem cannot be solved if it is not accurately defined. Worse, many companies have never considered re-evaluating their engineering manage-

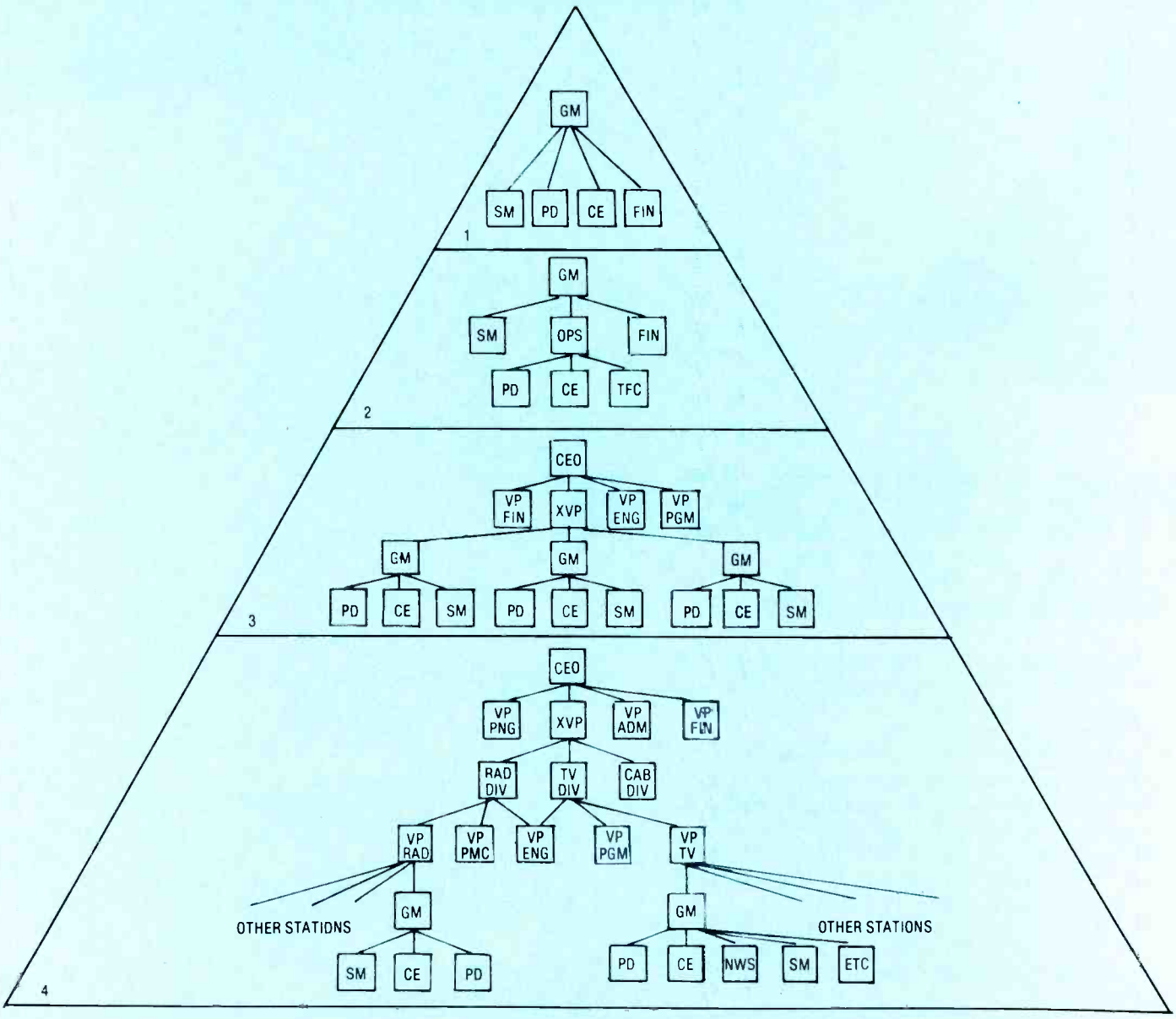

Figure 1 Tree chart illustrating levels of organizational complexity.

The UREI Compressor/Limiters

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

Because we built our reputation for unparalleled professional performance and quality with our compressors and limiters, we have continuously advanced their engineering and technology to offer more reliability, features and performance. When you need the fastest, quietest and most flexible gain control instruments available, you can be totally assured that these products will prove to you why they've earned the title — Studio Standard:

The Model LA-4
A single channel, half-rack unit with patented electro-optical attenuator. Featuring smooth, natural sounding RMS action, it offers selectable compression ratios, a large VU meter, adjustable output and threshold levels and stereo coupling.

The Model 1176LN
A peak limiter which features adjustable input and output levels; individual attack and release time controls; selectable compression ratios; switchable metering; and stereo coupling. The 1176LN is the most widely used limiter in the world.

The Model 1178
A two channel version of the 1176LN in a compact (3-1/2) rack mounting design. Featuring perfect tracking in the selectable stereo mode, it additionally offers selectable VU or Peak reading meter ballistics.

From One Pro To Another — trust all your toughest signal processing needs to UREI.

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ment structure at all.

It is important to understand that an engineering management structure exists even if the entire department consists of a single chief engineer. Who he reports to and how he is integrated into the management team (if at all) can make more difference in the technical competitiveness of the station than any other single factor. This is why occasionally a station with inferior parameters hang in right up there with the best facilities in town. The allocation may be the "pits," but that cannot prevent a sharp management team from achieving the best technical efficiency, and that can go a long way in compensating for other less-controllable shortcomings.

Some broadcasters diligently study the management structures of successful broadcast companies of comparable size and business framework and endeavor to emulate their modus operandi and, thus, replicate their success. Although this approach sounds reasonable, in practice it does not work because it is often difficult to separate efficient technical management from the whole. Just as good engineering can compensate for other weaknesses, other strengths can mask uninspired engineering management.

It is more effective to seek successful engineering management structures for analysis, regardless of the host company's status. Bear in mind that the Class A FM operator ranking third in B land may be the beneficiary of top technical management efficiency. That is worth emulating. The management techniques suggested here are the results of a decade of research, including the latest sampling of industry trends.

The best way to launch the search for the optimum management structure is to first understand the organizational level of the operation to be analyzed. Figure 1 illustrates the progression of organizational complexity in the form of a tree diagram. Discrete level designations are assigned to allow reference to the various levels without having to describe them repeatedly.

Management concepts will be dealt with, whether the station or group is radio or TV, or some mixture thereof; the problems and their solutions are the same. The purpose of this investigation is to suggest an orderly course of action for more detailed work within individual companies.

Some of the approaches that will be suggested are rather unconventional, while many are time-honored business principles. Many basic management principles are routinely violated in broadcast practice, particularly in the engineering segment. Yet, ironically, some that are applied do not really fit and can inhibit efficiency. These situations require unconventional approaches.

Referring back to Figure 1, broadcasters may choose the level of organizational complexity that comes closest to their operations and keep that level in mind as these suggestions are presented. Many operations will fall somewhere between these discrete levels, so that the analysis of the two closest levels may be applicable. Providing specific answers to individual problems is a secondary goal; the main objective is to develop a way of thinking about these problems.

The more complex organizations (as presented in Figure 1) are, for the most part, made up of building blocks that look similar to the basic station at the top of the tree. Because this simple structure is the basic building block

for virtually all broadcast management systems, and because it is representative of the vast majority of broadcast companies, it is the most important.

Figure 2 focuses in on this basic level and illustrates the communications cycle that people assume exists between the general manager and the chief engineer. The GM is often a nontechnical person and must, therefore, rely upon the chief engineer for the information input that is required to make executive decisions. This input can take one of two forms: information that is specifically requested by the GM and information that the chief engineer makes available to the GM because it is thought to be relevant to the successful operation of the company.

The information loop generally functions pretty well in the first case because the GM has asked the question and, thus, has prompted the engineering department to respond with data. The problem is that the station's technical situation could have serious problems that the nontechnical GM could not be aware of without first receiving data from the chief engineer. This is where the information loop is broken and communications break down. The GM often is frustrated by this lack of communication.

The chief engineer often is held responsible for the breakdown, but may not be at fault. The industry has nurtured and clung to a system of management that has insulated the engineering department from the rest of the station management team and has made it difficult for the engineering management segment to understand the company's business objectives.

Engineering has traditionally been treated as a service function, similar to building maintenance, and the technical department is rarely included in any management discussions or planning sessions that do not require technical input. Although this may seem logical, it prevents the chief engineer from developing an accurate understanding of the company's business objectives and how the management team plans to achieve them. In many cases the chief engineer sees his place of employment as a broadcast station only and not as a business at all.

Engineering personnel are usually intelligent people and have the potential to be communicative and organized managers, but the system that has prevailed in the broadcast industry has allowed this management resource to remain dormant. Some of the remarkably successful companies that have evolved excellent manage-

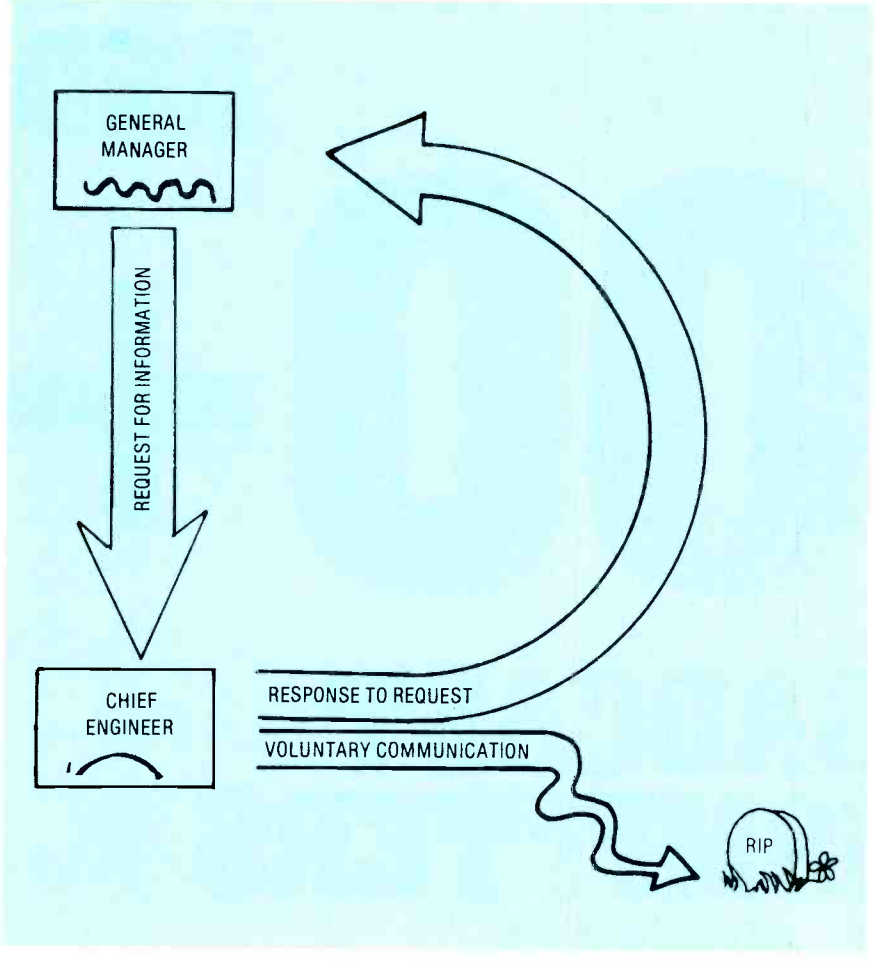

Figure 2 This diagram illustrates the usual communication problem that exists between the general manager and chief engineer. Note that response to specific requests for information usually results in good response, while voluntary communications from the chief engineer to general manager are almost nonexistent. This situation is usually the result of unwitting isolation of the chief engineer from the management team.

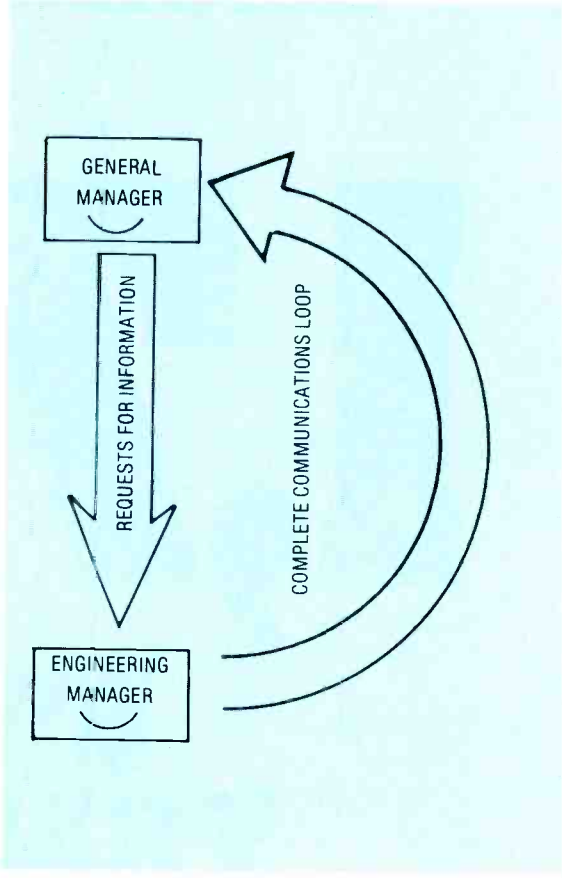

Figure 3 As the chief engineer develops into a technical management professional, voluntary information from the engineering department begins to flow, thus providing the general manager with a much clearer picture of the technical situation. This will only happen if the engineering manager feels like part of the team.

FROM THE FROZEN WASTELANDS OF THE ANTARCTIC,

TO THE SEARING DESERTS OF KUWAIT, AND

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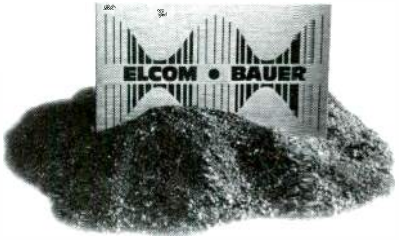
It's a whole new game from an experienced team that have gathered the industry people, engineering expertise and back-up products and spare parts inventory to take care of all past and future business.

Give Paul or Joe a call at their new 22,000 square foot manufacturing facility in Sacramento—that is, if you're interested in getting on the waiting list for a new AM or FM transmitter system from one of the newest, oldest names in the business:



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ment teams have broken through the communications barrier by developing technical management within the station.

Changes for the '80s

This is one of the ways in which engineering management will change in the '80s. Many broadcast companies are developing their technical management potential and are finding a new level of interdepartmental communications and overall efficiency. This movement will generate a new breed of chief engineers who are as concerned about the latest ARB and P & L as the general manager.

Although Figure 3 appears to represent a minor change in the title of the chief engineer, it denotes a much more significant change in management concept. The engineering manager would attend nearly all staff

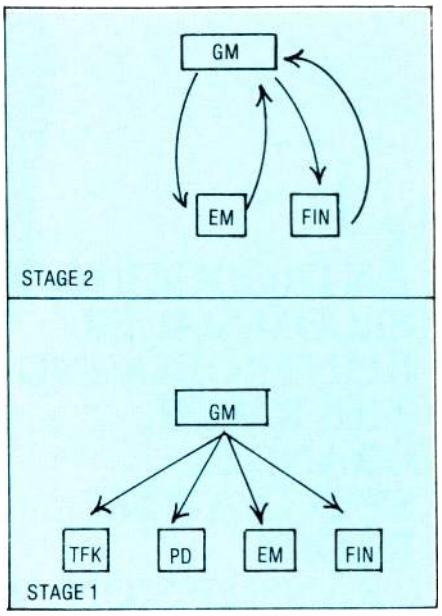

Figure 4 In the 2-stage staff meetings, everyone attends the first stage during which the general manager brings employees up-to-date on the progress of the company and his current objectives. in Stage 2, those management team members whose continued presence is required for more specific discussions remain in the meeting. Other team members, however, should be allowed to remain if at all possible, so that they may absorb information about other management areas and, thus, gain a clearer knowledge of the business. This approach can be particularly useful in laying the groundwork for improved communications with the engineering manager.

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We are proud to be the recipient of an Emmy for the development of an automatic color television camera — our TK-47. We are grateful to The National Academy of Television Arts and Sciences for this prestigious Engineering Award for "...the development of digital computer techniques for the automatic alignment of color television studio cameras."

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RCA

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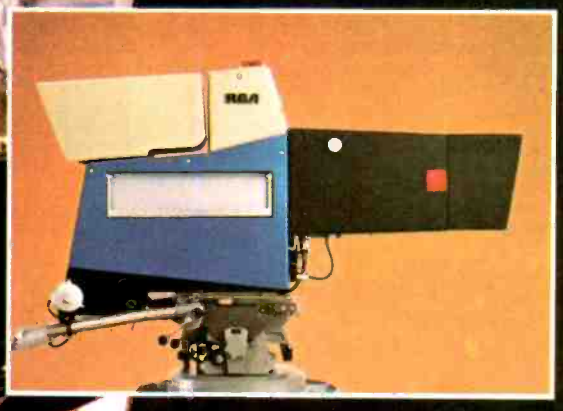

meetings regardless of whether or not they involve engineering, and he or she would be educated by the general manager in basic financial matters. A concern arises at this point. People wonder how an already busy chief engineer can afford the time to attend meetings that do not concern engineering.

This is a valid concern, and one answer is a 2-stage staff meeting as shown in Figure 4. This scheme allows the general manager to exchange ideas with all staff members in a brief manner in Stage 1, then allows those staff members whose continued *input* is not required to leave before beginning more detailed discussions in Stage 2. Stage 1 is the GM's opportunity to keep the engineering manager in step with the rest of the team, which cannot happen if he or she is excluded from every non-engineering meeting. The first stage should not take more than a few minutes, and it should emphasize information *output* from the GM to the staff.

In Stage 2, the GM has an opportunity to solicit additional input from those staff members whose presence is required. This gives the engineer the opportunity to become as involved in the company's business as current workload permits, and it breaks the awful tradition of only calling in the engineer when there is a problem to discuss. Engineers are conditioned to expect each encounter with station management to be of a problem nature, which is a major reason for lack of communciations between the engineer and the GM. No one likes to go looking for trouble.

The 2-stage staff meeting establishes a positive relationship and, thus, encourages further dialogue. The rest comes naturally as the engineering manager works to help achieve *company* goals along with engineering goals. Most people try hard to give what is expected of them, and managers are frequently surprised at what an engineer can deliver when positively motivated. The previous suggestions apply to each level of our tree diagram because each organization's success depends heavily upon optimization of that basic building block.

Optimizing the structure

Other optimizations apply to the more complex levels of the organizational tree. One big decision has to do with the degree of centralization. Years ago, most large broadcasting companies were vertically structured and were not very efficient from a management standpoint (for a number of reasons that are not important anymore). Today, however, the decentralized broadcasting company with relative autonomy at station level is common and works well.

It works well most of the time. As the technical challenges of the '80s grow more complex, group broadcasters can exploit the diversity of engineering talent and other technical resources, but only to the extent that centralized engineering activity can take place. This does not mean centralized engineering management from a personnel standpoint, but it does involve a lot of direct contact between the headquarters organization and engineering at station level.

This is often more difficult than one might expect because it leaves the GM at station level out of the loop on some occasions. This violates the autonomy that the decentralized organization is based upon, often to the chagrin of the

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general manager. It is sort of a management "short circuit."

Figure 5 illustrates this effect. The solution to this problem lies in weighing the loss of station level control against the benefits derived from the power of a combined and coordinated technical effort employing all of the company's resources to meet the onslaught of technological challenges coming its way. This means that the engineering manager is playing on two teams at the same time: the station team from a business and personal management standpoint and the headquarters team from a technical standpoint.

As the technological challenges

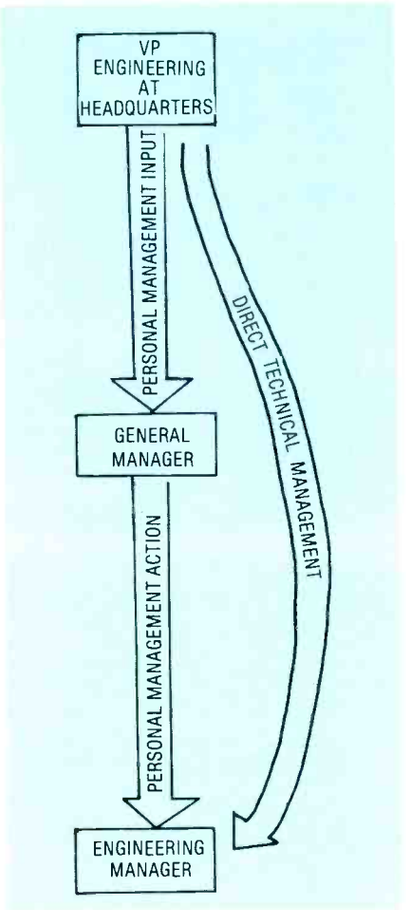

Figure 5 The engineering manager really needs two kinds of management. As a member of the station team, he or she should be personally managed by and reporting to the general manager. At the same time, technical management directly from the headquarter organization can make all of the company's combined technical power available to the station. Passing technical information and action requests back and forth through the general manager is inefficient unless the GM is an engineer.

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become more complex, as they always do as a function of time and progress, the cost/benefit ratio weighs heavily in favor of a centralized technical effort. Once the advantages of a total engineering offense are understood, steps can be taken to make the proposition a less awkward duality.

General managers are much less likely to resent a centralized function if it has no effect on station P & L. The GM can always control the capital budget for technical when all such decisions are made at station level, but not when company-wide planning is in effect. If the general manager's personal compensation is affected by the technical capital budget there is a problem: the GM can control technical operating expense directly but has lost control of the capital budget with respect to technical, and it may cost him or her personally.

One inelegant and seldom-invoked remedy is to exempt the GM's compensation from being affected by the capital budget for technical. A better solution is to improve the level of communications between the engineering department and station management to the point where the GM can understand how the expenditures will improve the company's competitive stance and enhance revenues.

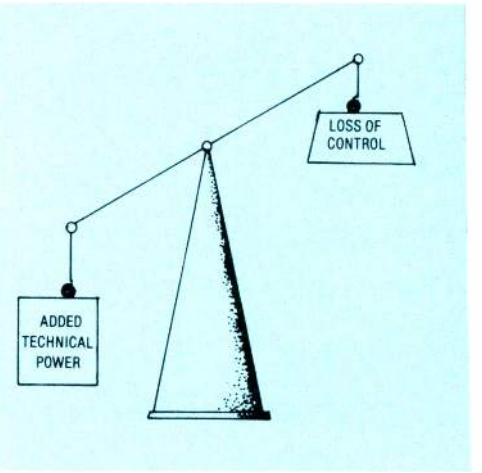

Figure 6 Although a partially centralized type of engineering management system results in some loss of the general manager's control of a staff member, the enhanced competitive edge that can result may outweigh the loss. However, the general manager must thoroughly understand what is to be gained.

The best way to accomplish this goal is to educate the engineering manager on the station's management team so that he or she can protect the station's business interests. To do this effectively, the engineering manager must understand the GM's objectives and, so, we come right back to that basic building block. If the GM can comfortably delegate responsibility to a strong engineering manager, the short circuit illustrated in Figure 5 can be removed and the station can benefit from a company-wide array of technical advances to a degree that is appropriate to local conditions and the business objectives of the general manager.

At group level, this means the company will benefit from the application of its full engineering power at each station in a way that is tempered at local level to suit each station's needs and protect its autonomy to the greatest extent possible. The larger the organization becomes, the more incentive there is to develop strong local engineering managers.

It is hoped that this analysis of engineering management concepts has prompted some thought about the state of things at individual companies, and might have generated some discussion. Success in the '80s will belong to those who alter their methods to match the times. □

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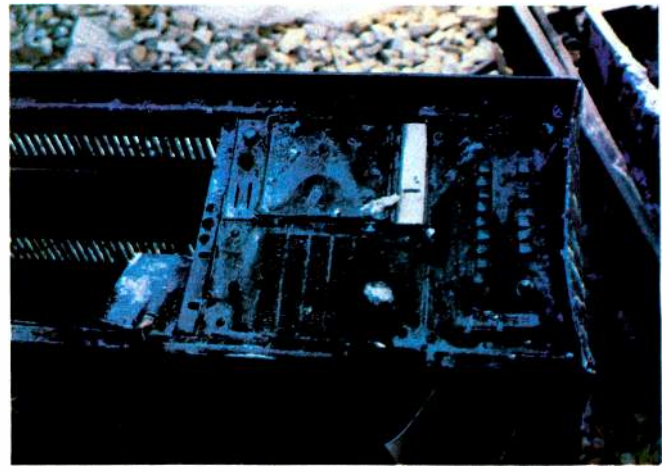

Remains of monitor bridge of AVR-2 Videotape Machine.

Fire protection in the equipment room

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

Photos by Steve Carroll, WTVP staff photographer

P. C. Board Cage from AVR-2.

On January 3, 1981, a fire broke out in the telecine room of TV station WTVP in Peoria, IL. The fire started in a quad tape recorder, but the exact cause of fire remains unknown because the tape recorder was destroyed.

The station had been shut down for the day and no one was in the telecine or main control rooms. It is not known how long the fire burned before being detected. Building maintenance personnel called campus security at Bradley University when they noticed smoke (WTVP is on campus.)

When the security personnel arrived, the telecine room and the main control room were filled with smoke. Not knowing exactly where the fire was, the security personnel sprayed all of the equipment in the area with available fire extinguishers. Normal procedures at Bradley University call for the city fire department to be notified of fire alarms. The Peoria Fire Department arrived at the TV station shortly after the university's security personnel. The fire department also sprayed everything in the area with their fire extinguishers. The combined efforts of both extinguished the fire and prevented building damage without injuries or loss of life. The total loss to the equipment was valued at more than $1.5 million.

The damage caused by the fire was limited to one tape recorder. The rest was smoke damage. It could be safely assumed that everything could have been cleaned up after the fire and that the videotape recorder could have been replaced for less than $150,000. More than half of this would have been for cleaning up the smoke damage and repainting the facility. However, the chemicals used in the fire extinguishers destroyed the remaining equipment.

The fire extinguishers used were primarily of the dry chemical type, commonly referred to as "ABC." These chemical fire extinguishers are filled with a dry powder substance identified as ammonium phosphate. This chemical extinguishes fire efficiently without causing a hazard to persons involved in the extinguishing process. However, this *would not* apply to facilities containing large amounts of extremely expensive electronic equipment.

Ammonium phosphate with its associated binding agents and propellants is corrosive and reacts with copper in an undesirable way. The material adheres to the copper and starts a corrosive process on all exposed copper or metallic surfaces.

As an example, all of the tape recorders in the telecine room had the tape path seriously damaged. The normally smooth surfaces were rough and pitted and would have destroyed any tape that might have passed across them. The tape recorder heads were extremely pitted and corroded. On the printed circuit boards in the equipment, corrosion was evident within two days. A microscopic inspection of integrated circuits and transistors revealed that the leads were being eaten away from the devices themselves.

This corrosive process occurred even though the modules were pulled from the equipment and washed in a

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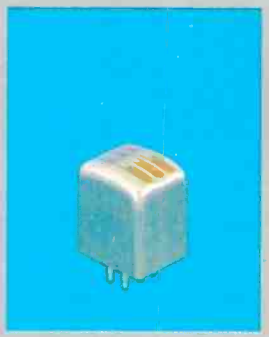
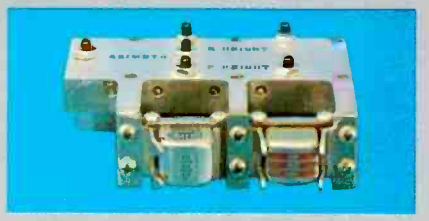

New Head Design


New Pressure Roller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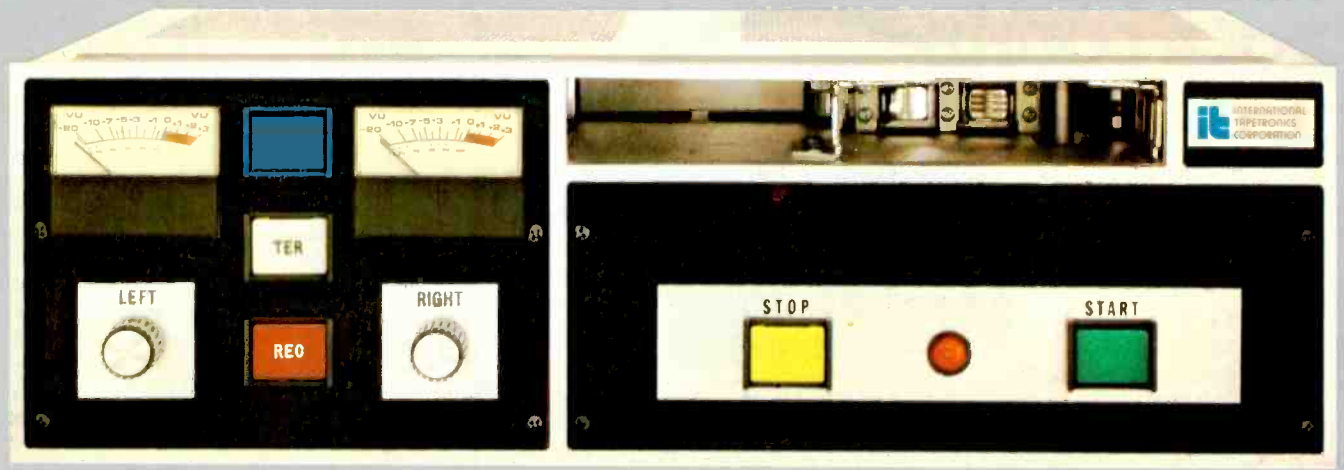

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Fire protection

commercial solvent and water the day after the fire. According to a consulting chemist, the corrosive process started as soon as the chemical touched the surface of the materials.

The washing of the modules and the immediate cleaning of all the equipment slowed the corrosive process, but it could not be stopped. The only solution would have been to remove all printed circuit boards and replace them with new boards. All components would have had to be replaced in the same manner. The tape recorders required replacement of all metallic surfaces and tape paths, as well as new motors. This process would be roughly equivalent to building new equipment from the parts bin. The cost is totally prohibitive; the only course was to scrap the equipment and replace it.

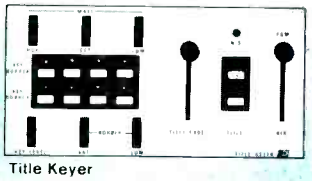
The first reaction was to blame the firefighters and say that they should never have sprayed the equipment with the fire extinguishers. However, the room was filled with smoke and the firefighters had no idea what equipment was in the room or its value. They *did* know that the fire had to be extinguished quickly and in accordance with their training. Therefore, they sprayed everything in the room with fire extinguishers.

To a firefighter, this action is natural. They did their job and did it efficiently, just as the fire extinguishing agent did. Unfortunately, the fire extinguishing agent caused far more damage to the delicate electronic equipment TV than did the fire itself.

It is highly recommended that all radio and TV stations carefully examine their equipment rooms. No fire extinguishers should be allowed on the premises if they are of the dry chemical or "ABC" type. Instead, all fire extinguishers should be either CO_2 or Halon types. These fire extinguishers are also highly efficient in putting out fires in electrical equipment. They have minor side effects, but not as severe as those of the ammonium phosphate type.

The CO_2 fire extinguishers can cause some pitting of metal surfaces because of the freezing action of the chemical. The Halon type fire extinguishers, if used in a roaring flame or sprayed on extremely hot metal, can cause some chemical side effects

Editor's Note: DuPont offers literature on the Halon 1301 Fire Extinguishant, including a color brochure on the protective system at the Museum of Broadcasting in New York. To receive information circle 300 on the reader service card.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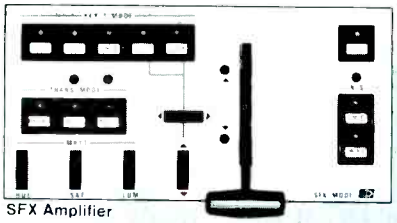
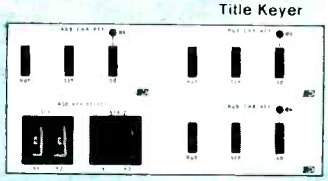

SFX Amplifier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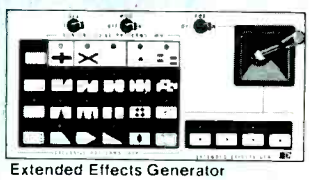
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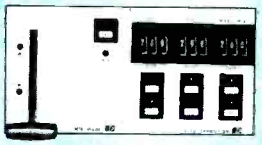
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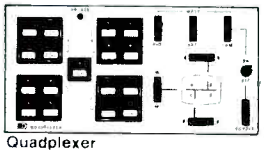
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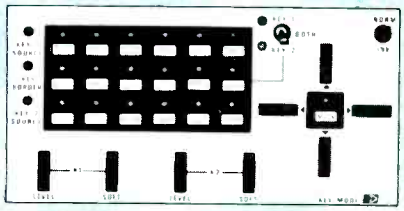
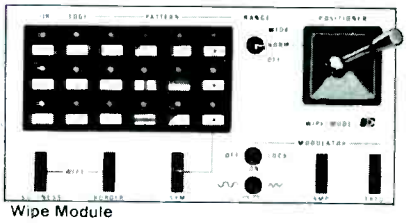

Key Module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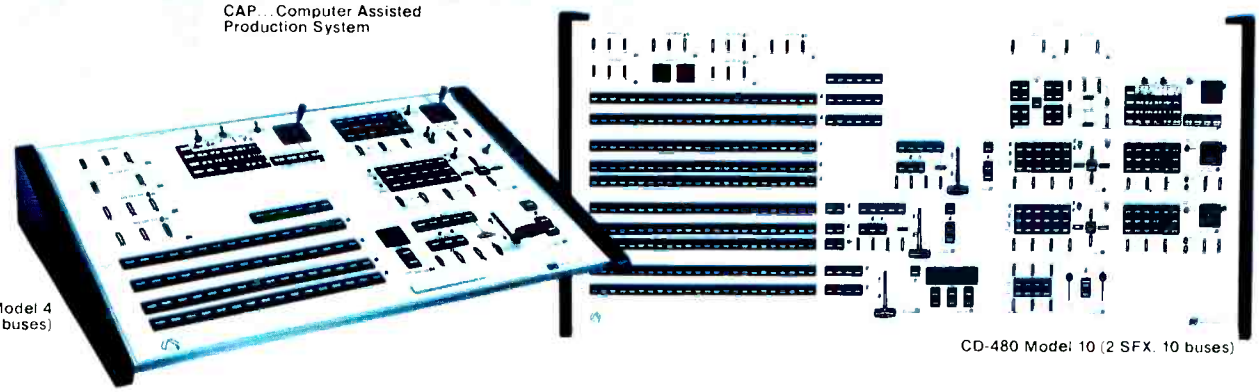
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Fire protection

Remains of tape deck and control panel. The intense fire melted the deck.

that are also undesirable. They should only be used if good ventilation is immediately available.

A better solution for equipment rooms is to install a Halon-type fire extinguishing system in the room. The cost of such a system is negligible compared with the value of the equipment in many facilities. This is especially true in TV control rooms. Halon is a trade name used to describe a particular chemical. Halon 1301 (Bromotrifluoromethane, CBrF3) is used in engineered fire extinguishing systems. This chemical belongs to the family often referred to as Freon (FE1301). Freon is actually a duPont trademark name for a complete series of hydrocarbon compounds. Some of these compounds are further identified as halogenated extinguishing agents.

Halon 1301 is the agent that is most desirable for use in manufactured total fire extinguishing systems. The chemical has been carefully evaluated by a number of agencies, including the US Army Chemical Center, Underwriters Laboratories Inc., the Kettering Laboratory and others. These agencies have found the chemical to be in a class of fire extinguishing agents considered to have the least toxic life hazard. This is identified as the class for which gases or vapors in concentrations up to 20% by volume would not appear to produce injury for durations of exposure up to two hours. This simply means that a staff would not be injured by the chemical in a reasonable concentration for the amount of time necessary to extinguish the fire.

The Halon works in a manner that is not really fully understood. What appears to happen is that the Halon joins in the process of the fire and actually stops the oxidation reaction that is occurring in the flames. The fire just quietly goes out. If the system is properly designed, the concentration of Halon in the room would be about 5% to 7%. This concentration would have no effect on persons for that brief exposure.

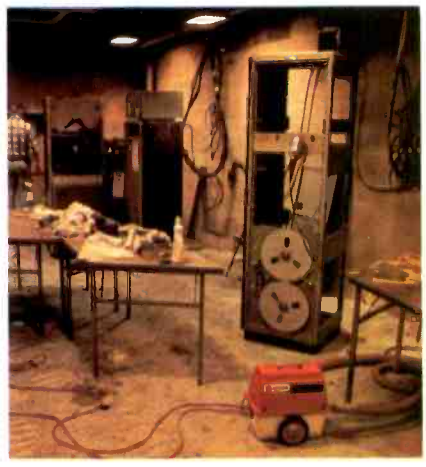
To function well, the Halon system must completely flood the room. This should occur as soon as the fire is first detected. The room should have automatic door releases and

Rear connector panel of tape deck. The rocks under the panel are the remains of the concrete floor.

Master control. Note the dust from the fire extinguishers on the table. This can best be seen where the piece of paper has been moved.

Printed circuit boards being washed. The solvent and water mixture was in the trash cans at the right of the picture.

Telecine room during the process of trying to save the equipment.



Telecine room after some equipment has been removed. Note the extensive smoke discoloration.

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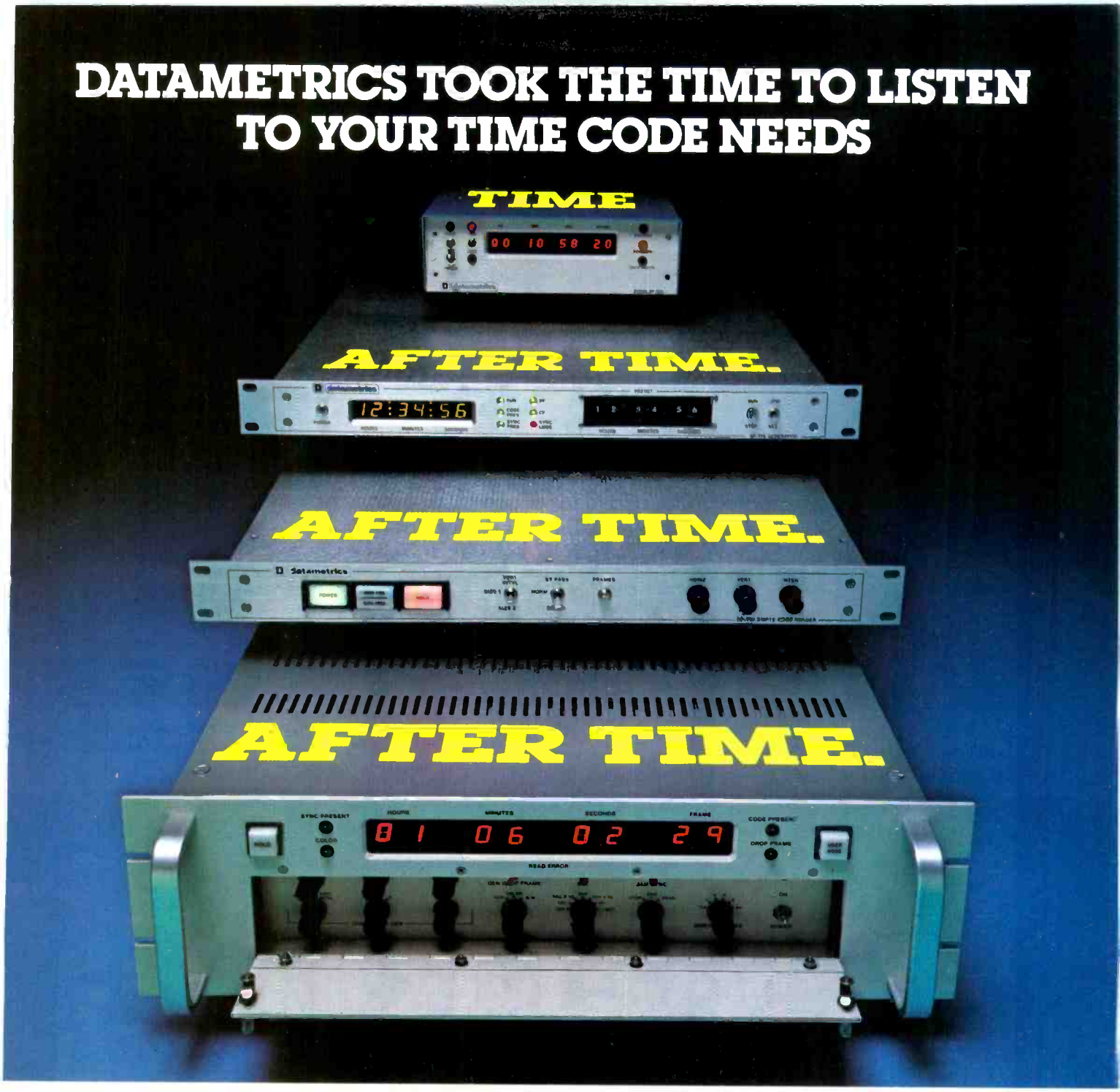

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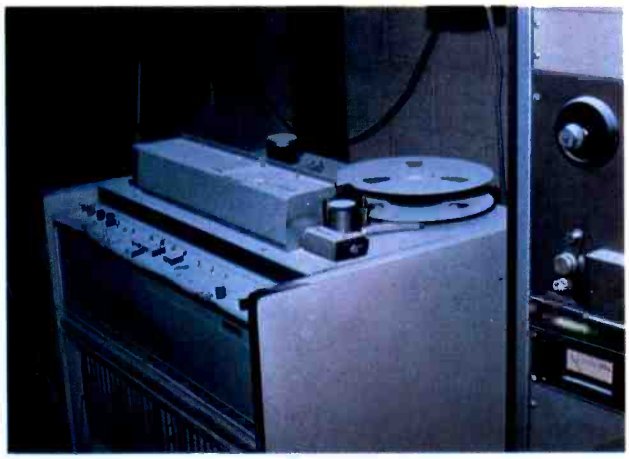
automatic dampers in the ventilating system to close off the room. The Halon should be maintained in the room for some time. This will ensure that the fire will not break out after the room is ventilated.

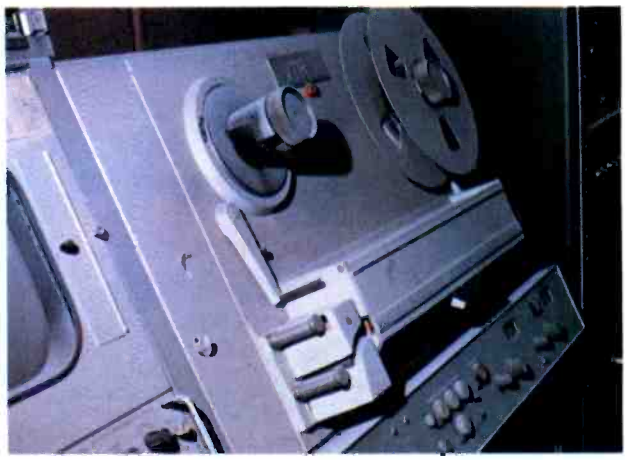
The only disadvantage of the Halon system is that some undesirable products are created when the Halon is sprayed on an extremely hot fire or hot metallic surfaces. A process called pyrolysis occurs. This is a chemical decomposition caused by the flames or heat. The decomposition products of the pyrolysis are hydrogen fluoride (HF), hydrogen bromide (HBr), bromine (Br_2) and a number of small quantities of carbonyl halites. These chemicals can be extremely hazardous. In particular, the hydrogen fluoride is extremely irritating and causes a sharp acrid odor. At concentrations greater than 100 ppm, harmful effects would be noticed immediately: burning pain in the eyes and upper respiratory tract and smarting of the skin. Further exposure can cause significant damage or death.

Before this discourages the installation of such a system, it should be noted that the occupants of the room would probably be dead from the effects of the fire and smoke before they would be seriously injured by the decomposing Halon.

The secret of a good Halon fire extinguishing system is proper engineering. The system should be installed by a company specializing in fire preven-



One of the remaining tape decks. Notice the amount of chemical on the deck.



A damaged VTR. Notice the blackened snap on the tape reel hub, where the plating material has been corroded away.

Here's another fine message about SHOK-STOP™

Thermodyne has it all, product, price and delivery.

We've moved to larger facilities, added a third shift plus a custom foam department and expanded our standard product line from 82 to 98 cases. So what does this all mean to you?

It means you can order the state-of-the-art SHOK-STOP cases you need, at prices you can't afford to pass up and get a delivery date that's easy to live with.

For our latest product catalogs and price sheet, send in the quick response coupon in this ad or call Thermodyne International Limited at (213) 603-1976.

QUICK RESPONSE

Send me your latest catalogs and price sheet. I'm interested in cases for:

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Call me. I need a price and delivery quote for these items:

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Superiority in every case.

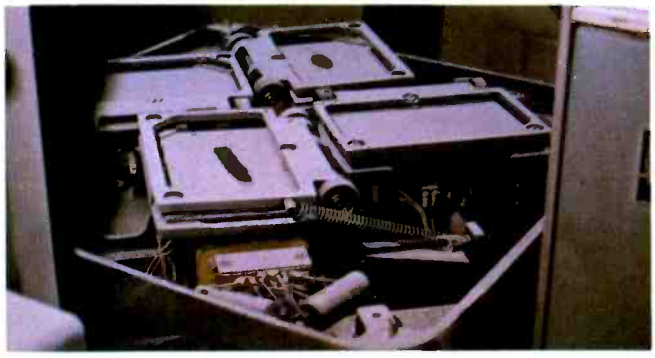
Circle (39) on Reply Card

tion and suppression systems. If not properly installed, the system won't flood the specified area; the concentration may be incorrect. The fire detection units may not be properly located and the system may present more of a hazard.

The cost of a Halon system is significant. A rough estimate is $1.25 to $2 per cubic foot for a typical broadcast equipment facility. The amount of Halon that would be necessary for a 5% concentration at 70°F is approximately 0.0206 times the volume of the room in cubic feet. Although these systems are expensive, an insurance carrier will be cooperative in adjusting the rate schedule. In some cases, the insurance company will actually pay for recharging the system in case of false alarms.

In broadcast facilities, as in computer facilities, the value of the equipment per cubic foot of room space can become extremely high. In such installations, the actual cost of installing and maintaining a Halon system is negligible compared with the value of the protected equipment. It is strongly recommended that broadcasters look into having such systems installed in their main equipment rooms. Regardless of whether the Halon system is installed, dry chemical fire extinguishers should not be allowed anywhere near the property. It is further recommended that the local fire department be advised of the type of equipment that is present in the facility and that a request is made that only Halon or CO_2 fire extinguishers are to be used in the facility in case of a fire. □

An ammonium phosphate-covered film stand.



When the cover was removed from FC#2, a thick layer of powder was found on all surfaces. This chemical powder destroyed all plated optical surfaces. This photo demonstrates the appearance of the inside of all equipment in the telecine room.

Six years ago, we had an idea for an interactive educational television system called the "Edutron System". To make it work, we needed an economical, high quality TBC. We decided to invent one ourselves, using a brand new Charge Coupled Device or "CCD" technology. We were the pioneers. We took the risks and they paid off. Today we are the world's largest producers of CCD Time Base Correctors and the fastest growing company in the video correction industry.

EDUTRON

FORTEL

As part of our growth plan, we acquired a company named "Fortel". Because our plans are not limited to educational technology, we wanted a strong, forward looking name to signify the advanced video and image technology which will continue to be our trademark. We have adopted the name Fortel. Watch for it on some of the most innovative products in the industry.

Y-688[32]

Total Error Corrector™

Y-688[32] Total Error Corrector... simply the most powerful tool available to improve video pictures and correct timing errors.

Advanced digital technology sets a new standard of performance and transparency. S/N better than 60dB. Differential phase and gain are not measurable in the dub (Y/688) mode and only 1° and 1% with composite video. Full bandwidth component processing

allows use with any non-segmented video signal, direct or heterodyne. Unique design allows input of composite or dub signals and output in composite, dub, color-over or R-Y, B-Y, Y formats. Optional RGB output.

A new image processing system provides noise reduction to 10dB, chroma and luma. Phase Comp™ look ahead velocity and phase error correction set new standards in color purity. Image processing is completely automatic when tapes are made with Record 1™ detail pre-processing.

Advanced Technology makes the power of the Y-688[32] TEC™ affordable by every broadcaster or professional teleproducer. Y-688[32] Total Error Corrector - The New Standard in video timing and image correction.

THE IMAGE SYSTEM™

by FARQUHAR Laboratories

The New Standard

The Image Correction System all the others would like to be.

The Image System is the most comprehensive system ever invented to correct deficiencies and color under video tape formats - and the first to do it automatically. The Image System includes a pre-record processor -Record 1™; and a post-record processor - Playback 1™. Record 1 boosts details normally lost in color under VTR's to eliminate the plastic look or cartoon effect.

It also inserts a compatible pilot signal for automatic control of Playback 1 detail and noise reduction levels. Playback 1 reduces noise and ringing, eliminates chroma and luma delay, corrects phase errors and sharpens details to make pictures appear as if they were produced by a full bandwidth recorder.

Record 1 may be used with the Y-688^{32} TEC™ for totally automatic image improvement or with any TBC or digital noise processor. The Image System is produced by Faroudja Laboratories and sold in North America by Fortel.

Time Base Correctors

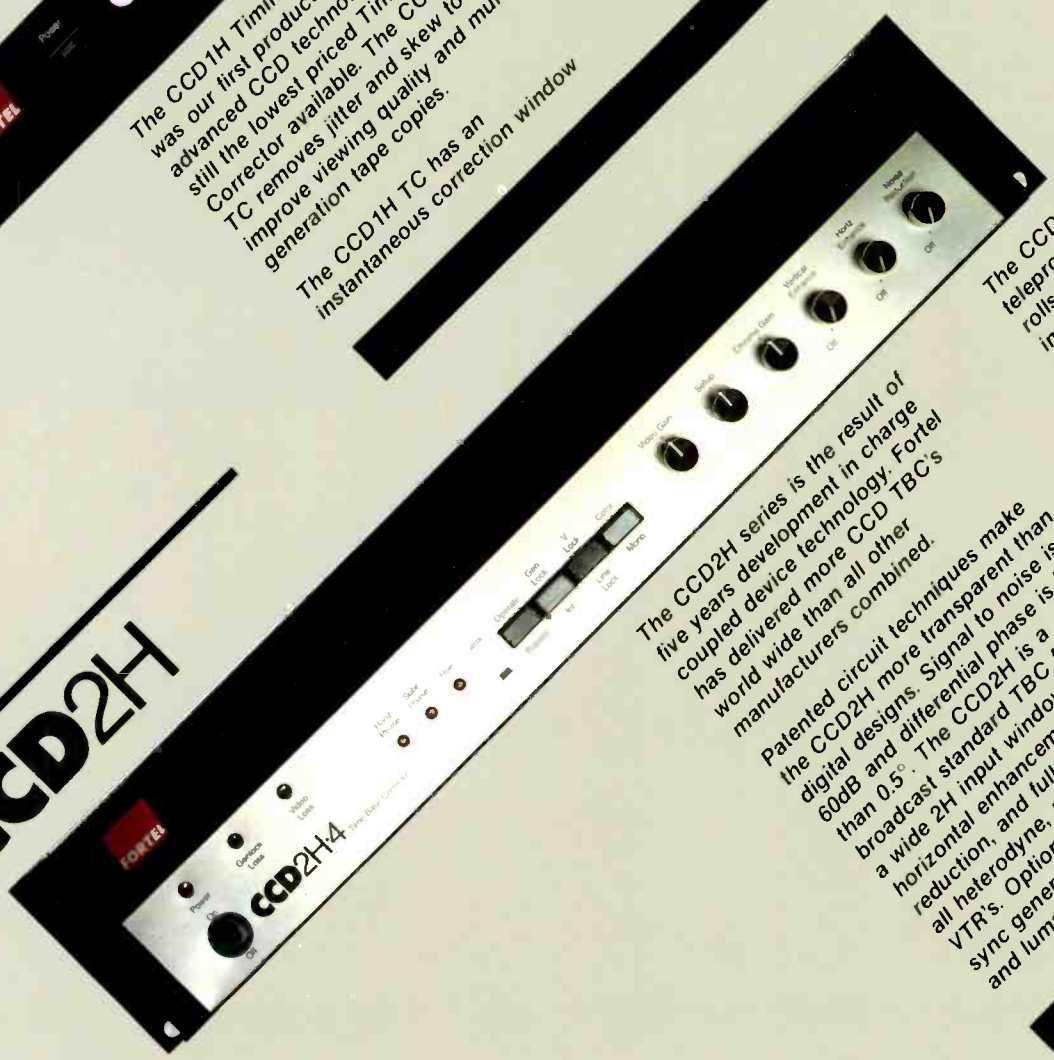
CCD1H

The CCD1H Timing Corrector was our first product utilizing advanced CCD technology and is still the lowest priced Timing Corrector available. The CCD1H TC removes jitter and skew to improve viewing quality and multi-generation tape copies.

The CCD1H TC has an instantaneous correction window of one horizontal line which tracks gyroscopic errors. Sync and burst are reinserted with proper rise times. Full proc amp controls are standard.

Signal to noise ratio of 60dB, differential phase of 1° and differential gain of 1% make the CCD1H TC more transparent than sophisticated digital designs.

CCD2H



The CCD2H series is the result of five years development in charge coupled device technology. Fortel has delivered more CCD TBC's world wide than all other manufacturers combined.

Patented circuit techniques make the CCD2H more transparent than digital designs. Signal to noise is 60dB and differential phase is less than 0.5°. The CCD2H is a broadcast standard TBC featuring a wide 2H input window, horizontal enhancement and noise reduction, and full proc amp for all heterodyne, non-segmented VTR's. Options include a gen-lock sync generator and 8dB chroma and luma noise reduction.

The CCD2H series is ideal for teleproducers who want to do A-B rolls, special effects, improve image sharpness, reduce noise and remove timing errors. CCD2H models are fully compatible with Record 1 and Playback 1. Available in NTSC and PAL. Prices start at $6,250.

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Broadcast salaries: A national survey

By Bill Rhodes, editorial director

Last year's national survey of salaries for broadcast engineers and managers revealed a number of interesting trends in compensation packages for top-level people in radio and television. The article covering the results of that survey, published in the October 1980 issue of **BE**, was also one of the most widely read reports of the year. As a result of this high interest among broadcasters to learn how the industry compensates its key people, the survey is being repeated this year to track salary trends and explore common fringe benefits in the industry.

This year's survey was again conducted scientifically under the direction of Kate Smith, market researcher, Intertec Publishing Corporation. In an accompanying sidebar, she explains the methodology followed and the statistical basis of this survey. The balance of this report will deal with the results compiled from our readers' response for specific data. Respondents also were asked to comment in writing about industry trends and conditions. Excerpts from these comments are included in sidebars.

Salary levels

The key question of this year's survey was that of salaries received for services rendered by top-level broadcasters. Table I shows the tabulated results of the responses, broken down by radio and TV markets, and by position and salary levels within each market.

It is immediately obvious that salaries for comparable positions in TV broadcasting exceed those for radio, with the greatest difference occurring in the corporate management salary levels. Note that nearly 23% of the TV corporate managers receive $75,000 or more while only 5% of radio corporate managers were as well compensated. The spread is less at the operations and engineering positions, but television still leads radio across the board.

In terms of markets being served, the salary trends for both industries are mainly what might be expected. The one exception appears in the upper right sector of Table I. Here the median salaries for the top 100 market computes higher than those of the top 50 market. However, this difference is probably within the margin of error of the sampling rather than representing true salary differences in the two markets.

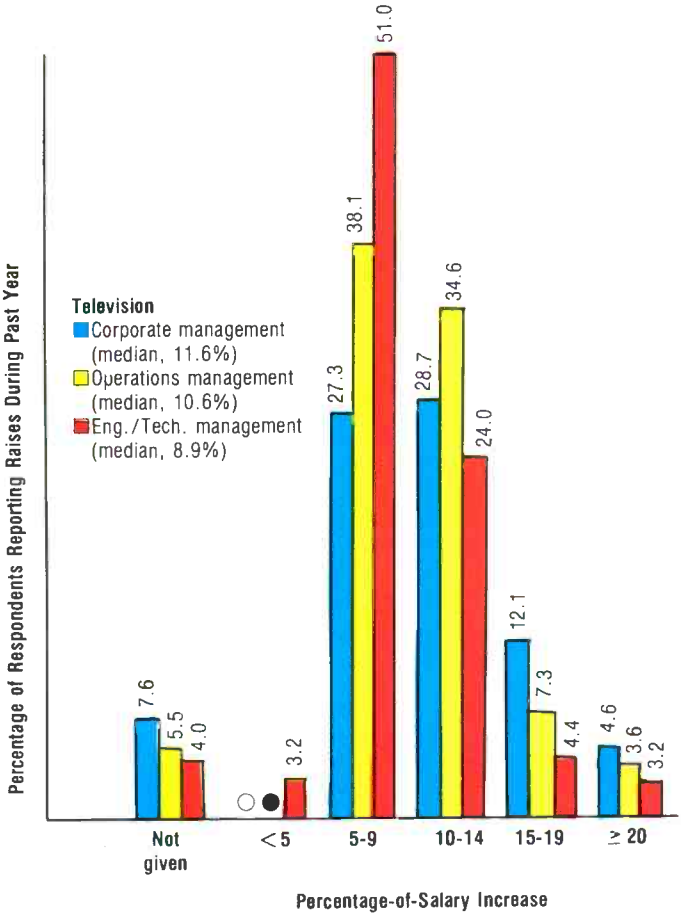
Salary increases

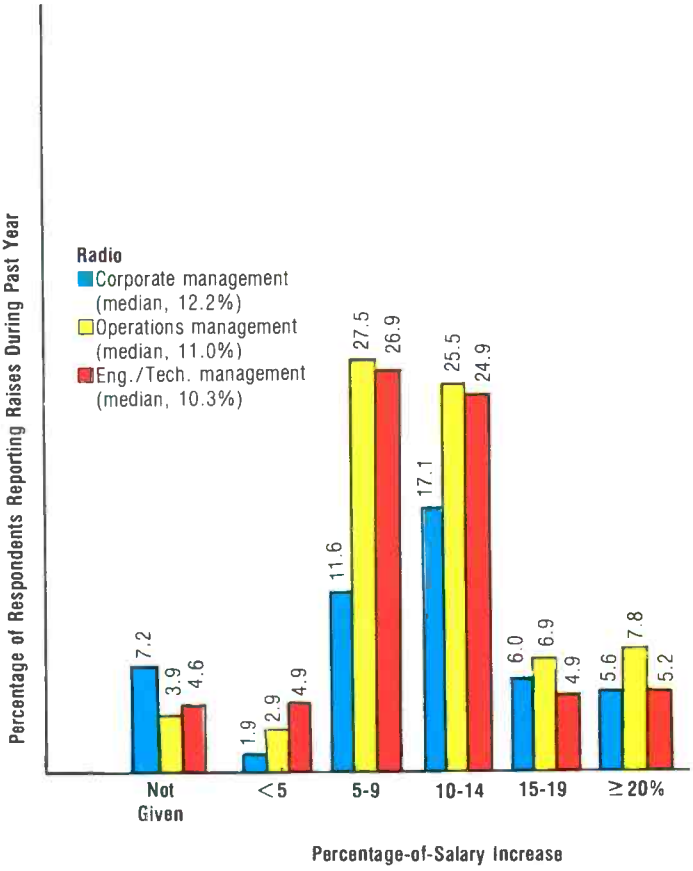
Salary increases for the past year are illustrated in Figures 1 and 2. Plotted and tabulated are the percentage of respondents receiving a pay boost, again segregated by corporate posi-

Table 1: Percentage of respondents receiving various salary levels, broken down by markets, for radio and television.

Salary Range and Median Salary By Job Position / Television or Radio Market		TELEVISION				RADIO			
		All Channels (%)	Top 50 (%)	Top 100 (%)	Below Top 100 (%)	All Stations (%)	Top 50 (%)	Top 100 (%)	Below Top 100 (%)
1 Corporate	Less than $15,000	1.5	.....	.....	3.7	13.6	8.2	11.7	15.1
	$15,000 to $24,999	9.1	17.9	.....	3.7	34.6	32.6	23.5	36.2
	$25,000 to $34,999	13.6	7.1	18.1	18.5	23.0	16.3	23.5	24.9
	$35,000 to $49,999	31.9	14.3	27.3	51.9	12.4	14.3	5.9	12.4
	$50,000 to $74,999	21.2	28.6	27.3	11.1	11.6	18.4	17.7	9.2
	$75,000 or more	22.7	32.1	27.3	11.1	4.8	10.2	17.7	2.2
	Median Salary	$47,150	$59,500	$54,250	$41,900	$25,800	$30,600	$31,300	$24,650
2) Operations	Less than $10,000	.....	.....	.....	.....	2.0	2.9	.....	2.0
	$10,000 to $14,999	12.7	3.2	18.2	30.7	21.6	2.9	11.1	38.0
	$15,000 to $19,999	14.6	19.4	9.1	7.7	32.3	20.6	44.4	36.0
	$20,000 to $24,999	18.2	9.7	36.3	23.1	23.5	29.5	33.3	16.0
	$25,000 to $34,999	34.4	45.1	27.3	15.4	9.8	20.6	5.6	4.0
	$35,000 to $49,999	14.6	12.9	9.1	23.1	6.9	14.7	5.6	2.0
	$50,000 or more	5.5	9.7	.....	.....	3.9	8.8	.....	2.0
	Median Salary	$25,650	$26,950	$23,150	$22,500	$19,100	$24,000	$19,400	$16,400
3) Engineering	Less than $10,000	1.2	.....	.9	5.3	9.2	3.6	8.1	17.4
	$10,000 to $14,999	5.2	1.7	7.3	13.8	14.9	8.4	12.9	24.8
	$15,000 to $19,999	17.3	7.7	30.8	31.9	26.3	16.8	37.1	33.9
	$20,000 to $24,999	23.5	20.5	29.1	26.6	17.2	16.3	22.6	15.7
	$25,000 to $34,999	33.7	40.9	24.6	21.3	24.9	41.0	16.1	7.4
	$35,000 to $49,999	15.7	23.5	7.3	1.1	6.9	13.3	1.6	.8
	$50,000 or more	3.4	5.7	.....	.....	.6	.6	1.6	.....
	Median Salary	$25,800	$29,900	$21,900	$19,850	$19,900	$26,200	$18,900	$16,150

(1) Corporate management: president, owner, partner, vice president, general manager.
(2) Operations management: operations manager, station manager, production/program manager.
(3) Engineering/technical management: technical manager, chief engineer, engineer.





tion for both television and radio.

As a result of last year's survey, a salary increase category of 20% and more was added to this year's compilation. Note that in both television and radio a significant percentage of top station managers received raises of 20% or more, with radio slightly leading television.

In both radio and television, the overall salary increase curves for last year and this year remain similar. In television, the curves again peak at 5-9% pay hikes, with engineering still leading the way. However, increases in the 10-14% groupings were significantly higher this year, with corporate managers showing the greatest gain. This seemed to be at the sacrifice of the 15-19% raise brackets, which showed that fewer respondents received pay increases in that range this year.

Comparing radio and TV salary trends, a markedly lower salary increase was reported among radio broadcasters. Table I shows that radio people are paid less, and Figure 2 shows that their raises trailed similar positions in television. However, in radio engineering, raises were more equitably spread across the 5-14%

BE Salary Study Methodology

By Kate Smith, market researcher

This study was designed to enable readers to compare their job compensation packages with those of their colleagues in similar jobs within comparable-size market areas. Separate graphics illustrate returns for television and radio, showing job title (management, production, engineering) and market size (top 50, top 100 and below top 100 markets), reporting salary levels, fringe benefits received and salary increases during the past year.

On July 21, 1981, 3115 questionnaires were mailed to recipients of **Broadcast Engineering** on an "nth" name basis. On Aug. 26, the cut-off date for this report, 1325 (42.5%) questionnaires had been returned. The data in this article are based on those responses.

Top 50 TV management

They have slowed down as station profits have slowed down.

We need to work harder to keep engineering staff salaries at a level that will attract good people.

Top 100 TV management

Being driven up too high by emphasis on high salaries for news personnel.

Not keeping pace with other electronics industries.

Below top 100 TV management

Will slow down due to inflation. Cost side of broadcasting is rising faster than sales. Costs projected up 18%.

Generally acceptable.

I expect to see greater emphasis on benefits improvement.

Getting better.

Top 50 TV production

Not keeping up with competitive industries.

Too low—need pension plan.

Top 50 TV engineering

Because of union contracts, salaries have kept up with the cost

Table II. Percentage of respondents receiving fringe benefits in radio and television, data averaged over all markets in each field.

Breakdown by Industry / Fringe benefits	TELEVISION			RADIO		
	Corporate (1)	Operations (2)	Engineering (3)	Corporate (1)	Operations (2)	Engineering (3)
Medical insurance (paid)	84.9	90.9	88.5	76.1	81.4	77.1
Dental insurance (paid)	25.8	29.1	31.9	12.0	22.6	25.8
Life insurance (paid)	74.2	81.8	75.1	55.4	52.0	64.5
Sick leave	80.3	92.7	90.6	58.6	75.5	71.4
Vacation	92.4	100.0	97.6	80.5	96.1	89.7
Stock purchase plan	16.7	23.6	25.9	8.4	11.8	11.8
Profit sharing plan	30.3	20.0	19.7	21.5	16.7	14.3
Savings plan	12.1	25.5	24.3	1.6	7.8	11.5
Pension plan	54.6	60.0	64.5	16.3	29.4	35.2
Bonus	45.5	14.6	15.9	29.1	23.5	18.3
Tuition refund plan	12.1	29.1	34.5	6.0	12.8	17.5
Automobile furnished	62.1	7.3	8.6	50.6	15.7	20.3
None	1.5	.....	1.0	7.6	1.0	6.0

(1) Corporate management: president, owner, partner, vice president, general manager.
(2) Operations management: operations manager, station manager, production/program manager.
(3) Engineering/technical management: technical manager, chief engineer, engineer.

Salary survey

categories than for television. In radio, engineers peaked at the 5-9% pay-raise range while operations managers peaked in the 10-14% range.

Fringe benefits

Fringe benefits for broadcasters, as shown in Table II, were added to this year's survey to more completely describe the broadcaster's compensation package.

Although Table II indicates some interesting industry trends, the actual numbers may also indicate the statistical accuracy of this study. For example, note the insurance line. Intuitively, we would expect to see all top-level managers receiving paid medical benefits, but the values of 85%, 91% and 88% for television probably lies within the statistical accuracy of the survey.

Keeping this limitation to Table II in mind, it still appears that benefits in television lead those in radio. This appears dramatically in the final row of "none," where an appreciable number of top-level radio people receive no benefits.

Two interesting benefits are the bonus and the automobile. Both industries seem to use such fringes to attract and keep top-level personnel, with the corporate managers enjoying most of these two benefits.

Industry comments

Comments added to the survey forms reflect respondents' thoughts and feelings about the industry in which they work. Excerpts from this data are included in sidebars. Although these are isolated remarks, the mass of them is impressive. When typed, they filled 18 pages for television and 26 for radio. Both radio and TV management sees broadcasting growth lagging behind the inflation rate, but there is an indication that *any* growth is appreciated. Also, there is clear indication that people in radio resent receiving lower compensation for service than do their counterparts in television. A comment that occurred repeatedly in both TV and radio returns said that the abolishment of the requirement for 1st class licenses was a serious blow. Top engineers see this as a means by which owner/managers could drive engineering salaries and benefits down. Many appear to be eyeing opportunities in other industries as a way of beating inflation if salaries/fringes do not improve.

Final notes

One of the points brought out in

Top 50 TV engineering

of living (though paid a year late) but there has been no consideration to the additional education and training required to operate and service modern broadcast equipment.

Engineering salaries today compare unfavorably to other salaries, for example, 1965 to 1980 construction vs. broadcast salaries.

Up and coming, but still need some improvement.

Pay scales for engineers are generally 10-30% lower than, for example, carpenters, plumbers and journeymen/master workers in other industries.

They must go up—greedy companies think only of themselves—that's what made the film unions and guilds so strong; it should be the same way in broadcasting.

I feel the compensation will decrease since the FCC abolished the First Class License.

The trend will be toward more benefits, which are non-taxable, than pay increases, which cause tax bracket creep.

With the elimination of the first phone, I think the SBE will give too much power within the industry.

If salary and other costs continue the present upswing (which they almost must, especially salary) broadcasting as we now know it will no longer exist. Cable and other selective pay TV will become the norm.

Not generally competitive with jobs requiring similar levels of knowledge in electronics. FCC no longer issuing or requiring First Class Radiotelephone Licenses will tend to depress pay scales for operation engineers.

Appears to be accelerating.

Not keeping pace with inflation. The extra competition that cable will bring will further slow compensation advances.

This depends on your management, and it still comes down to what you can work out with them.

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Meet the members of our Studer console family. The compact, very portable 169. The expanded 269. And the full size 369 studio production console. A respected family with three common traits...

Exceptional Audio Quality
Studer consoles are designed for quiet operation, the utmost signal clarity, and precise tailoring of the sound. The inputs feature 3 section EQ, the overload margins are generous throughout, and each master module has a built-in limiter. As for S/N, well, it's no surprise that the 169 has been used for many digital classical recordings.

Total Flexibility
Pick a frame size and outfit it to suit your needs: portable remote, OB van, or studio production. Module selections include basic input (mic/line), stereo high level, master, monitor, reverb/foldback, and aux monitor. Optional linking kits provide extra I/O flexibility. On the 169/269, power supply options allow operation from mains cable, vehicle battery, or built-in NiCad batteries. All three consoles are available with either VU meters or, at no extra charge, one of two PPM types.

Long-Term Reliability
Studer consoles are built for the long run. They'll take years of hard knocks in remote or OB van use. The Studer "family tradition" of reliability is the result of thoughtful engineering and careful Swiss craftsmanship.

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these surveys is the wide differences in median salaries of top level technical personnel in radio vs. TV broadcasting. Furthermore, the inequities in compensation in top positions result in sharper industry critiques appearing in the radio comments section of our survey form.

The purpose of these annual salary surveys has been to report facts and trends, not to cast shadows on either the TV or radio industries. However, the uncovered differences have prompted us to pay attention to other

Top 50 TV engineering

Hope we can continue to keep up with inflation without our First Class license to back us up.

It appears to be swinging upward for management and higher grade engineers and technicians, while automation and computerized operations are decreasing the overall work forces.

Total compensation (salary and fringes) at our company have been very fair. Salary alone has lagged the inflation rate for several years.

In our station, compensation has improved very much in the last 10 years.

Good.

We are losing ground to the other industries, our job is not as desirable as it once was.

No hopes of keeping up with inflation here.

The most significant increases in salaries are in the area of maintenance. Maintenance people are few, and the position is a thankless one. We have spent more money obtaining these people than any other.

Independents are starting to fall well below network salaries.

With inflation at its present rate, management salaries are decreasing rapidly.

Salaries not offsetting inflation. Changing firms still best way to increase compensation.

Loss of the FCC First Class phone license will be loss of compensation to all in broadcasting in the next 10 years.

Today's state-of-art equipment requires higher skilled engineers to install and maintain. Obviously requires higher salaries. Tomorrow's talent will cost more.

Very sorry to see first phone abolished. Was an excellent screening device, and will perhaps have an effect on engineer's salaries in the future.

My union seems more interested

New Gould portable video monitor/ oscilloscope lets you select by number any line of composite video.

Meet our new OS3350/5. It's the first-ever NTSC 525-line waveform monitor, complete picture monitor, and 40 MHz oscilloscope combined in a single, portable package.

Through an onboard time-base generator, it lets you examine each of the composite video signal's 525 lines—one at a time. PAL plug-in available.

Or you can display complete pictures, highlighting any line selected for inspection to show the relationship between waveform and picture.

And finally, our OS3350/5 functions as a general-purpose 40 MHz, 5mV/cm dual-trace scope.

Our compact monitor/oscilloscope is suited for testing and troubleshooting TV, CATV, CCTV, video recorder/playback and other equipment in mobile TV, microwave repeater, broadcast station, institutional, military, plant and production-line applications.

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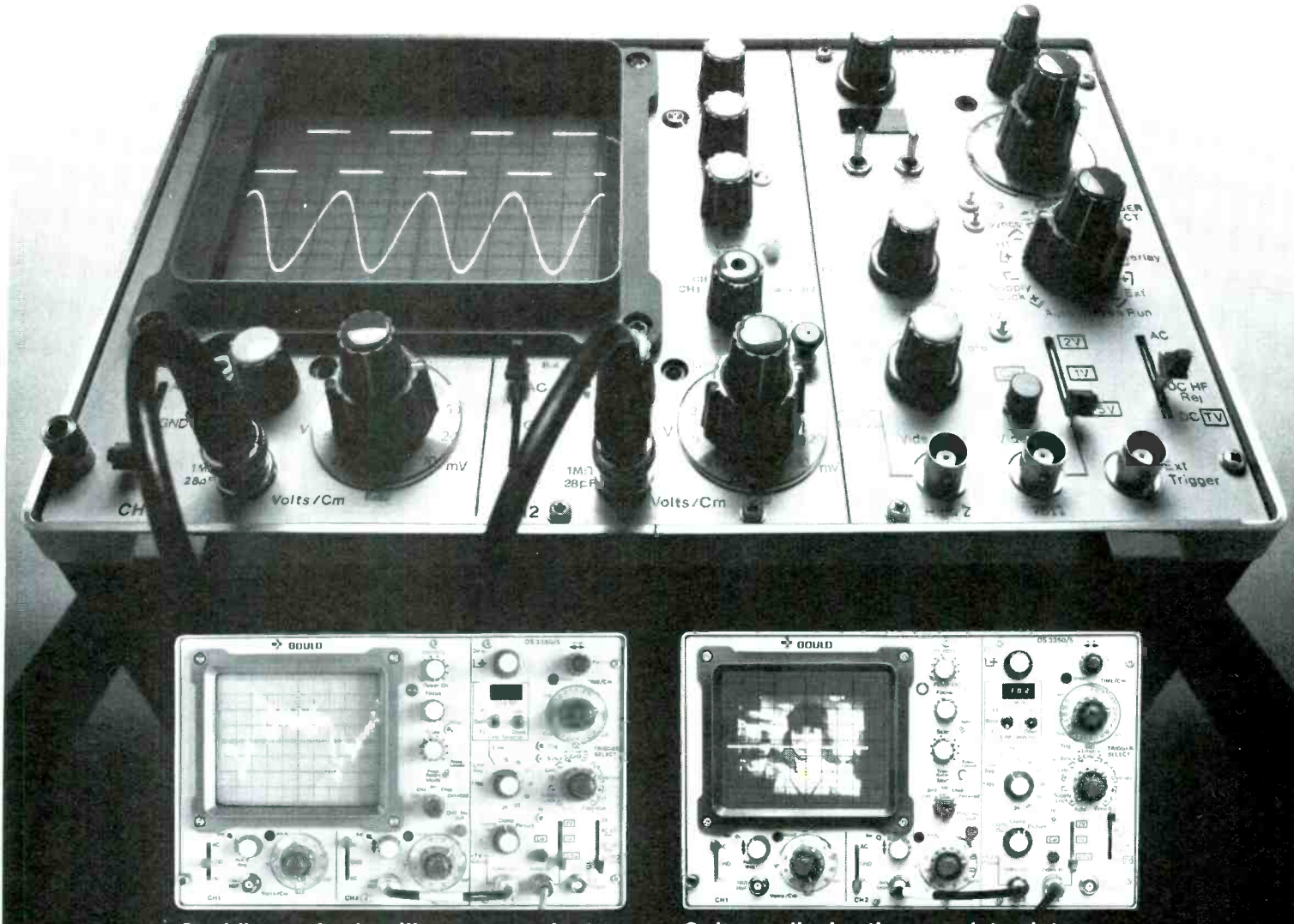

Gould's monitor/oscilloscope can look at a video signal line-by-line...

Or it can display the complete picture, with a bright line indicat ng the line under examination.

Table III. Broadcasting revenues, 1975-1980.

	Broadcasting Revenues			
	Radio*		TV†	
Year	Billions ($)	Annual Growth %	Billions ($)	Annual Growth %
1975	1.892	.....	5.263	.....
1976	2.226	17.6	6.721	27.7
1977	2.512	12.9	7.612	13.3
1978	2.911	15.9	8.955	17.6
1979	3.172	8.1	10.154	13.4
1980	3.534	11.4	11.366	11.9
1981	.....	.....	(12.630)	(11.1)

*Data courtesy of the Radio Advertising Bureau, New York.
†Data courtesy of the Television Bureau of Advertising, New York.
Data in parenthesis are estimated values.

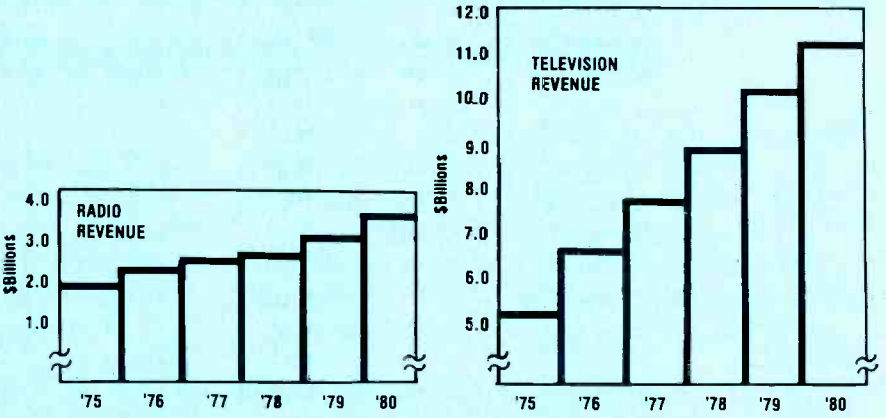

Figure 3. Broadcast revenues (data from Table III).

Salary survey

factors that might partially explain the current situation of salary levels: sales and station growth patterns.

Data obtained from the Radio Advertising Bureau and the Television Advertising Bureau are summarized in Table III and plotted in Figure 3. The data show that both radio and television have been healthy industries in terms of revenues for services rendered. But two other factors are clear—both revenues and growth-rate in revenues for television lead those for radio. The average growth rate over the past five years has been 16.8% for television and 13.2% for radio, a significant difference.

There appears to be a correlation

Top 50 TV engineering

in salary gains than in non-taxable fringe benefits.

I would like to see more share in the profits by the workers.

Down in terms of real dollars, except where there are unions.

Compensation for engineering management remains static in this market. TV news and radio personalities continue to gain yearly.

Very poor, low salary, long hours.

More money is necessary for highly skilled technical people.

Must be increased to hold qualified people.

Needs cost of living adjustment.

Top 100 TV engineering

Technical salaries need improvement. News salaries elevating very fast.

Wages are becoming better. I don't believe there is any field that is more demanding than broadcast engineering.

In this area, sunshine is considered part of one's salary; hence, abominable wages.

Top 50 radio management

We are currently seeing the technical staff paid lower increases than other comparable jobs—there is talk—about hiring lower qualified types now that First phone is not required—feeling is that station can pay less.

Headed down hill!

Will be above the average if radio people want to work; they are lazy. Radio has always lived under a big foot. With part of that removed, radio's growth is beyond imagination.

Thanks to the FCC, we may all be out of work.

The public broadcasting industry is far below comparable position in commercial broadcasting.

Below top 100 radio management

Although our sales have gone up by about 7%, overhead has gone up by 14%.

Compensation seems to be getting ahead of advertising rates.

Are improving, usually with increase in fringe benefits such as automobile, insurance and trade merchandise.

There is need to up incomes in lower and middle position categories in order to attract more

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between the two industries' incomes and revenue growth rates and their compensation/raises/bonuses for top management services.

Figure 4 shows the rate of growth in the number of radio and TV stations serving the public in the United States. The two curves clearly establish that the growth in the number of radio stations has outstripped that for television.

Although the additional research into station revenues and plant count

Below top 100 radio management

competent personnel.

Not increasing because of excessive competition.

Compensation in the broadcast industry has historically been behind most businesses. Also, most do not have pension or retirement plan.

Compensations in radio are excellent. As the FCC licenses more stations, competitors will grow, and we will *all* get *better* or

fold. I believe a broadcaster who depends on competitors should welcome it in his industry.

1981 appears to be a lower profit year. Otherwise, future appears to be on a steady trend rather than upward.

Middle-to-top executives, in the national end of the broadcast industry, are grossly overpaid; the same categories in the local and regional markets are generally underpaid.

Not increasing in pace with other industries.

The small market stations trend to compensate upper management personnel rather than spread it down through the lines of employees.

They're going up faster than revenues.

Not keeping up with inflation and cost of living.

Need to upgrade the mid-management level to continue attracting competent people.

Really not very good at this time; the return is low.

Getting harder and harder to get a raise.

Below par, but fair based on amount of business done.

Fringe is better than cash.

This has been a rough year.

Top 50 radio engineering

Because of FCC discontinuing First Class license—companies will no longer give increases and engineers can't find jobs.

Too much emphasis on sales, not enough on people who provide the service that is being sold!

Very good—wouldn't be happy doing anything else at any salary level.

Compensation trends appear to be that the engineering portion of the broadcast industry is holding at a steady pace rather than at an inflation-paced rate.

Unions losing jurisdiction and

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Salary survey

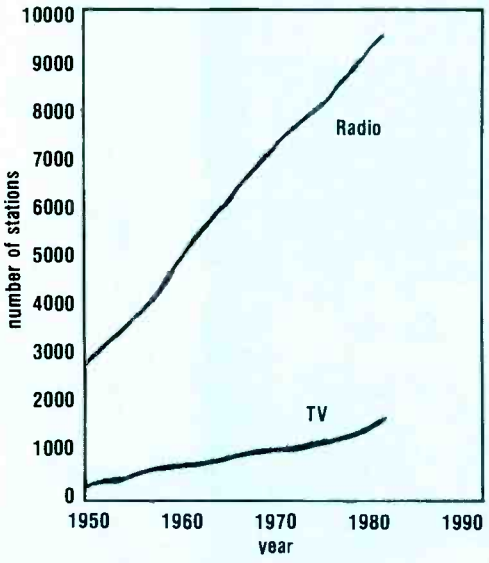

Figure 4. Radio and TV station growth rate (FCC published data).

growth have proved interesting, the results still cannot explain the salary differences uncovered in the preceding survey. One might be tempted to conclude hastily that the higher growth rate in the number of radio stations coupled with the disproportionate revenue growth results in a lower distributive wealth for top management. But this conclusion is not supported by the logic behind the growth in stations in the first place.

The conclusions to be drawn from this survey and the additional studies are that:

(1) both radio and television are exhibiting growth patterns that portray health and vitality in the industry and

(2) people in TV management are enjoying greater returns for their efforts than are their counterparts in radio.

Readers who would like to comment on the economics of the industry and upon this survey are invited to address their letters to the Survey Editor, Broadcast Engineering, P.O. Box 12901, Overland Park, KS 66212.

Top 50 radio engineering

jobs. Trend seems to be toward entry-level candidates at minimal pay.

Technical folks and operators seem to be underpaid for the amount of responsibility that's expected from them.

There is a shortage of qualified people in broadcast. They are moving into industry for better pay, and the situation doesn't look like it will get better.

Fine for me at our station.

Salary increases shrinking due to automation and FCC dropping license requirement for engineers.

I have been receiving cost-of-living increases for the past 10 years and have felt none of the "crunch" other occupations have been experiencing.

Higher pay for the experienced, qualified engineer seems to be more the rule nowadays. Something of this nature is necessary to keep engineers from going to some other line of work.

Stations have finally realized that good engineering talent costs more.

Less than other industries; way behind government and industry.

Technical management personnel are seldom paid enough compared to other management positions.

Fast growing market. Trend is up here.

Not enough for skills involved.

Top 100 radio engineering

Stagnant to downward; 30-50% below 1970 in constant dollars.

Salary levels will drop for engineers as deregulation continues. Few bright engineers will remain in the field.

New technology equipment will require better-paid engineers.

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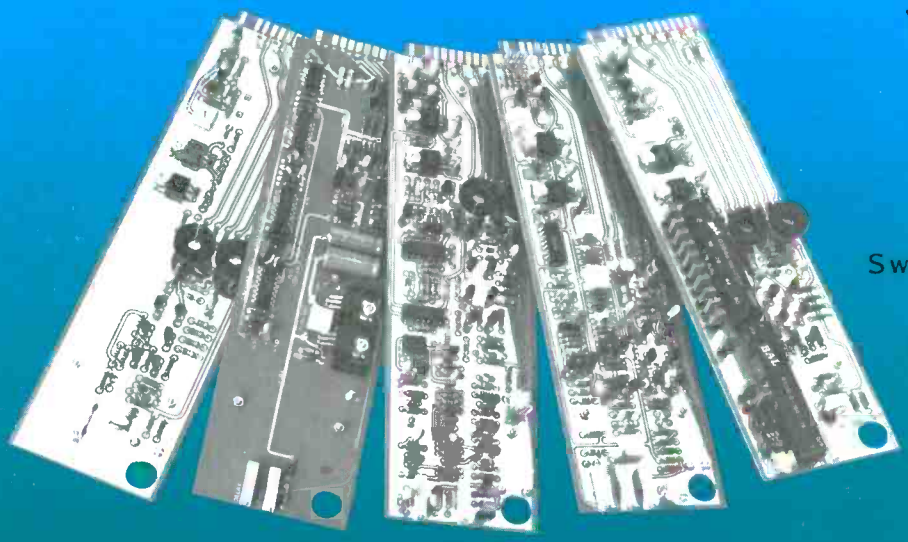

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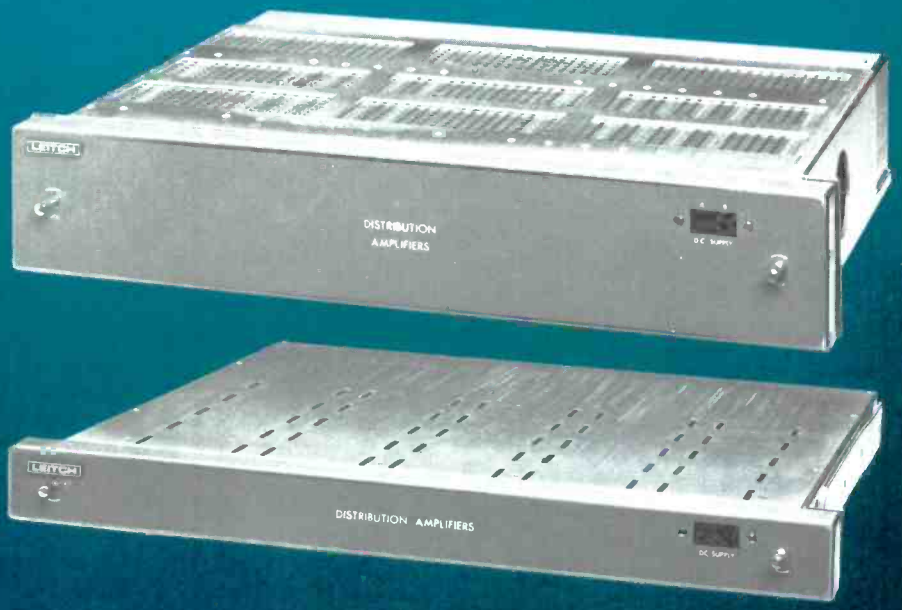

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Top 100 radio engineering

Broadcasters must offer some incentives to keep qualified people from going into *other* areas.

Thanks to FCC dropping First Class—STINKS.

I'm taking computer training and plan to go into a related field in 1982.

Don't know if salary increases will happen again due to FCC doing away with First Class License... Might not even have a job.

Rotten!

Below top 100 radio engineering

Far below most industries demanding equal technical competence.

Adequate.

We need more money.

Not keeping pace with business and inflation.

I think it is getting better. I have just started my 25th year here.

Getting better all the time.

I feel broadcasting is losing technical people to other electronics industry due to much lower pay/benefits, etc.

Pay generally too low to attract and keep *competent* people.

The deregulation of the First Class license will cause a trend of lower salaries for technical employees over the next few months.

I would like to see more uniform fringe benefits throughout the industry.

Underpaid and overworked.

Too low; few, if any, benefits; not keeping up with industry.

Top 50 radio production

The difference between wages and workload in a non-union shop and a union shop are too great—I'm in a non-union station and I feel as if I'm being cheated!

I love radio for what it is, not the compensation or pay.

Top 100 radio production

There is not enough compensation for the many hours of work involved.

Considering my station's profit level, the pay is low. We need to share the wealth a little more.

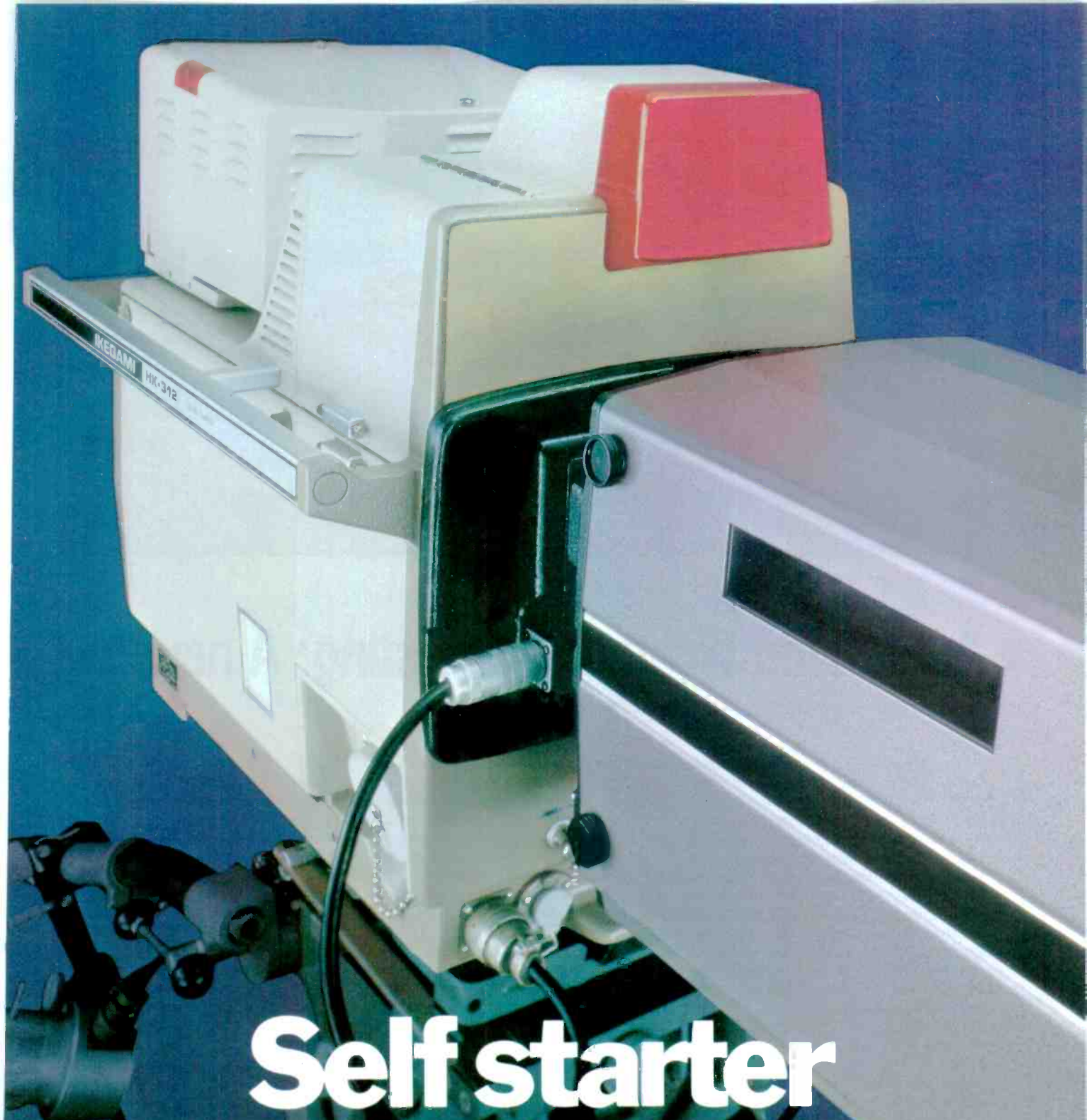
Below top 100 radio production

Far below other better managed industries.

As an industry, small and medium markets, as a whole, stink.

Below Top 100 markets tend to lag way behind in keeping compensation competitive with other industries.

We're seeing more of a demand for benefits, which we recently added. Overall, staff salaries have not increased greatly except for key management in our operation. □



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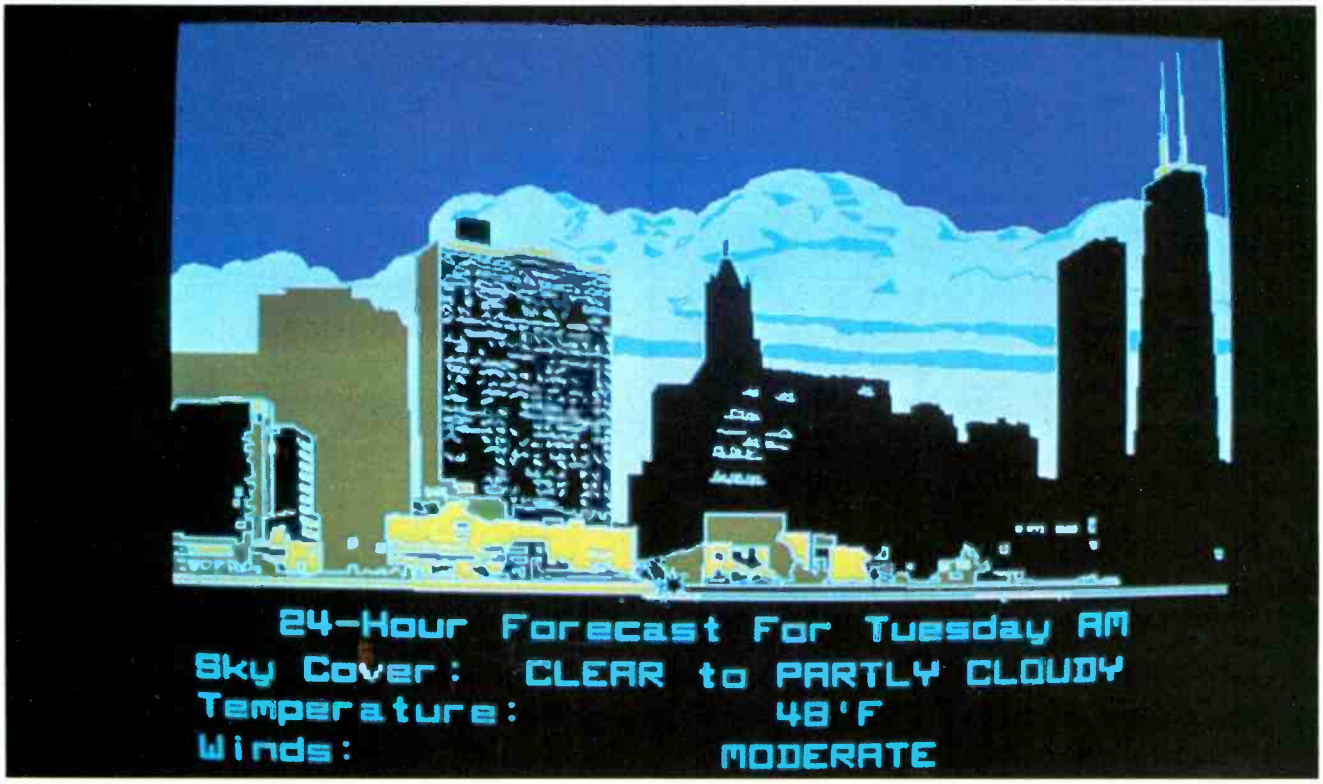

24-hour forecast for Tuesday a.m.

Automated weather forecasting: A new tool

By Steven A. Root, president, Weathercaster Inc., Salt Lake City, UT

Weather is a significant controlling factor in our daily lives. People plan their dress, work and recreation around the weather forecast. Corporations schedule production runs, labor requirements, contract decisions and pollution control with regard to the current forecast. Thus, the role of the broadcasting meteorologist goes beyond just being informative. Because meteorological material directly influences economic and environmental decisions, reliability of information is important.

Traditionally, sources of weather information have included the *Old Farmer's Almanac*, telephone recordings provided by the National Weather Service (NWS) or the Federal Aviation Administration (FAA), and the local broadcasting weather bureau. Each source has its inherent limitations.

The NWS

Robert B. Thomas, author of the *Almanac*, eludes to a secret weather forecasting formula, devised in 1793, which is the basis for annual predictions. However, any accuracy attributed to this publication is probably coincidental.

Telephone recordings provided by the NWS forecasting offices and radio and TV broadcasters more adequately approach the needs of the public, but do not provide tailored weather information. The forecasting procedure followed by the NWS is complicated. Weather data is continuously gathered from many locations around the hemisphere. Weather balloons are sent aloft twice daily to collect data, which is then used as input into complex mathematical models to approximate atmospheric motions.

Model outputs form the basis of the weather forecasts that reach the public. These forecasts receive constant modification with regard to certain surface conditions and are generally accurate. During radically changing weather patterns it would be beneficial to incorporate more upper air information. However, the twice-daily sampling restricts forecasting services' ability to do so. The collection-to-dissemination process generally takes three to four hours. In many cases, forecasts are presented for large geographical areas. The NWS meets its responsibilities by providing general weather information to the public within the means and guidelines of its organization and to the public's benefit. However, the level of information presented is often quite limited.

The meteorologist

To minimize the effects of lagtime between data gathering and forecast dissemination, and to tailor forecasts for specific local viewer appeal, a TV broadcaster may employ a meteorologist. Typically, broadcasting meteorologists present their weather programs during the evening news shows. Many times, as the weather unexpectedly changes, updating is desirable. This may not be possible because the meteorologists may have gone home. The radio weatherperson experiences much of the same problem, usually presenting a live report only once a day and recording the others. In some cases, the entire radio weather program might be recorded the night before, severely limiting the station's ability to inform listeners of important conditions.

Real-time forecasting

One method for combating problems such as these is to provide real-time, site-specific weather forecasting computers for both radio and TV stations, preferably a completely self-contained computer needing no NWS information or other source data. It must also offer the broadcaster a cost-effective tool to support his professional staff. This real-time forecasting computer would be on the

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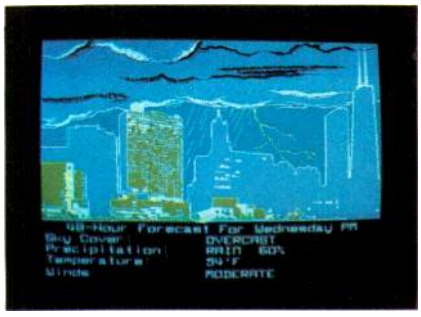
12-hour forecast for Monday p.m.

36-hour forecast for Tuesday p.m.



48-hour forecast for Wednesday p.m.

Automated forecasting

job 24 hours daily, providing coverage of current weather conditions and timely forecasts for the broadcaster's audience. Such a system, coupled with a color graphic computer having highly flexible production capabilities, would be even better.

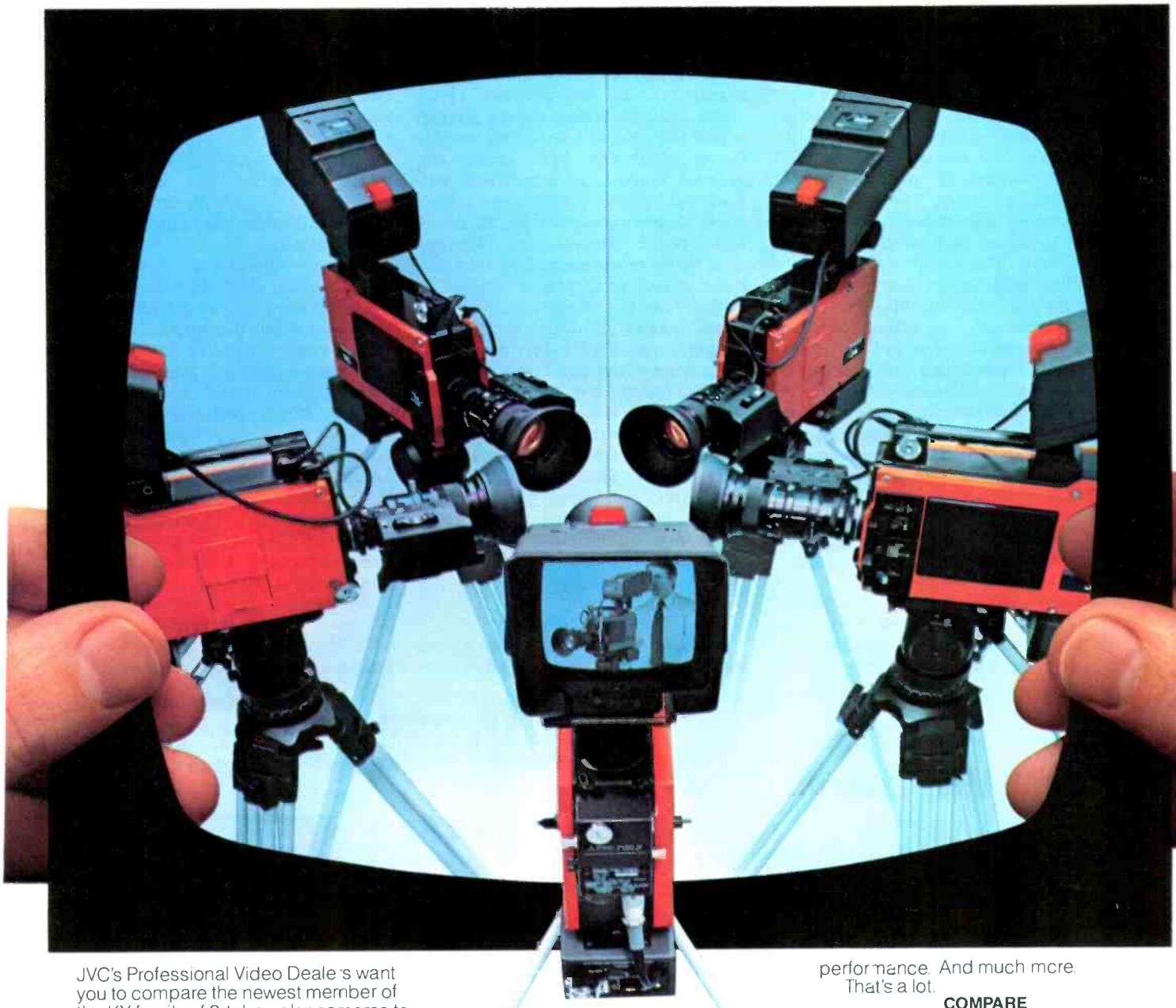
With these criteria in mind, Weathercaster of Salt Lake City began developing its first product for the broadcast industry. To start, Weathercaster investigated the potential means for automatically generating weather forecasts. The best approach was considered to be empirically derived forecasting equations; equations relying on experience or observations in a specific location. An alternate approach would have been to use mathematical theory to approximate atmospheric motions. After describing the atmosphere with dynamic or theoretical models, certain constants have to be assumed for the equations to work. When such assumptions introduce sufficient error, the forecast becomes inaccurate. Thus, the dynamic approach was discarded in favor of an empirical technique that could draw upon a large data base already existing for most of the country and international regions.

The Polar Front Theory

A model often used by meteorologists to describe atmospheric conditions is referred to as the Polar Front Theory (PFT). PFT models are derived from observations that relate the formation and development of storm centers in terms of frontal boundaries. Each storm or fair weather area may be characterized by existing cloud types, pressure patterns, winds and weather occurrences.

PFT is a good diagnostic tool in areas of low relief and little frictional forces, for example, oceanic areas. But with the altering influences of mountain ranges, water bodies or coastal areas, PFT is less applicable. However, if it were possible to isolate these modifying influences on a site-specific basis—including known data on topography, geography and climatology—the means for predicting weather in that location would be defined.

Compare



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Automated forecasting

Thus, the approach and method taken by the meteorological staff at Weathercaster was born.

Salt Lake City parameters

A system begins with an investigation of existing data banks for a given area to define those parameters that most accurately predict future weather conditions. For example, the forecasting algorithms for Salt Lake City depicted that wind speed and direction, plus barometric pressure reading and its tendency, were excellent predictor variables for upcoming storminess. As wind speed increased and as observed directions veered to the south and southwest, the possibility of precipitation also increased. By selecting random data spanning 10 years, comprising days in which precipitation was observed, it was found that the greatest frequency of precipitation occurred when the barometric reading was between 29.85 inches and 30.05 inches (reduced to sea level)

Also, an important condition was verified during the initial research period for the Salt Lake City area. Three types of weather classes that experience unique patterns were segregated according to the level of the barometer. For instance, a barometric reading of 30.25 inches or higher generally shows (1) a drastic decrease in the possibility of precipitation; (2) that periods of strong winds were short; and (3) that temperatures seemed to fluctuate only slightly, depending on the cloud cover. By comparison, during periods where the barometric reading was between 30.20 and 29.80 inches the greatest amount of storminess was observed. These periods saw cloud cover lingering more than 12 hours after storm passage, fair weather days being more susceptible to storm penetration, atmospheric instability giving rise to cumulus buildup for more partly cloudy skies, and temperatures being highly dependent upon wind speed and direction.

These conditions were, however, localized and unique to the Salt Lake Valley. The same forecasting equations would not be applicable to other areas. Each area and its unique topography and geography will support its own forecasting equations, which may be defined from existing data.

Using the computer

After establishing the forecasting equation set in terms of weather conditions measureable at the surface, a computer system can then interface to real-time weather sensors to automatically input the necessary data for forecast computation. Although automatic data entry is a definite plus to a complete system, manual data entry is easily achieved. Once the manual observation of current weather has been entered into the computer, any atmospheric changes, for example, barometric pressure or wind characteristics, that would significantly impact an earlier broadcasted forecast is automatically sensed and entered.

The computer at that point has the self-contained ability to update the entire weather prediction instantaneously. Recognizing the forecast change, master control may insert the updated information between late night programming or commercials with a station ID. In this respect, the viewing audience is always given current weather information supporting the broadcaster's weather talent. The same ability applies to the radio broadcaster, allowing the talent at the board to constantly monitor the computer and present new information as necessary.

Recent tests

To date, a number of accuracy analyses have been conducted in

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The **MCG-2500** is a microprocessor based message generator with internal sync and color background. Performance features begin with a new highly legible upper and lower case, 16 x 20 matrix character display, plus 26 special graphic characters. The display can contain a maximum of 14 lines of 32 characters and up to 2 crawl lines at any line location in the raster.

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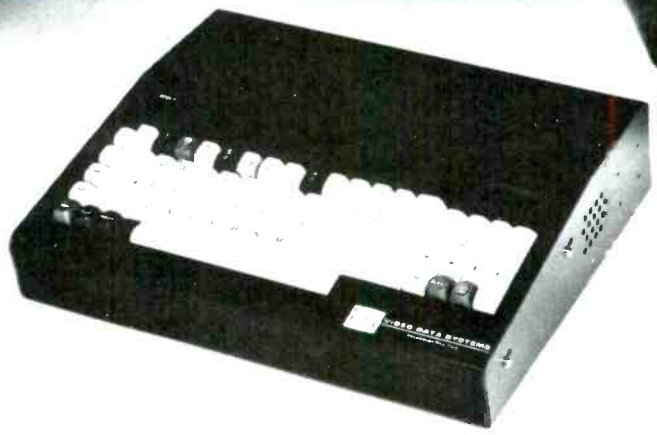

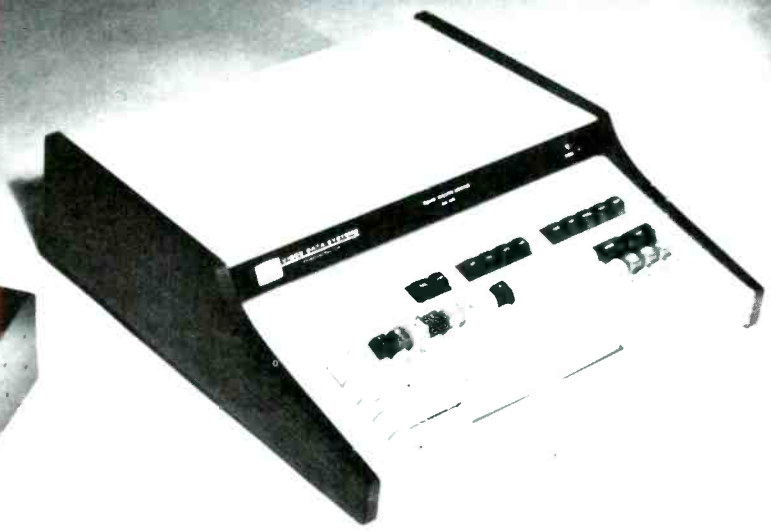

The new TPT-2500 titler offers features not expected in this price range: eight character sizes, upper and lower case, border line, underlining, graphics, flash, crawls, positionable title window, 32 page resident memory and optional 700+ page tape memory.

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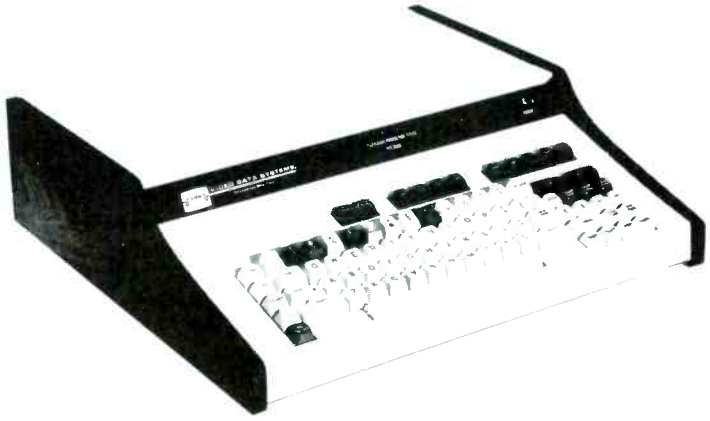

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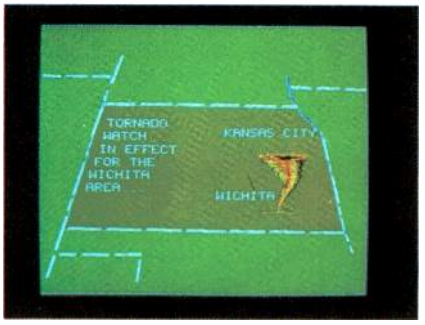
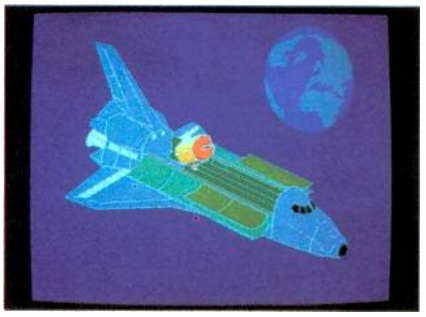
Hurricane Teri



Wichita, KS, tornado


Space shuttle


CT1000 equipment

Saudi Arabia

Automated forecasting

order to support and direct modifications to the main forecasting technique. Two recent tests were designed to: (1) test regional forecasting equations against NWS computer automated forecasts and (2) verify the new site-specific equations to the fully automated, dynamic models available from the NWS.

In Test 1, five random locations across the country were used to supply inputs for each predetermined, meteorologically-similar region over the four seasons of the year. Only the 24-hour forecast was verified in the test, with results showing this technique comparable to, and in some cases, more accurate than the NWS product for the same period.

Test 2 was a preliminary analysis conducted on the site-specific equations developed for Salt Lake City. Verifications were made on forecasts for the amount of sky cover and possibility of precipitation for 12, 24, 36 and 48 hours from time of input. NWS computerized products were used for comparison. Weathercaster 12- and 24-hour forecasts for sky cover were found to be the most accurate, having between 150% to almost 400% greater skill scores than the automated products. The 36- and 48-hour forecasts were shown to be comparable to, or slightly more accurate than, the NWS outputs. For possibility of precipitation forecasts, the same kind of sloping accuracy through 48 hours was found. The comparison was difficult because the NWS automated products rarely met the qualifications of a categorical "yes" for the occurrences of precipitation.

It is important to make a few qualifying remarks at this point. The significance of these accuracy tests is *not* in the statement that one mode of weather forecasting is perhaps better than another. Each mode represents predictions designed for completely separate applications. Each forecasting approach is equally valid for the requirements that it attempts to satisfy. The significance lies in the statement that this new forecasting method is a reliable tool that the broadcaster may use in order to better satisfy the needs of his viewing/listening audience.

The weather forecasting system

A product for both the TV and radio segment of the broadcasting industry, the forecasting computer interfaces with a sensor package and electronic reader board display for radio. An optional computer voice synthesizer allows radio broadcasters to customize the product for their particular uses. For television, the forecasting computer is paired with a sophisticated color graphic computer. This graphic art capability allows the TV weatherperson to transform the forecast from the computer into a color-graphic forecast presentation over the broadcaster's cityscape or any other desired display.

Through the research and development period on the weather forecasting computer, it was found that this product solved many problems existing in weather programming. However, like most new products being offered, there might be initial resistance to automated weather forecasting. Therefore, in order to add station acceptance (market entry), the combination with color graphic capabilities was important. Initial research showed the market to have a definite need for a reasonably priced (less than $75,000) color graphic computer having not only the capability of constructing weather graphics, but also news and production graphics. With the completion of a weather forecasting computer, the research and development aspect of Weathercaster shifted to design of a color-graphic computer that would satisfy these needs. It was mandatory that the color graphic computer have high quality resolution, a full pallet of color, full screen refresh ability, NTSC compatibility, and large memory storage. (Because the scope of this article is inclined to needs in weather forecasting, developmental problems of producing a color graphic system for television will not be detailed.)

Although the technological inroads into automated weather forecasting are unparalleled, the most obvious and significant technology to emerge from Weathercaster may well be a cost effective, flexible color graphic computer to go with a weather forecasting system. The surprising result from the development of such a system was that, while it was specifically made for weather forecasting, it is one of the most exciting color graphic computers on the market—an unanticipated product for any graphic production job, including slides, camera ready artwork, film commercials, news graphics and sports.

The CT1000 weather forecasting computer system for television and R-300 for radio use were not designed, nor intended to replace meteorologists, but to give them a powerful tool to enhance accuracy in weather reporting and to permit talent creativity. □

THE INNOVATORS

We started with a
oncept. An abstrac-
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theoretically synchro-
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Interview with Ryozo Nagahama, president of Hitachi Denshi

By Bebe F. McClain, president of B. F. McClain Productions, Asheville, NC

Early this summer, at the Hitachi Denshi main offices in Tokyo, Bebe F. McClain interviewed Ryozo Nagahama, president of Hitachi Denshi Ltd. Nagahama, a respected engineer, has been president of Hitachi Denshi since 1976. Previously, he participated in the field of home appliances and consumer products, was plant manager of the Hitachi TV plant in Yokahama, and was later appointed chief executive of the Electronic Consumer Products Division Ltd.

Hitachi Denshi Ltd. is a member company of Hitachi Ltd. In addition to computers and radio communication equipment, Hitachi Denshi manufactures video equipment for broadcast as well as industrial, medical and security markets.

Below are the questions asked during that interview by McClain with Nagahama's responses following.

Q: You are the only manufacturer of the type "C" 1-inch video recorder who developed and put a studio and a portable unit on the market at the same time. Why did you do this?

Nagahama: In a few words, we wanted to respond to the needs of the customer. From a technical point of view, the high quality picture was what we wanted and we decided that the 1-inch format was the best format to meet the customer's needs. By introducing the portable and the studio models, we could respond to the customer concerning effectiveness of production in the field as well as in the studio.

(Left to right) Dr. Chikafusa Hirano, deputy general manager; Jay Tosaka, manager overseas division; Ryozo Nagahama, president—Hitachi Denshi Ltd.; and Bebe F. McClain.

Q: Your company is the co-developer of the Saticon tube, which is one of the two types of tubes used predominantly in broadcast cameras. How did this come about and why?

Nagahama: Development of the Saticon tube began in 1965. A tube was needed that would be relatively inexpensive with improvement in regulation and stability, mainly in the red color. To solve these problems, NHK started the research using selenium and arsenic. Those elements were the basic starting point of the Saticon tube, but this tube had burning characteristics. Hitachi realized that it was important to improve this burning characteristic. We suggested adding tellurium. The materials for the new tube became arsenic, selenium and tellurium. This was a great improvement. As you know, the Saticon is a smaller-sized tube that has better resolution compared to lead oxide tubes because of the solid photo conductive film that is stable in the air. Lead oxide tubes are porous and stable only in a vacuum. Improvements were made in colorimetry and average life expectancy. The Saticon is particularly well-suited for mass production as evidenced by the production of 10,000 such tubes per month. Hitachi supplies these tubes to Panasonic, JVC, Ikegami, Sharp, RCA, Sony and many others.

Q: Did Hitachi Central Research Laboratories and NHK Laboratories work independently or together on this Saticon project, and how long did it take?

Nagahama: It was a collaboration. NHK asked Hitachi to enter into joint research in 1966, and the tube became available for sale in 1975 for the broadcast field.

Q: You are competitive as far as camera manufacturers are concerned. Why?

Nagahama: The new tri-electrode tube has been developed at Hitachi Central Research Laboratory and is being successfully manufactured at our Kobuchizawa factory. Each camera from the low-end single-tube cameras to the high end cameras has its individual characteristics. The SK-100, the highest performance camera, is a result of Hitachi's collective power utilizing technologies from semiconductors to computers.

Q: How does your ability to manufacture your own ICs contribute to your ability to be a leader in the video field?

Nagahama: We produce monolithic ICs and hybrid ICs at our broadcast equipment manufacturing plant at Koganei. The total volume of ICs used for broadcast equipment is limited compared to consumer products. We believe that by producing our own ICs with our own designs, our products are much better performance-wise and can also be made within a short period of time. In the case of special ICs that are used for home appliances, Hitachi Denshi sometimes designs the circuitry of the ICs and leaves the production to Hitachi Ltd. By producing our own ICs, we can react in a shorter period of time, less expensively. It is effective for production. There are several cases where we are supplying our own ICs to other camera manufacturers, but some very special unique ICs we reserve for our use.

Q: Why do you manufacture so many kinds of cameras?

Nagahama: First of all, it is obvious that there are numerous customers and users in the market. In order to satisfy each customer's needs, better than any other camera manufacturer in the world, it is important to have many kinds of cameras. All our customers have different needs. As a leader in camera manufacturing we have to supply those customers by producing many cameras.

Q: What is your commitment to the US broadcast market concerning spare parts and service?

Nagahama: About a year and a half ago, we had occasion to survey the market asking why and how Hitachi products were being sold in the United States. The response usually involved service—the pre-service and the after-service. The response was that Hitachi has the most preferable

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service. Having realized the importance of service, we decided to improve even further this service to better satisfy the customer. In the broadcast field, we are establishing a 24-hour service. The most important element of after-service is the supply of spare parts. Three years ago, we reviewed our spare parts policies from the point of view of effectiveness of operation. We modified our direction to one of putting greater emphasis on the immediate availability of all spare parts. We feel that the important thing is to supply spare parts in time.

Q: The Hitachi SK-100 represents a very advanced camera. CBS selected it. What made you decide to develop this top-of-the-line camera?

Nagahama: We are interested in that type of camera. Broadcast Center at NHK has 40 of our studio cameras out of a total of 47 cameras. It so happened that CBS put out specifications for a very sophisticated high quality video camera, so we decided to make these cameras using our collective technological resources.

Q: How do you feel about the CBS order, and what impact does it have on Hitachi Denshi?

Nagahama: This is a very good chance for us to show our capability and the collective technologies of Hitachi.

Q: Are there any other major international purchasers of your equipment?

Nagahama: In Japan, all major TV stations are our customers as well as local stations. We have products at NHK, TBS and ABC in Japan, and others. Overseas we have sold broadcast products to the Italian public stations, called RAI, and many other local Italian broadcasters. Also we have customers in Korea such as KBS and MBC, HKTVB and RTV in Hong Kong, RTM in Malasia, NMPC in the Philippines, Nigerian National Broadcasters, Kenya, Nairobi, Indonesia, Taiwan, China, CBC in Canada and various customers in America such as Storer Broadcasting and Corinthian Broadcasting.

Q: What role does Hitachi Central Research Laboratory play in the development of equipment for Hitachi Denshi?

Nagahama: Central Research Laboratory has two tasks to perform. One is to study and research subjects they decide upon and the other task is to work on subjects requested by other parties in the Hitachi Group such as Hitachi Denshi. The ratio of these is about half and half. The subjects related to the broadcast field that they are studying for themselves include new photoconductive layers, flat display (thin film transistors, plasma display), optical communication devices including laser diodes, high density magnetic recording technology, sub-micron physics—VLSI, electron beam physics to improve the electron gun of tubes, solid-state pickup devices—chips, optical videodiscs and digital video.

The subjects that Hitachi Denshi has asked Central Research Laboratory to study are solid-state cameras, improvement of pickup tubes, digital VTRs, high integrated ICs for use in broadcast cameras, broadcast videodiscs and high definition TV. Central Research Laboratory

develops the technology and Hitachi Denshi develops the products from the technology supplied.

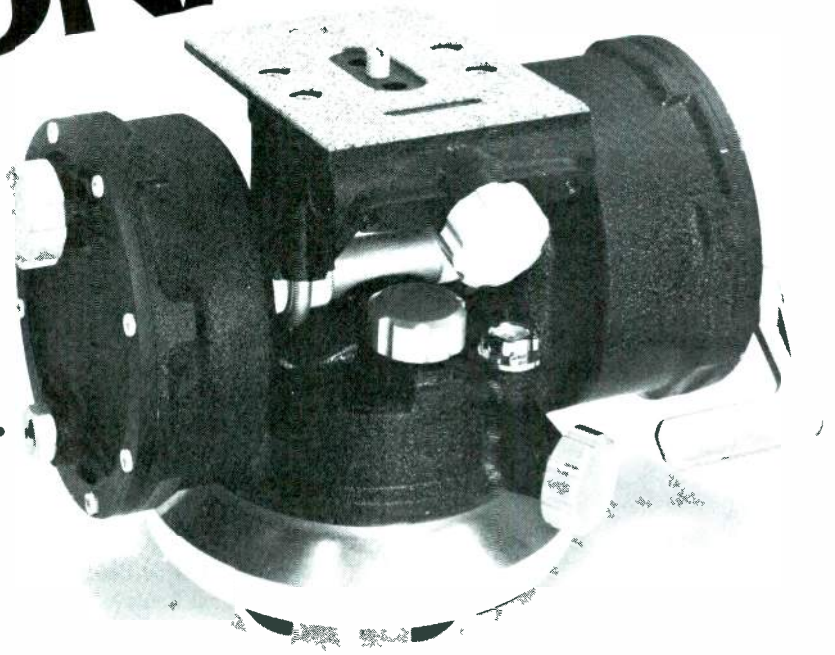
Q: How does the US broadcast market differ from the Japanese market?

Nagahama: American broadcasters evaluate equipment in a more critical manner, even though there are some Japanese that are very critical in their specifications. But when I look at the general differences in the market, America has stricter evaluation of products. There can be no success in America unless the manufacturer can withstand those strict evaluations.

Q: How do you view your competition?

Nagahama: In each field there are many good competitors. For instance, in the camera field, RCA, Sony and Ikegami. Recently, JVC in the low-end industrial. As I previously mentioned, Hitachi has great collective power in technology in the semiconductor field and the computer field. I do not think that we are utilizing 100% of this collective power. To give an example of how I view Hitachi compared to the competition, I would liken it to golf. We do not make a great shot every time, but when the game is over and

DIAGONABLE.



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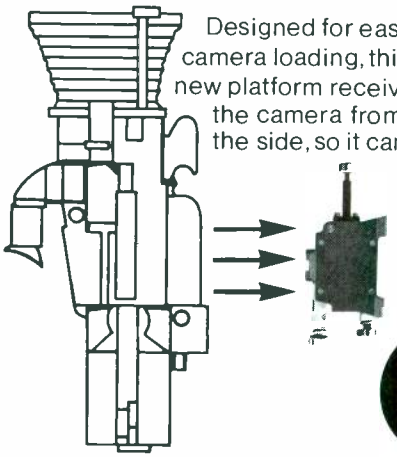

Designed for easier camera loading, this new platform receives the camera from the side, so it can be lifted more comfortably at the lens and the rear of the body. The mounting plate can be ordered to any length providing support for those extra long and heavy lenses. Plus, the platform is made adjustable to balance the camera on the head and it's a quick release type with a built in safety feature.

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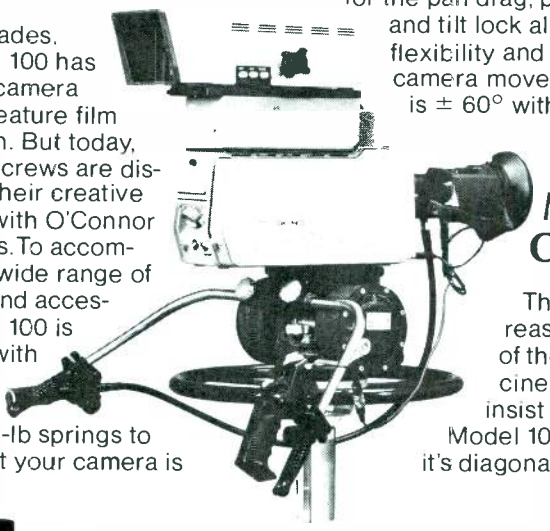

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the score is added up, we come out with the best score.

Q: What factors best show your commitment to the US market?

Nagahama: Aside from the commitment to service that I mentioned, I believe that our basic commitment is to have advanced technology and to raise the level of engineering so we can produce the most reliable products. Minimizing the problems of the customers by having quick service is also important. The most important principle is to advance engineering technology. I believe that Hitachi will be the first manufacturer to produce a solid-state camera for broadcast and industrial use.

Q: Does Hitachi see any future in videodisc recording systems for broadcasting?

Nagahama: I believe that the videodisc is going to be a very good means for future broadcasting. We are developing such a videodisc in collaboration with Central Research Laboratory. We cannot specify, at the moment, when this will be available. The disc has faster access and higher recording density, therefore the problems broadcast stations have involving quick editing and videotape storage will be eliminated.

Q: How will TV signals be transmitted in the future?

Nagahama: TV stations, network, satellite and cable will expand in their fields independently. In the case of broadcasting TV stations, the transmitting bandwidth will be much wider regarding component signal transmission or digitalized signal transmission. As a result, an optical fiber transmitting system will be utilized. In the case of network satellite, I expect the use of a wider bandwidth for high definition television. In the case of cable TV, the optical fiber communication system will be used.

Q: What part will Hitachi play in the future of broadcasting?

Nagahama: Hitachi would like to apply its technologies to new systems in the market such as digitalization and high definition television. Another goal is to come out with a new camera for broadcast production that will be a combined camera/VTR. And, always, we try to be a manufacturer that can meet customer's needs.

Q: Because satellites and earth stations are obviously a large part of the future, will Hitachi be heavily involved in this technology?

Nagahama: Yes, although we are still in the planning stage. Our work, mainly involving earth stations, is targeted for export overseas and not for the Japanese domestic market.

Q: Are you combining computer and camera technologies?

Nagahama: Yes, not only in the case of cameras, but all equipment will eventually utilize computer technology.

Q: How do you feel about the future of high definition television?

Nagahama: For the time being this may be used in limited areas such as for video printing, movie production in place of film, military use, CCTV use and for medical camera use. The broadcast use, in general, will come later. Generally it has been forecasted that high definition television will not come out for some years. We hope to use this technology in broadcasting five to 10 years from now. If there is anything that we can do for the customers to have it come out sooner, we will do what we can. We will cooperate with the customers.

Q: What about the future of the camera tube. Do you see any improvements or radical changes?

Nagahama: There are two things that we see happening in the future. One is the improvement of the Saticon. The Saticon photoconductive film will keep improving in the future and also the gun system for which new material that will be stronger in high density cathode loading will be developed. As a result, the technology for high resolution, low lag and long life will be advanced. The most recent improvement that we made for the Saticon is that we improved the sticking characteristics so that the tube is better than lead oxide tube. A high definition color camera tube will be introduced that is being developed at Hitachi Central Research Laboratory. It will have resolution up to 1800 lines. At last year's NAB, we demonstrated a high definition monochrome camera with 1800 lines. We have such a prototype. In the meantime, besides tube improvement, we will come out with a new solid-state device. Cameras using solid-state devices will first be developed for use in the industrial and home use field. It

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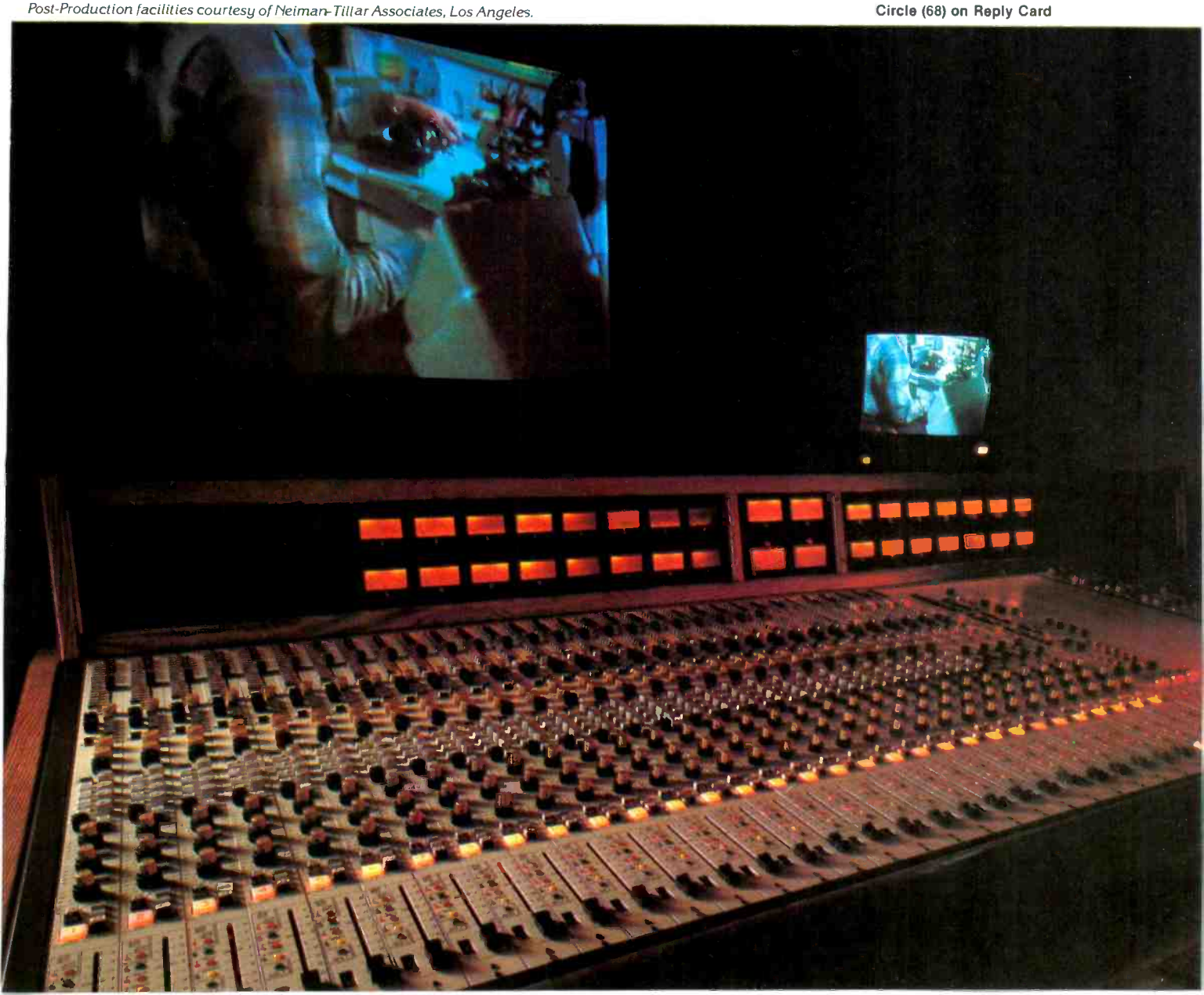

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will be several years before the picture quality will be as good as a tube broadcast camera.

Q: Is Hitachi, as a company, expanding the broadcasting and video systems division of Hitachi Denshi?

Nagahama: We are expanding in the video products field very fast. We have more than doubled in size in the broadcast field in three years. I foresee that this rate of expansion will continue in the broadcast video field.

Q: Do you foresee any significant changes in broadcast technology in the next five years?

Nagahama: Yes, the 1-piece camera/VTR. The other is the computer setup camera. Also, the continuation of product development technology in the field of digitalization and high definition television. I do not feel that, at this moment, the technology of high integration circuitry is being fully used in the broadcast field. From now on, we will see the trend in that direction. In five years, this technology will be used much more frequently just as in the computer industry.

Q: Do you think that within a few years the low-end inexpensive cameras in the $1000 to $5000 range will be broadcast quality?

Nagahama: I expect that is possible but the key point for this camera is the price of the lens. It depends upon the cooperation of the lens manufacturers. If this can be accomplished it will be possible. We could deliver our end of it. The other is out of our control. As far as the tube is concerned, it is possible using the Saticon. By using the LSI, the circuitry is also possible.

Q: Is Hitachi interested in developing products for special applications or to meet special specifications of individual customers?

Nagahama: I believe that perhaps products should be developed having customers' needs and requirements in mind. And, generally speaking, yes, we will supply the products to the customer that has specifications—when feasible.

Q: Do you think that the broadcast camera will be made simpler to operate, with such things as automatic features?

Nagahama: Yes, without any doubt. However, there are always customers that prefer to operate cameras manually and want control over all the features. We will have cameras for both.

Q: Are you developing a 1-tube camera for broadcast applications?

Nagahama: We have announced our new FP-10 (high resolution camera) that we believe is the highest quality single-tube camera. We believe that this camera will be used and liked for ENG.

Q: Will RF cameras play a large role in future development plans at Hitachi?

Nagahama: We are working on these, but there are many problems in picture quality coming from reflection. So I cannot foresee when a camera with reasonable quality can be introduced for the broadcast field. It is attainable, but I am not in a position now to say when.

Q. What do you feel the future role of ½-inch or smaller formats will be in broadcasting?

Nagahama: I believe that a smaller format will become the main format. The tendency toward high density recording will continue and will eventually reach ¼-inch. I am not sure exactly when.

Q: What do you feel is the greatest technical achievement of Hitachi?

Nagahama: Not limited to the field of broadcasting, from Hitachi's point of view, I believe that Hitachi has great strength in electronic technology and also in the technology for applying energy. In our opinion, Hitachi has surpassed General Electric in electronic technology. Recently Hitachi has been concentrating in the fields of LSIs, computers and image devices. We feel it is important to make products using these technologies in which we are concentrating and to come out with new products that will be liked by the customer. We constantly search for ways to utilize these technologies effectly. As far as Hitachi Denshi is concerned, the SK-100 (Color TV Camera) is a great achievement. Also, the new technology that we have developed for the new tri-electrode Saticon tube. The new FP-10 utilizes this tube.

Q: Is there anything else that you would like to say concerning Hitachi's future contributions?

Nagahama: One of the unique products that Hitachi Denshi is working on is visual displays for a training simulator that applies technologies of hybrid computers and image processing. Another contribution concerns broadcast oscilloscopes. Hitachi is making test equipment that everyone, not just broadcasters, can afford to buy. High performance for low cost.□

A plant tour of the Koganei Works, one of three Hitachi Denshi broadcast equipment manufacturing plants, was presented in the September **BE**. The tour explained the process by which many of the products that Nagahama mentioned in this article were produced.

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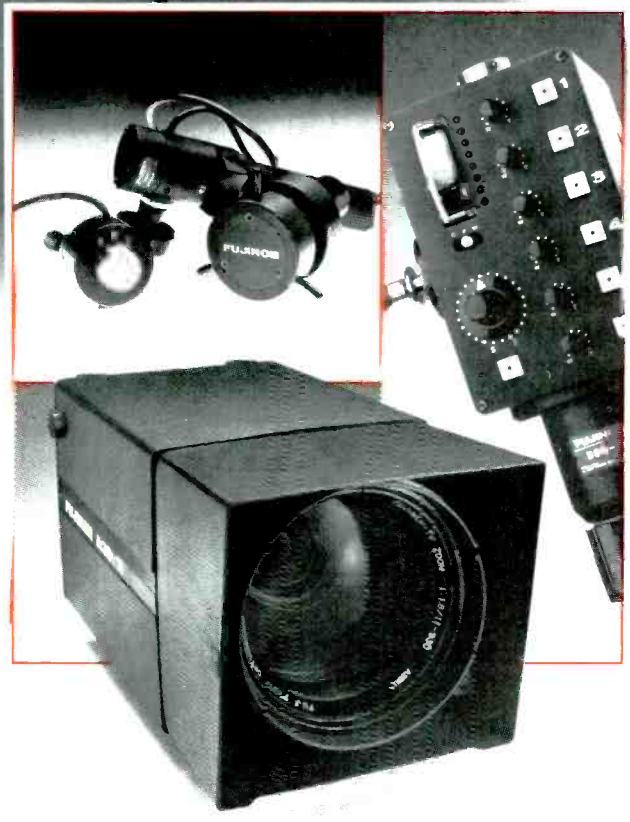

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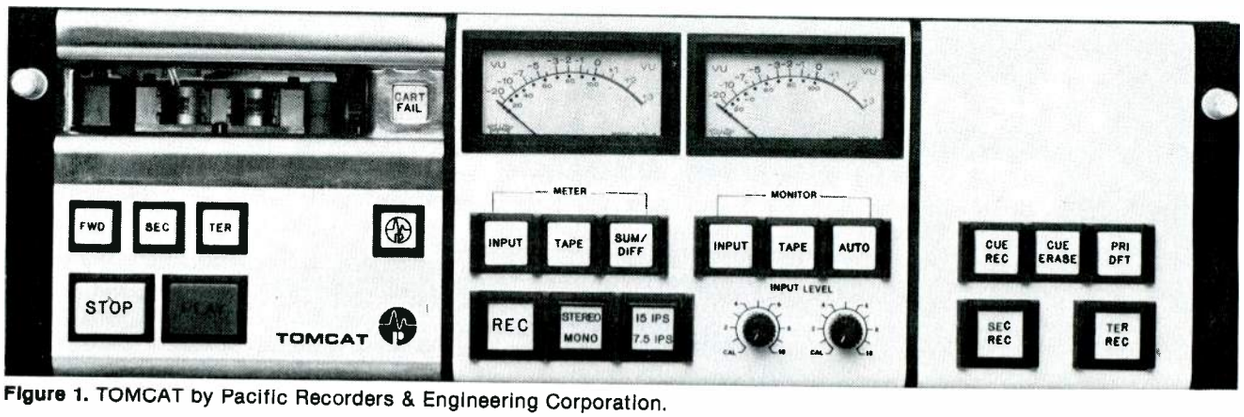

Figure 1. TOMCAT by Pacific Recorders & Engineering Corporation.

Field report:

TOMCAT Cartridge Machine

By Gary Schroeder, chief engineer, WCLR, Chicago, IL

Some years have passed since the introduction of the continuous loop cartridge to broadcasting, many of them with no real change in technology. There have been refinements in head assembly design, in cartridge design and in the several characteristics of the tape itself—but the machine has remained basically the same. Then, finally, a few years ago came a departure from the "pull the tape, stuff a head in somewhere and amplify what comes out" design that we have used since the early 1960s.

This report considers a product representing a recent step for broadcast cartridge technology: the Pacific Recorders & Engineering Corporation "TOMCAT." This machine has features making it desirable to the production person, to the control room operator, and to the combo jock. Even maintenance people should be interested in seeing this microprocessor-controlled system incorporated into the station. First, we'll look at the operating features. Then we can consider the technical features and specifications. Finally, despite my overall enthusiasm, there are several things one needs to be aware of before measuring the studios, counting the number of decks required and signing the purchase order.

For those who are into buttons and lights, there are 21 push-buttons and/or indicator lamps on the record/play model. This may at first seem too formidable for easy use. Yet, despite my initial concern, after 10 minutes of familiarization I could not find a production person or combo/DJ who thought it confusing.

On the record control area, the metering buttons INPUT and TAPE select input signal metering or tape playback metering. The SUM/DIFF button lights up to indicate *sum* metering on the left channel meter and *difference* metering on the right channel meter (in matrix mode only). Monitor switching selects which signal appears at the output of the machine—the input signal, the tape playback or automatic monitoring mode. In the AUTO mode, both the metering and the monitor output are switched to the input signal when tape is stopped or the machine is in record set. If tape is moving, the monitoring is from tape playback. This feature is useful if one wants to monitor cart play during record, but wants to listen to the input for cueing. With the TOMCAT no additional steps are required.

The REC record set button operation is standard. A second press, however, releases the set condition, as does stop or removal of the cartridge. A STEREO/MONO switch is used only in the matrix mode. For those not familiar with the matrix mode of stereo recording, left plus right signals are recorded on one track (for TOMCAT the left, while left minus right is recorded on the right track. In playback, the signals are rematrixed to provide left and right stereo channels. If stereo is selected, the STEREO legend lights and audio is matrix recorded. When mono is chosen, MONO is illuminated and monaural audio is recorded on Track 1 only. No audio is recorded on Track 2 (right), while the recorder places a signal on the cue track to switch the play deck to monaural automatically. The machine can be internally jumpered for regular discreet left/right stereo or matrix record/play operation. But remember, the matrix offers matrix stereo or mono switching.

This cart machine has two operating speeds: the standard 7.5ips or a higher performance 15 ips speed, which does make an audible difference. See the square wave photographs, Figures 2 and 3, and frequency response values in the specifications listed elsewhere in this report.

Also on the central portion of the control panel are the input level controls—standard controls—but with a calibrate detent as found on some reel-to-reel decks, allowing for internally preset levels to be used as a reference.

On the right third of the front panel are five indicator buttons for normal secondary and tertiary tone record commands; a record enable for cue tone recording during playback; cue erase to clear mistakes or make

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

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

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

It is the responsibility of **Broadcast Engineering** to publish the results of any piece tested, whether positive or negative. No report should be considered an endorsement by **Broadcast Engineering** for or against a product.

The big news is performance. The good news is price.

Once again Panasonic makes headlines with our newest ENG camera, the AK-710. And the reasons are simple: High performance Saticon® tubes plus prism optics—all for a newsworthy price of $10,950.*

The AK-710's compact size, light weight and durable die-cast chassis make it a natural for electronic newsgathering. While the performance of a high-index optical system with built-in bias light and three Saticon tubes makes it a natural for news broadcasting: Performance like horizontal resolution of 500 lines center, a S/N ratio of 52 dB and standard illumination of 200 footcandles at f/3.5. And for even more light-gathering capabilities, there's a 2-position high-gain switch.

You'll also get colors as intense as the action, thanks to the AK-710's automatic white balance circuit and built-in color temperature conversion filter wheel. And for minimal comet tailing, the AK-710's feedback beam control stabilizes highlights that exceed normal white levels without reducing dynamic range or resolution.

Equally newsworthy is the AK-710's built-in genlock and adjustable horizontal and vertical blanking intervals. With them the AK-710 can double as a system camera. There's also an optional remote control unit, as well as a 5" CRT viewfinder for studio use.

So if news is what you're after, go after it with the AK-710. A newsmaking camera from Panasonic.

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

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Midwest —(312)364-7936
Southwest —(214)258-6400
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*Manufacturer's sugg. price. (Lens not included.)
Saticon is a registered trademark of NHK (Japan Broadcasting Corp.).

Panasonic®
VIDEO SYSTEMS DIVISION

Circle (73) on Reply Card

Field report

changes on the cue track that otherwise would require complete recarting; and a PRI DFT primary tone defeat button, which electronically latches the primary cue tone record circuit out at initiation of record.

The left third of the panel contains oversized stop and start pushbuttons—easy to find without confusion. The stop button blinks to indicate recue of a cart and can be programmed to lockout a replay. Should the cart be stopped before recue for any reason, the machine will tell the operator about that too. The stop button blinks to say the cart has not yet reached the primary cue tone before stopping. FWD initiates fast wind and indicates the fast wind mode whether manually selected or optionally triggered by sensing of a secondary tone. Fast wind can be either 15 or 30ips.

The other indicators SEC and TER illuminate upon playback of their respective cue tones. The "Pacific" logo button lights to show when power is applied to the machine with no cart loaded in the slot. If the reproducer decides your cartridge is not fit to play for mechanical reasons, the logo lamp blinks.

Finally, the last indicator on the panel is CART FAIL, located next to the cartridge opening. Its warning indicates a cartridge developing too much drag tension. Tests made with defective carts found the lamp to blink as intended while the deck would still pull tape satisfactorily. The warning indication intent is to prevent failure and/or show trouble.

My first operating contact with this machine—inserting a cartridge—resulted in satisfying tactile feedback. The mechanical cartridge positioning system feels *elegant*—the only word to describe it. I don't often talk about loading carts into a machine, but this

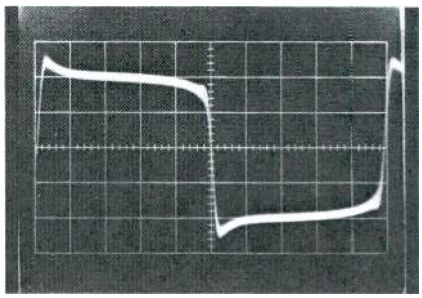

Figure 2. Square wave response for 7.5 ips exhibits less than 25% overshoot with no ringing.

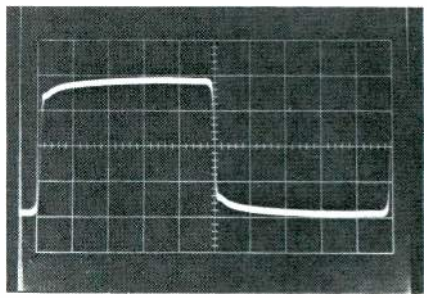

Figure 3. Square wave response for 15 ips exhibits no overshoot or ringing.

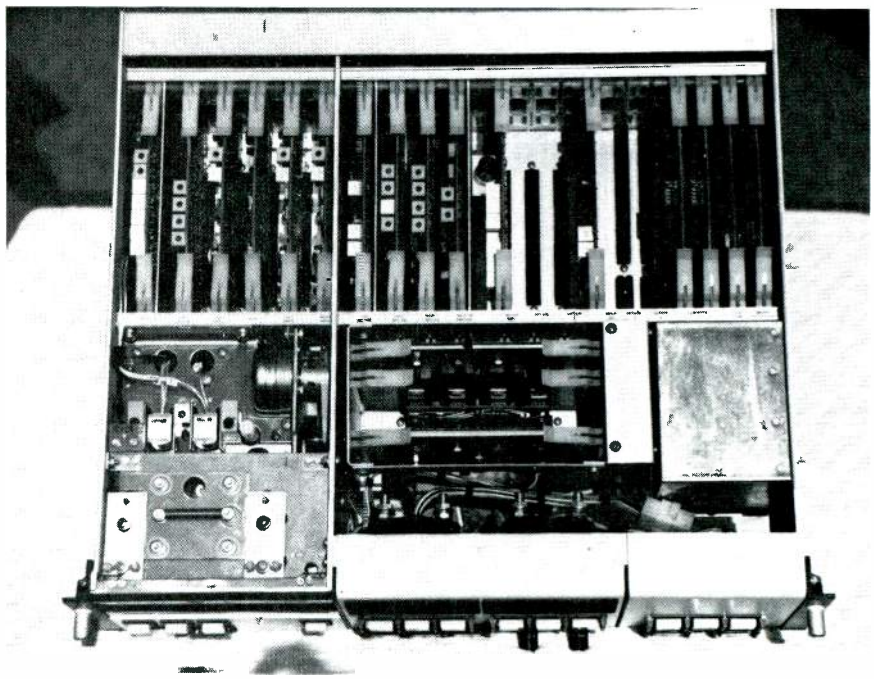

Figure 4. Top view of TOMCAT.

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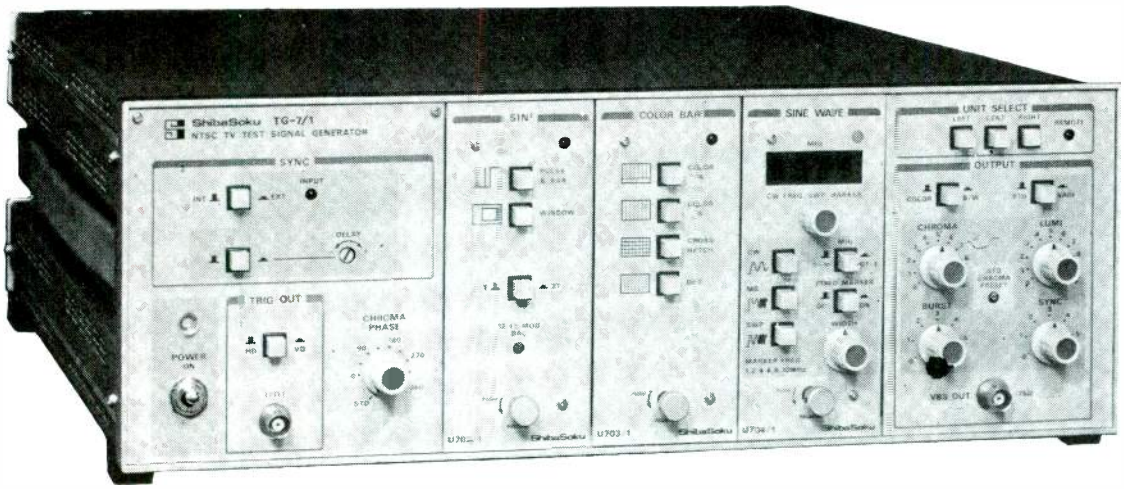
to fit your individual needs .



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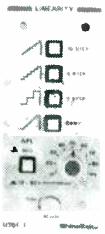
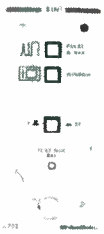
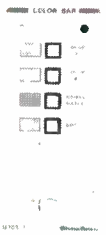


U701 LINEARITY UNIT

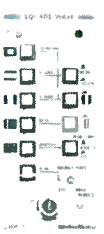


U702 SIN² UNIT

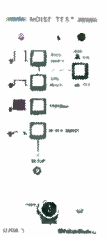


U703 COLOR BAR UNIT

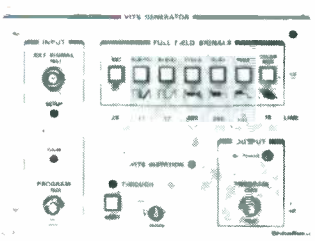
U704 SINE WAVE UNIT



U705 SQUARE WAVE UNIT



U706 NOISE TEST UNIT



U707/1 VITS GENERATOR

ASACA/SHIBASOKU TG-7 TV test signal generator is a main frame which accommodates interchangeable modules, and by using it together with these modules, it generates TV test signals which are used for the adjustment, testing and measurement of video equipment.

Features

- The sync signal generator contained in the main frame allows color lock and gen-lock with the VBS or sync with color burst.
- The model contains a built-in dual axis balanced modulator and this allows the chroma phase to be varied from 0-360°.
- The subcarrier oscillator is incorporated into an oven and its frequency stability is within ±5Hz.
- Independent output terminals provide video component, sync signal, color burst level signals to be connected to an external programmable attenuator, each output level can control with external signals independently.
- The main frame and plug-in modules are coupled with DC circuit and so there is no bounce from the signal selection.
- Switches provided on the front panel enable selection horizontal or vertical drive for a trigger pulse output.
- The maximum variety of test signals can be generated with the minimum number of modules.
- Optional IEEE-488 Bus unit provides automated program control.

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one feels solid and gives me confidence that the cart is in its proper position. Then I noticed that the motor was not running. It doesn't need to, until you push play. The dc servo capstan motor achieves play speed in 80 milliseconds, before the pinch roller engages.

Subjective testing in the WCLR studios resulted in a consensus that operating features were well thought out, easy to learn, and, once learned, second nature to the operator. The sound was judged to be indistinguishable from current-generation reel-to-reel machines.

The written specs for this cartridge machine read like those of a high quality reel-to-reel machine. The tape speeds available—the standard 7.5ips, for which Pacific states response to be 40Hz to 16kHz at +0.5,-1dB, and a 1kHz square wave response at less than 25% overshoot with no ringing; at 15ips figures are even more impressive at 55Hz to 22kHz ± 1dB with no overshoot or ringing on the square wave tests. Noise through the entire record-tape-play system stays at -59dB (unweighted) for both speeds. Distortion is a comfortable 0.9% THD at O VU level.

My tests confirmed all published specifications, and in a few instances surpassed them. Frequency response was slightly better than stated at 7.5ips.

At 15ips I measured response variations at only ±0.5dB. The distortion figures were also better than spec. Record amp distortion is stated to be less than 0.1% with the reproduce amp distortion the same 0.1%. I measured 0.005% from input to output (electronics only). For Pacific's claim of maximum output level of +25dBm into 600Ω, I found greater than +26dBm into 600Ω and the THD was still 0.008%. The intermodulation distortion is not specified, but the test showed IM distortion tracks close to THD levels.

With tape running I arrived at the 0.9% system distortion level at the 250nWb standard recording level. This would indicate tape medium to be a definite limiting factor. Changing cartridges exhibited variations in response (caused by head wrap and pressure pads) and distortion (caused by tape formulation). As further improvements are made in tape, numbers will continue to approach those represented by the electronics only. The electronics noise is specified at -64dB. I measured -66dB (or -71dB "A" weighted). The cue-to-program crosstalk was well below that noise level.

For those who choose to maintain equipment, this machine has good features also. An 1802 microprocessor controls all machine logic and functions. All circuit boards are plug-in type, and any adjustment necessary may be made with the board in place. Extender cards are used to get to components, not adjustments. On reproducer-only machines, even the motor tach symmetry adjustment is easily accessible. For the record/play decks the servomotor can be removed with only four screws and placed next to the machine chassis. Its cable is long enough to allow adjustment. If it needs to be replaced, one plug does

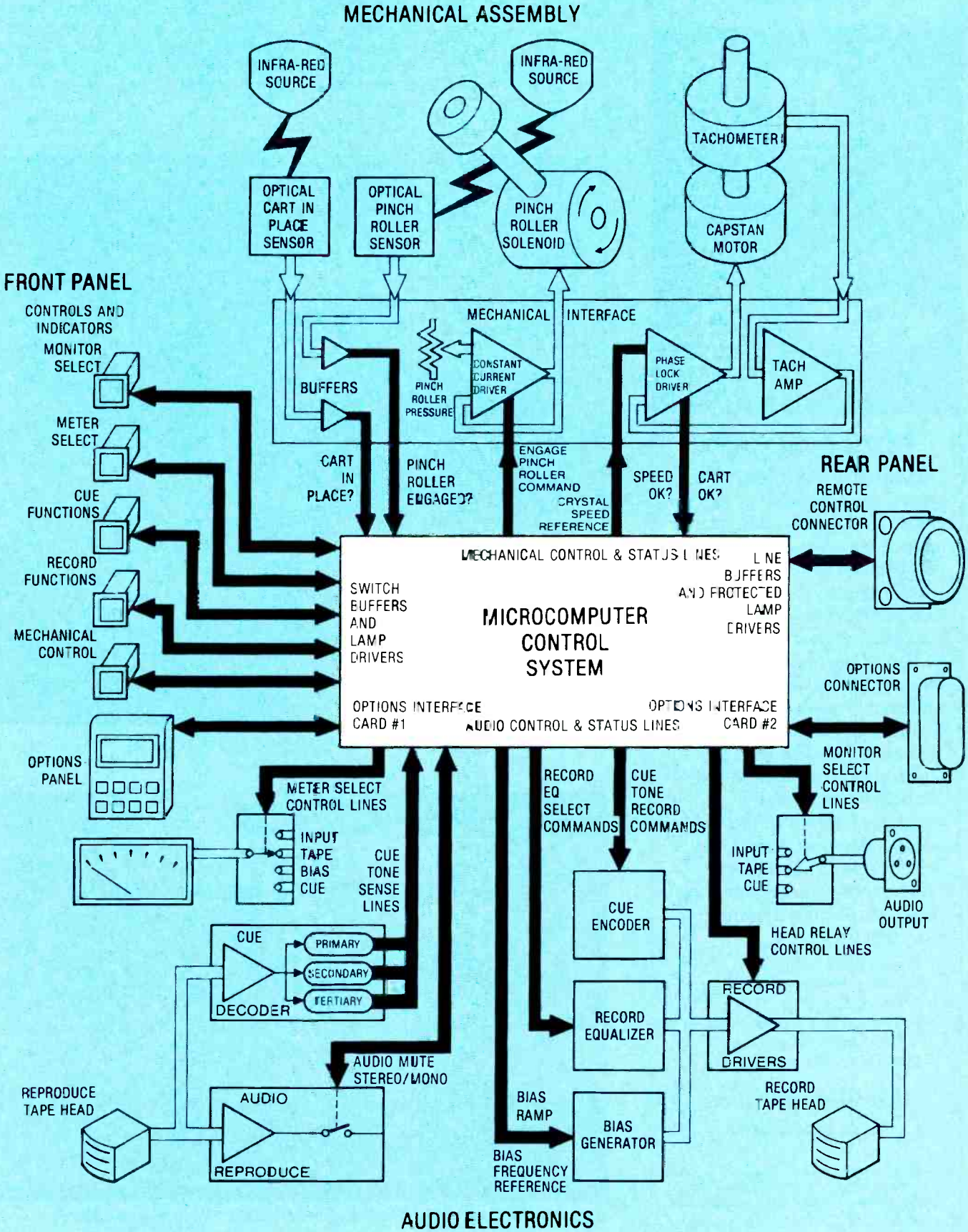
OTHER TOMCAT SPECIFICATIONS

(Manufacturer's Data)

Tape Format	NAB size AA cartridge
Start Time	Less than 100ms.
Stop Time	Less than 40ms.
Wow and Flutter	Better than 0.1% RMS unweighted
Speed Accuracy	Better than 0.1%
Input Impedance	20KΩ balanced, bridging
Input Level Range	−13dBm to +9dBm
Output Impedance	
Source	Less than 95Ω
Separation, Audio Tracks	Better than 50dB at 1kHz
Crosstalk, Cue to Audio	Better than 60dB
Bias Signal	200kHz crystal generated, less than 0.07%THD
Cue Signals	
Record	1kHz primary, 150Hz secondary, 8kHz tertiary
Reproduce	1kHz primary, 2kHz primary at 15ips fast wind, 4kHz primary at 30ips fast wind, 150Hz secondary, 8kHz tertiary.
Output	24Vdc control outputs for secondary and tertiary tone detection. Cue audio output balanced, 600Ω, OdBm.
Cue Erase*	Better than 30dB
External Connectors	Audio: XLR-type
Mating connectors supplied	Remote: 16-pin Amp, lock-ring type Cue: 4-pin AMP, lock-ring type
Power Requirements	
120Vac, 60Hz	
Recorder	25W idle 35W running
Reproducer	10W idle 20W running
Weight	
Recorder	42 lbs.
Reproducer	15 lbs.
Reproducer	TRI-MOUNT 8 lbs.
Dimensions	
Recorder	Rack style case, allow 3" minimum at rear for cables and connectors. 19" Wide, 5.25" High, 15" Deep.
Reproducer	Tri-mount track mount case will accommodate up to three reproducers. Allow 3" minimum at rear for cables and connectors. 19" Wide, 5.25" High, 15.5" Deep.
	(Recorder and reproducer cases are supplied ready for rack mounting; no additional adapter hardware is required. Only 5.25" of rack space is needed for either the recorder or reproducer tri-mount.)

*All measurements were taken using Audiopak™ type AA-3 cartridges and tape at a standard recording level of 250nWb/m.

TOMCAT CONTROL SYSTEM OVERVIEW



the disconnect. In the same assembly a unique method of pressure roller control uses a rotary solenoid. There are two electrical adjustments for this roller. One is engagement speed; the other, pinch roller running pressure.

A problem in many stations is constant slamming of tape cartridges against the head assembly caused by overzealous DJs. This requires frequent re-aligning of heads. In the TOMCAT, the cartridge stops against stainless steel pins on the capstan motor block assembly, thus saving the heads. Perhaps the most surprising development in alignment of the

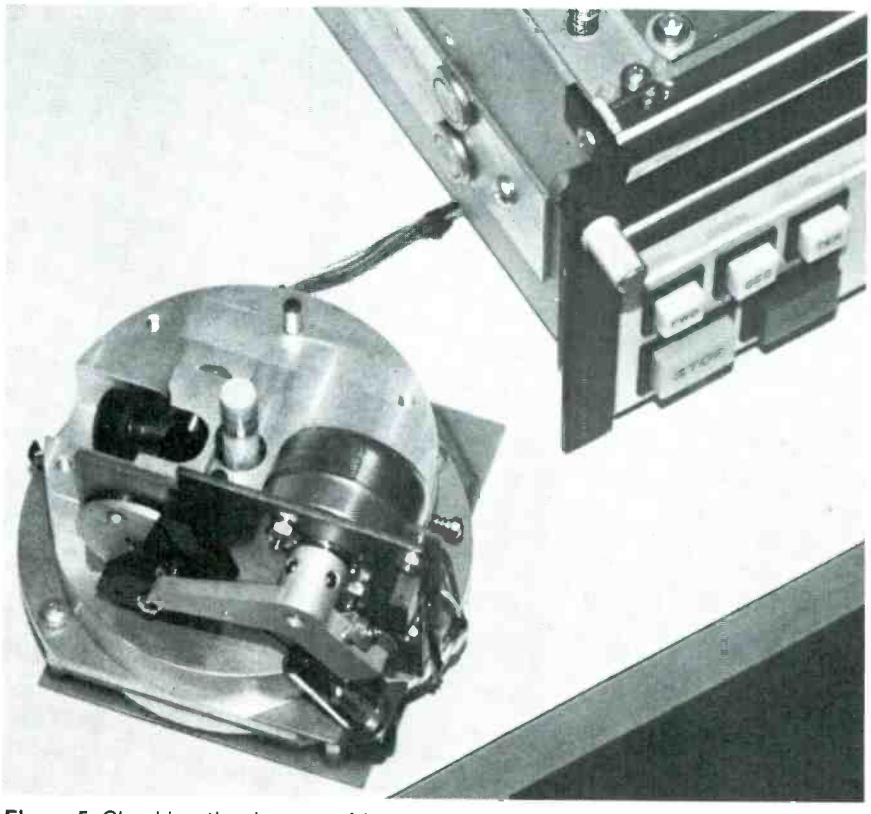


Figure 5. Checking the dc servo driven motor.

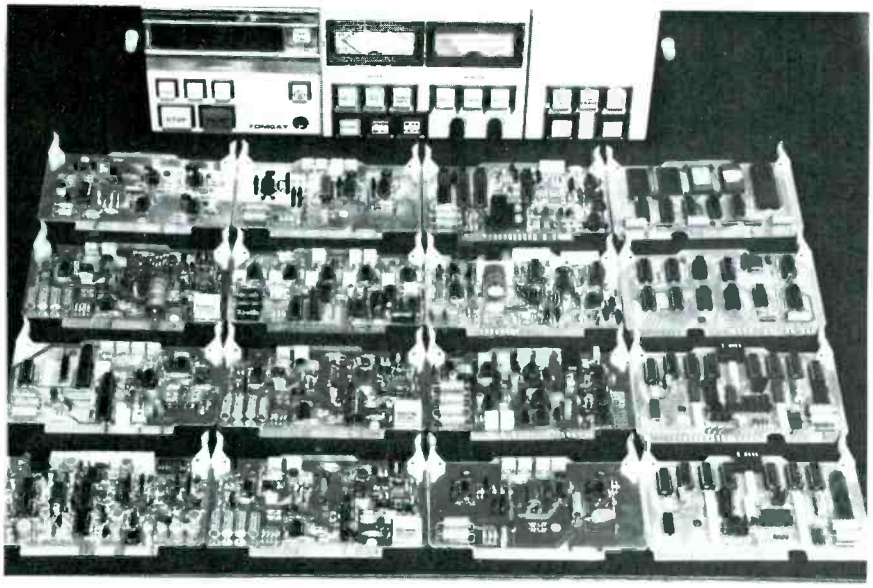


Figure 6. Electronics cards necessary for TOMCAT functions and features.

machine is that *no* azimuth alignment is required—*or possible*. The head assembly is precision-machined and guides the tape in the head area better than is usually accomplished in the conventional way. Phase is maintained within a few degrees. There is no discernible skewing from machine-to-machine or cart-to-cart in the discrete stereo mode, and separation is maintained in matrix mode.

Now, to look at those noise figures. First low noise circuit design is good with its 100% Mu metal shielding around the power transformer, under the stainless steel deck plate, as well as wrapped over the top of the heads. A bit extreme, you might say, but the results bear out the idea.

The operating signal-to-noise ratio includes a completely redesigned head track arrangement called MAXTRAX,® which incorporates the NAB ½-track reel-to-reel standard, 80 mils wide, with the cue track 21 mils wide. This arrangement gives extra track width for program material without wasting the space on the cue track where it is not needed.

Other considerations

There are several things I wish to point out to a prospective TOMCAT buyer.

To achieve the advantages of the TOMCAT you need cartridges with the new NAB Capitol AA standards for head openings, allowing for proper tape guidance.

Playback machines must either be TOMCATs or have MAXTRAX heads in them.

Any current carts must be re-recorded if they are to play in MAXTRAX equipped decks.

New test tapes will be needed for this format.

These problems have solutions if you are willing to make the cash outlay. WCLR testing was done with Capitol AA3 carts loaded with its latest high-output, low-noise tape. Pacific Recorders offers heads for retrofit of other brands of playback units. Finally, the test tape required is available from Pacific Recorders.

My exposure to the TOMCAT—operating, testing and examining—has convinced me that the features and advantages far outweigh the problems involved for those who search for reel-to-reel performance in the cartridge world. □

For more information on the TOMCAT, contact Pacific Recorders & Engineering Corporation, 11100 Roselle St., San Diego, CA 92121; (714) 453-3255.

ENG microwave systems: A source guide

By Carl Bentz, technical editor

Beyond the philosophical possibilities of the word NEWS and its origins (**N**orth **E**ast **W**est **S**outh), events of importance to a community can occur worldwide. The broadcaster, intent on news coverage, must be capable of presentation from anywhere. This is the reason for development of ENG and RENG equipment.

In electronic journalism (EJ), the origination of program material—golf course, political convention, concert hall, shopping center, accident scene—is immaterial if the subject is worth coverage. Every major TV station and many radio stations use remote equipment regularly in their news and sports programs. Even public affairs coverage may depend heavily upon RF-linked camera systems, mobile vans and airborne units to bring a scene immediately to the viewer's living room.

The latest technology can provide noise-free pictures and multiple-channel audio from almost anywhere within sight of the station transmitting tower. Repeaters extend the range well beyond the horizon.

Philips Broadcast A10 Mobile Van

Electronic journalism is not new, but solid-state devices have decreased the size of cameras and audio equipment, processors, mixers and microwave units to make the recent models of ENG and RENG more prevalent. Many camera parameters are automatically controlled. Equipment is operable from belt batteries or 12V vehicular power, as well as aircraft electrical systems. In some cases signals can be received by studio-based receivers directly from the camera and mic for *Live Eye* (and live ear) reports. The immediacy of such live segments improves credibility (reality and believability) of local station production efforts and of network materials. Reality, believability and immediacy are factors that count heavily in the *all important* ratings returns.

Many radio operations use traffic helicopters to provide a useful public service with daily guidance to work. Certain segments of demographics ratings would be greatly affected by addition or deletion of RENG efforts in that regard. Radio news, more easily than television, can go afield for on-the-spot coverage because it is not tied to power and telephone lines. Stations with budgets that allow live remote operations, usually have increased revenues from the remote work. For long distances, the telephone line still provides a cost effective means for program signal transportation. But for in-town work, ENG microwave equipment can soon be paid for with money that would otherwise be spent for telephone connections.

Seldom does a newscast occur that does not include three or four segments using ENG systems. Many stations have multiple ENG channels. In fact the 2, 7 and 13 GHz bands are so crowded by TV ENG use that the FCC has considered new spectra for at least part-time (non-interfering) ENG expansion. To ease channel needs, several manufacturers are considering means to transmit multiple video signals on a single ENG carrier.

What is involved in using ENG? Obviously a camera and/or microphone is needed, and a variety of sources is available. For guidance in those areas, see the September Buyer's Guide and the upcoming January 1982 ENG/RENG emphasis issue. What is needed next is the microwave transmission system.

Without microwave equipment, the ENG reality and quality efforts depend upon tape; with microwave, immediacy is a selling point. This creates a need for transmitters and receivers as well as mobile, portable or fixed antenna systems; perhaps even repeaters.

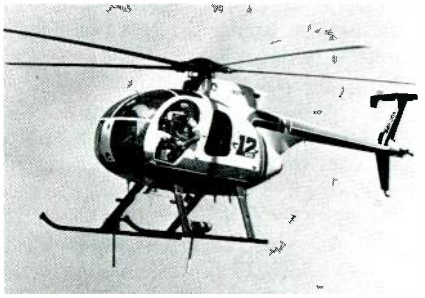
What to consider

The following are a few questions that can help a prospective ENG microwave buyer optimize his equipment selection.

What do I really need in the ENG line? How much do I want to use, at one camera (or remote production facility) per microwave system? Not every newsworthy event occurs during local news time, so videotape is always a good means for program inserts of noncritical items. Yet, some events could conceivably occur simultaneously, which requires taping.

ENG by microwave will not replace portable videotape, but will definitely enhance ENG coverage. Also, because live coverage is still better, what about multiple community events? Or more than one point of interest in a single happening? The possibilities are numerous.

Microwave Associates Communications MX Transmitter



Hughes Helicopter Inc. 500D Helicopter

How portable is portable? Is there a need for an airborne operation? Will a mobile van be sufficient? Usage must include consideration of limitations in distance, terrain and obstructions. Helicopter or airplace-based units certainly reduce such limitations, but they also increase the costs in purchase, rental, lease and maintenance. City statutes may rule out single-engine airborne units (helicopters included). For a much lower cost, can a portable antenna on a van do the job? Or perhaps a small dish antenna system would be sufficient? Would a repeater ease distance or obstruction difficulties.?

How much system capability do I need? Recent FCC considerations now allow a communications channel for remote personnel to be via the station aural carrier, using a multiplexed subcarrier for the TV ENG crews. Because multiplexing is already used for many services on FM carriers, perhaps that would also provide a viable solution for many radio stations. The use of existing carriers

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When an entertainer has an off day, that's a problem. When your communications system decides to take the day off, that's a disaster.

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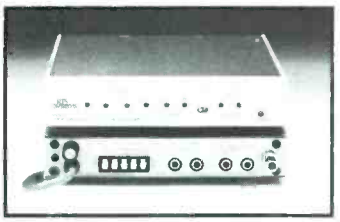
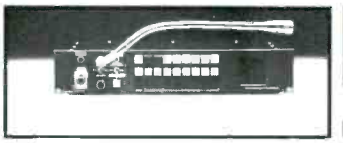
To find out why RTS Intercom Systems are fast becoming the industry standard, call today.

Additional Product Lines

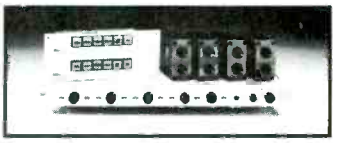


SERIES 400 PRO-AUDIO
High performance amplifiers

SERIES 1000 MATRIX SYSTEM
Dedicated-line matrix intercom/squawk system



MODEL 801 MASTER STATION
Multi-channel communications center



SERIES 4000 IFB SYSTEM
Self-contained program interrupt system

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Circle (77) on Reply Card

would relieve the need for 2-way microwave links. In-bound audio channels must still be considered, however, for program and communication lines. With video expected as the main channel, subcarrier capability for audio on the microwave system must be investigated.

Once the originated signal is in the airwaves, how best can I receive it at the studio? Can I install a switchable, fixed, multiple-antenna system on my transmission tower? That will require tower stress and wind-loading analysis at least, as does any addition to the tower structure. Possibly a remote-controlled, steerable microwave dish could be used on an extension from the tower or on a separate tower. Local zoning and construction statutes should be checked.

If airborne units are considered, should a ground-mounted automatic tracking antenna system be used? In areas that are clear of obstruction and terrain considerations, how about a studio building roof-mounted receiving system? For aerial signal sources, a lower altitude receiving system should be used. For ground level sources, however, elevation of the receiving antenna system will become important.

The questions of ENG involve multifaceted strategies: costs, possible use, probable use, implementation, maintenance and ratings (financial) payoff.

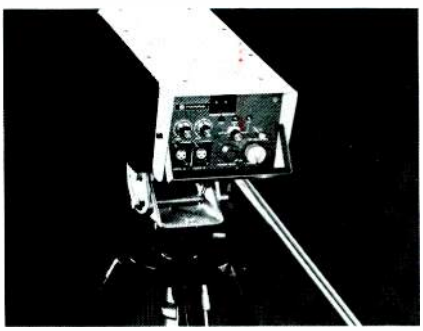
ENG microwave systems

In an attempt to make engineering selection easier, the next few pages offer a glimpse at microwave system equipment presently available for EJ/ENG/RENG operation. The models listed were selected as representative of some of the equipment available and do not represent all available products. The information was taken from materials listed in the September **BE** Buyer's Guide, including manufacturers that responded to our request for ENG microwave equipment data.

To provide more complete coverage of the ENG microwave industry a list of those companies that make ENG microwave equipment, or that provide services to the microwave system ENG operator, is included for reference.

ENG microwave systems are usually designed around video signals of 1Vp-p, 75Ω; RF input and output 50Ω impedances; audio inputs may be mic and/or line level, 600Ω balanced, with audio outputs at 600Ω line level. Audio subcarrier channels may generally be selected from standard frequencies: 4.83, 5.8, 6.2, 6.8, 7.5 and 8.5 MHz.

Farinon Video (Harris)



Global IX

Portable Microwave Transmitter GLOBAL IX FV2/2.5G

- Frequency agile from 1.9 to 2.7GHz to 55 channels synthesized;
- NTSC, CCIR compatible;
- Remote/local frequency selection;
- Output power 3W;
- Two audio channels, mic or line levels;
- 70MHz IF input available;
- Programmable subcarriers;
- Operating: 115/230Vac, 10.5 to 16Vdc;
- Weight: 15 pounds.

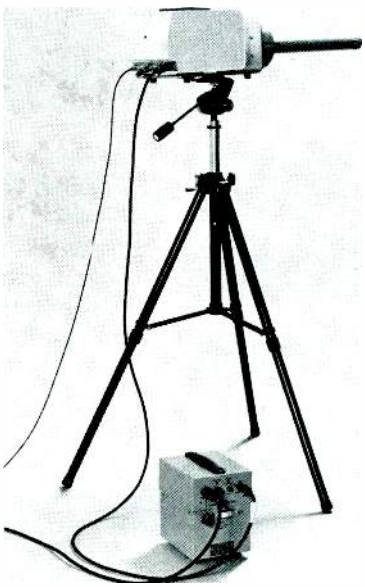
Circle (200) on Reply Card

ENG Microwave Radio Receiver FV2CR "Central Receiver"

- Frequency agile in 2GHz band, 21 channels synthesized;
- Remote/local frequency selection;
- Threshold at least -82dB for RCL -40dBm;
- Noise figure 3dB;
- Signal-to-noise: video, 70dB; audio, 66dB;
- 70MHz IF output available;
- Operation: 115/220 Vac, -24 or +28Vdc;
- RFI shielded;
- 5¼-inch of 19-inch rack space;
- Weight: 35 pounds.

Circle (201) on Reply Card

Miniature Portable Microwave System FV-MP "Mini-link"



FV2MP Mini-link

- Frequency agile within selected band, 12 channels crystal-controlled;
- 7, 8, 11, 12 or 13GHz band options;
- Output power: 0.25W at 2GHz; 63mW at 13GHz;
- Single audio channel, line level;
- Threshold: -83dB at 7GHz; -78.5dB at 13GHZ for RCL -40dBm;
- Noise figure: 6dB at 7GHz, 8.5dB at 13GHz;
- Signal-to-noise: video 70dB; audio, 70dB;
- Operation transmitter or receiver: 115/230Vac or -24Vdc battery pack, 36W.
- Dimensions (each unit) 14¾" x 7¼" x 8½";
- Weight: transmitter, 14 pounds; receiver, 17 pounds;
- Conical horn, parabolic antennas with fixed or switched circular polarization or linearization polarization available.

Circle (202) on Reply Card

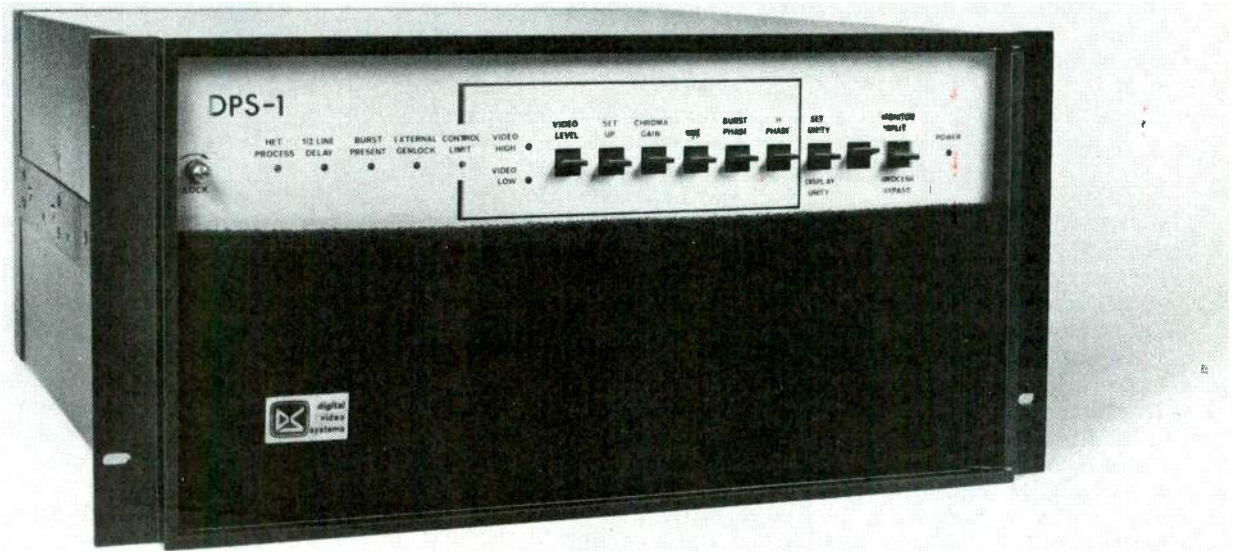
Loral Corporation (Terracom)

Microwave Radio System, Series TCM-6

TCM-6 Series

DIGITAL
VIDEO SYSTEMS
DPS-1 TIME BASE CORRECTOR
$16,430

Trade in your old TBC. Allowance up to $4,000.



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Corrects velocity errors on a line by line look ahead basis to provide highest quality color pictures.

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Converts all normal incoming NTSC Signals to RS 170A Standard, facilitating color frame editing.

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- Frequency agile from 1.7 to 15.35GHz, using plug-in modules, with crystal or synthesizer control;
- Power output: 5W for 2GHz; 0.75W for 7GHz; 0.25W for 13GHz;
- Two audio channels;
- Threshold -78dB for RCL, -30dBm typical;
- Noise figure: 8dB at 2GHz; 9.5dB at 7GHz; 11dB at 13GHz;
- Signal-to-Noise: video, 76dB at 2GHz; 72dB at 7GHz; 68dB at 13GHz; audio, 70dB;
- Operation: ± 24 Vdc, ± 48Vdc; 110/220Vac; 80W transmit; 50W receive;
- Dimensions: (each unit) 16¼" x 9½" x 12"
- Weight: 45 pounds.

Circle (203) on Reply Card

Miniwave Microwave Radio Systems, Series TCM-7

- Frequency range from 1.7 to 15.35GHz using crystal control;
- Transmitter power: 0.5W at 2GHz; 0.15W at 7GHz; 50mW at 13GHz;
- Audio, one channel standard;
- Threshold, -78dB for -35dBm RCL nominal;
- Noise figure: 7.5dB, 8.5dB, 10dB at 2, 7 or 13GHz frequencies, respectively, without preselection;
- Signal-to-noise: video 72dB at 2GHz; 70dB at 7GHz; 68dB at 13GHz; audio, 70dB;
- Operation: +12 or +24Vdc; 115/230Vac, 20W for transmitter; 25W for receiver;
- Dimensions (each unit) 7½" x 5½" x 10";
- Weight: transmitter, 10.5 pounds; receiver, 12.5 pounds.

Circle (204) on Reply Card

Microwave Associates Communications

Eagle-Eye Gyro-stabilized Optical System

- 3-axis gyro-stability for helicopter mounting;
- Permits 44:1 effective zoom range;
- Spherical enclosure, external to fuselage houses stabilized camera and motor-driven aiming mechanism;
- 28Vdc power conditioner, external to fuselage on opposite side of aircraft also balances weight;
- Control panel allows operator to pan, tilt, zoom, focus and change iris;
- Spherical pod has 32" diameter, weighs 120 pounds.

Circle (205) on Reply Card

Sky Scan

SkyScan Auto Track Antenna System

- Frequency range 2 to 2.5GHz models;
- Gain, 25.5dBi;
- Beamwidth 6° azimuth; with CSC^2 up looking to 60°, 7° elevation;
- Polarization may be switched—vertical, horizontal, right- or left-hand circular;
- Rotation 360° continuous at 18°/second;
- Includes MAC MA-2GU or MA-2GD receiver;
- Power required at pedestal: 115Vac, 350W in motion; at control/receiver, 115Vac, 200W.

Circle (206) on Reply Card

Nurad Inc.

SuperQuad II Receiving Antenna System 20SQ3/RA5

- Operating frequency, 2GHz; available for 2.5, 2+7, 2.5+7, and 7GHz;
- Gain, +25dBi;
- Beamwidths, 8° HPBW Azimuth; CSC^2 to 30° elevation;
- Pan range 360°, continuous at 2.4° or 12°/second;
- Polarizations: right- and left-hand circular, vertical, horizontal;
- Maximum windload area, 30 square feet;
- Remote-controllable functions (using Nurad MC3 digital controller); polarization; preamp normal or bypass, main, auxiliary or bypass; rotation left or right, fast or slow;
- Power required: 115/230Vac, 6A;
- RA5 Radome available, 72-inches tall with 66-inch diameter;
- Construction of low loss polyester fiberglass with epoxy Jellcoat finish.

Circle (207) on Reply Card

Quad Horn Receive Antenna System, 70QPI/90

- Four individually selectable quad-polarized antennas;
- Operating frequency, 7GHz; also available for 2 and 2.5GHz;
- Beamwidth, horizontal, per horn 90°, vertical 15°;
- Gain 13dBi;
- Local controller allows selection of sector and polarization;
- MC3 digital controller allows remote selection of sector, polarization, preamp control, channel offset; up to seven receiver channels;
- Windload area per horn, 0.9 square feet.

Circle (208) on Reply Card

COPTER POD System

Mini Pod™

- Four circularly polarized directional transmit antennas;
- Frequency agile transmitter with power supply;
- Frequency agile receiver with circularly polarized receive antenna (for ground-to-air-to-ground relay);
- 2GHz band, 7-21 channels;
- Amplifier power 12W minimum;
- Antenna gain 8dB referenced to like polarized isotrope;
- Enclosed in aerodynamic skid-mount package;
- Manual antenna selection or AUTO TRANSMIT option for automatically controlled selection referenced to compass heading.

Circle (209) on Reply Card

RF Technology Inc.

Microwave Radio Series RF-200 (RF-201 Transmit/RF-200 Receive)

- Frequency range, 21 channels in 2GHz band with optional synthesizer;
- Full- or half-channel operation possible;
- Remote controllable;
- Output power, 1W;
- Two audio channels standard, line level;
- Threshold -83dB for RCL -40dBm;
- Noise figure, 3dB;
- Signal-to-noise: video 65dB; audio, 60dB;
- Operation: 10.5 to 20Vdc, 2.7A total; 120Vac;
- Dimensions: (Transmitter) 8¾" x 6¾" x 5"; (Receiver) 7" x 7½" x 3";
- Weight: Transmitter, 11 pounds; Receiver, seven pounds.

Circle (210) on Reply Card

No excuses

In EFP or ENG, getting the shot is everything.

And, a growing number of networks, major stations and independent producers are consistently getting everything with the Ikegami HL-79. They've become so confident with their HL-79's that the need for a "backup" no longer exists.

The more than 2,000 HL-79's in service today have set new industry standards for low light level performance, well-balanced handling and unprecedented reliability. But Ikegami never rests. Now, the best ENG camera is even better. The improved HL-79D Series features an advanced FET preamp that (depending on your choice of tubes) will deliver a 2to3 dB gain in signal-to-noise ratio. The HL-79D Series is available in four new, application-matched configurations that include high resolution diode-gun or low capacitance diode gun tubes.

In EFP and studio production, the new HL-79D will deliver excellent results. In fact, if you don't have an Ikegami studio camera, chances are that the HL-79D will produce a better picture than whatever camera you've got on the floor.

Contact Ikegami and ask for a side-by-side comparison. Then you'll see why an Ikegami HL-79 crew can leave the excuses—and the backup—at the station.

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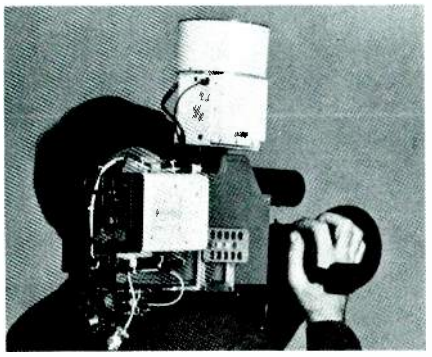
Ikegami Electronics (USA) Inc. 37 Brook Avenue, Maywood, NJ 07607; (201) 368-9171
Northeast: (201) 368-9171 | **West Coast:** (213) 534-0050 | **Southwest:** (713) 445-0100 | **Southeast:** (912) 924-0061 | **Canada:** (201) 368-9179

Circle (99) on Reply Card

ENG systems

Wireless RF Camera System RF-203



RF-203

- Frequency range 2, 2.5 or 2.7GHz with full- or half-channel operation;
- Frequency agile with thumbwheel selection;
- Power output, 0.2W;
- One mic level audio channel, -50dBm, 150Ω;
- Operation: 10.5 to 17Vdc, 0.6A;
- Dimensions: 6" x 4½" x 2";
- Weight: Less than 2 pounds
- Use with RF-QA-6 Automatic Steerable on-camera antenna.

Circle (211) on Reply Card

Omnidirectional Antenna RF-100
- Frequency range, 2GHz;
- Gain, 6dBi;
- VSWR 1.5 maximum;
- Beamwidths: 24° elevation, 360° azimuth;
- Vertical polarization;
- Diameter: 1"
- Length: 24"
- Connector SMA female.

Circle (212) on Reply Card

Tayburn Electronics

Video Transmitter/Receiver, TBT-50-A/ TBR-50-A
- Frequency agile, 21 frequencies in 2GHz band;
- Remote controllable;
- Transmitter output, 2 to 12W programmable;
- Receiver input, typically -40dBm;
- Receive noise figure, 7dB standard;
- Signal-to-noise: video, 65dB; audio, 60dB;
- Audio inputs, 2 channels, one 0dBm, one -50dBm;
- Operation transmitter: 12 or 28Vdc, 110 or 220Vac;
- Operation Receiver: 12 to 32Vdc;
- Weatherproofed for mast or helicopter skid mounting:
- Dimensions: 4" x 5½" x 2";
- Weight: approximately 2 pounds per unit.

Circle (213) on Reply Card

Video Receiver TBR-1K
- Frequency agile for 2, 7 or 13GHz spectra;
- Thirty channels available: at 7GHz bands;
- Threshold: -81.5dBm to LNA at 7GHz;
- Noise figure: 4.5dB at GHz preselector at receiver input;
- Dual video outputs have front panel level control;
- Operation: 115Vac, 0.5A;
- Portable version available at 24Vdc, 2A;
- Dimension: (Rack Mount), 5¼" x 17" x 19"
- Weight: 30 pounds.

Circle (214) on Reply Card

Portable ENG Transmitter, TBT-200 Series
- Frequency crystal-controlled in 2 or 7GHz bands;
- Transmitter output: 2W, 2GHz; 1W, 7GHz;
- Audio inputs, up to 3 channels, 0 to +8dBm;
- Operation: 28Vdc;
- Dimensions: about 7½" x 7" x 4 15/16";
- Weight: 5 pounds maximum.

Circle (215) on Reply Card

Electronic News Gathering Master Station TBM-100
- Communicates with TBM-100 Remote Stations (Remote controls two receive dishes);
- Operates up to four ENG Receive Systems;
- Requires full duplex telephone mode for PDM/FSK;
- 16 control functions include azimuth motion; polarization; any one of four receive frequency selectors; elevation control; dish one or two selector; manual or autotrack (optional) modes;
- Proportional telemetry for azimuth, elevation, receiver signal strength, receiver frequency offset and system power supplies;
- Discrete telemetry for polarization, selected dish, receiver frequency, control mode;
- Operating Power Master/Remote: 115Vac, 1A/115Vac, 15A.

Circle (216) on Reply Card

The following companies are listed in the Buyer's Guide as sources of equipment and/or services for ENG users. For more information, contact the companies at these addresses.

Airborne Video Systems
7525 Hayvenhurst Place
Van Nuys, CA 91406

Allen Osborne Associates
5195 North Douglas Fir Road
Calabasas, CA 91302
•Antenna Supports

Andrew Corporation
10500 West 153 Street
Orland Park, IL 60462
•Waveguide, Coax

Anixter-Mark
2180 South Wolf Road
DesPlaines, IL 60018
•Antennas

Commerce IFR
16425 Hart Street, Suite 104
Van Nuys, CA 91406
•Turnkey Hughes 300 System

Compact Video Sales Inc.
2813 West Alameda Avenue
Burbank, CA 91505
•Mobile Van Facilities

Compucon Inc.
P.O. Box 401229
Dallas, TX 75240
•Consultant Services

DYMA Engineering Inc.
P.O. Box 1697
Taos, NM 87571
•Systems Consultants

ENG Corporation
1009 C Shary Circle
Concord, CA 94518
•Mobile Vans, Airborne Units

ENG Helicopter Satellites
7920 Airpark Road
Gaithersburg, MD 20760
•Helicopter Units

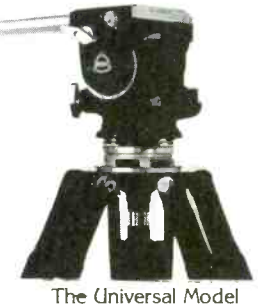
Farinon Video (Harris)
1680 Bayport Avenue
San Carlos, CA 94070
• System, Components

Hughes Helicopters Inc.
Centinela & Teale Streets
Culver City, CA 90230
•Turnkey Airborne Systems

International Microwave Corporation
33 River Road
Cos Cob, CT 06807
•Systems

From Down Under to Down South

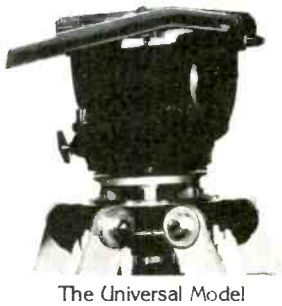
On September 1, 1981, Bush and Millimaki Services, Inc. was appointed sole United States' distributor for Universal Fluid Heads. Universal Fluid Heads will continue to be sold by the finest equipment dealers in this country. The availability of full factory service, support, and maintenance here in the United States will insure all of Universal's customers (old and new) prompt, effective response. Every Universal Fluid Head sold in the United States will now carry a full two-year warranty (parts and labor). If you have any questions regarding the Universal Fluid Heads, please call our factory representative, Tim Miller. For the location of your nearest dealer or dealership, please call Gary Gross, both at our toll free number 1-800-633-2080.



The Universal Model 808BV Fluid Head

- For Video, 16MM, 8MM cameras up to 12 pounds
- Positive Tilt Lock-Tilt Tension Control
- Autoslip
- Camera Platform 3½ x 2¼

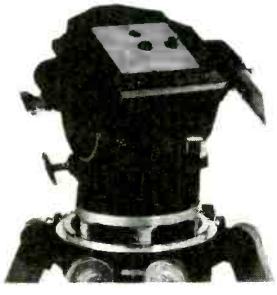
$425



The Universal Model 205BH Fluid Head

- For Cameras up to 50 pounds
- Positive Tilt Lock-Tilt Tension Control
- Autoslip
- Hydralock

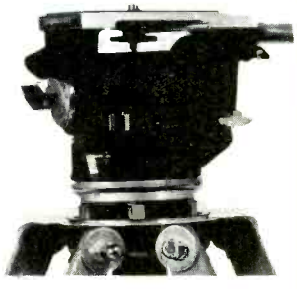
$880



The Universal Model 12BV Fluid Head

- For Cameras up to 25 pounds
- Positive Tilt Lock-Tilt Tension Control
- Autoslip
- Snaplock

$675



The Universal Model 16BH Fluid Head

- Up to 30 pounds
- Positive Tilt Lock-Tilt Tension Control
- Autoslip
- Hydralock

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ENG systems

Jenel Corporation
9550 Forest Lane, Suite 400
Dallas, TX 75243
•Consulting Services

Leasametric
1164 Triton Drive
Foster City, CA 94404
•Rental Equipment

Loral Microwave Communications
(Terracom)
9020 Balboa Avenue
San Diego, CA 92123
•Systems, Components

MicroCommunications Inc.
Grenier Field, P.O. Box 4365
Manchester, NH 03108
•Antennas

Microflect Company
3575 25th Street SE
Salem, OR 97302

Microwave Associates
Communications
63 Third Avenue
Burlington, MA 01803
•Systems, Components

Moseley Associates
111 Castilian Drive
Goleta, CA 93017
•Remote Pickup Equipment,
Controllers

NEC America Inc.
130 Martin Lane
Elk Grove Village, IL 60007
•Systems, Components

Nurad Inc.
2165 Druid Park Drive
Baltimore, MD 21211
•Systems, Antennas, Controllers

Philips Broadcast (CDC)
91 McKee Drive
Mahwah, NJ 07430
•Mobile Vans

Prodelin
P.O. Box 131
Hightstown, NJ 08520
•Antennas, Waveguide

R F Technology Inc.
145 Woodward Avenue
South Norwalk, CT 06854
•Systems, Components

RHG Electronics Labs
161 East Industry Court
Deer Park, NY 11729
•Systems, Components

Rockwell International
1200 North Alma Road
Richardson, TX 75081
•Systems, Components

Tayburn Electronics
6106 Avenida Encinas
Carlsbad, CA 92008
•Systems, Components

TEAC Corporation of America
7733 Telegraph Road
Montebello, CA 90640
•Airborne VTR

Tennaplex Systems Ltd.
34 Bentley Avenue
Ottawa, Ont, Canada K2E 6T8
•Canadian Distributor of Nurad

VanLadder Inc.
P.O. Box 1557
Spencer, IA 51301

Wolf Coach
200 Bartlett Street
Northboro, MA 01532
•Mobile Vans

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Circle (81) on Reply Card

Current trends in offline videotape editing

By Arthur Schneider, A.C.E., post-production consultant, Agoura, CA

The term "offline" videotape editing has been with us for more than 16 years. As a generic term, it is defined as the workprint stage of videotape editing. This type of editing in its crudest form began in 1965, when ½-inch reel-to-reel VTRs were used in an effort to locate edit points before conforming master tapes. One feature of these ½-inch helical scan VTRs that made them so popular was the capability of still-framing a single TV picture for long periods of time. This allowed the user to identify precise edit points based on word cues or actions. In those days, it was the only means of locating material because time code had not yet come into use.

Today time code is used as a means of locating edit points to give editors frame accuracy. When scenes are assembled in continuity, they form the basis of an edited workprint. The information thus gathered is used at a later time to conform unedited original master material in almost any format to the edits made during the offline editing session. Videotape offline editing may be compared to editing motion picture film on a Moviola.

On the other hand, "online" videotape editing is a form of mastering; that is, creating a finished product in most cases suitable for broadcast. Online editing or mastering may be done on nearly any tape format from 2-inch to ½-inch Beta or VHS formats. It should be understood that just because an edited master was made on ¾-inch or smaller videotape, it does not necessarily mean that it will meet broadcast standards.

Previously, ½-inch reel-to-reel VTRs were used because of the ease with which the tape could be manipulated and still-framed by merely moving the supply and takeup reels with a smooth motion across the video head. When one's hands were removed from the reels, a single field appeared on the TV monitor as a usable video picture and would remain on the screen still-framed for as long as the user required.

The next step was to imprint visible time code numbers in each picture frame as an accurate reference. Each TV frame contains time code information displayed as hours, minutes, seconds and frames. As each frame is advanced or reversed, the visible time code numbers within each frame follow accurately, making it easy to identify any given frame. When the video picture is still-framed, the exact 8-digit time code number of each in- and out-edit point may be written down for future reference. The device used to generate these visible time code numbers in the video is known as a character generator or inserter.

Frame accurate edit potential

With the introduction of the ¾-inch videocassette, a new potential for frame accurate edits emerged. Unlike the early ½-inch VTRs, the ¾-inch format included two audio channels, one for program and the other for time code information. It was not until late 1974 that ¾-inch cassette VTRs were successfully used in computer-assisted editing systems. One reason for this is that early ¾-inch VTRs had to be extensively modified internally to be able to read time code at VTR search speeds. Also, mechanical and electronic features were added to ensure frame accuracy and to give these VTRs a motion control capability with the familiar "joystick" control.

Today, the ¾-inch VTR is still a popular machine for recording and

Never Play Naked Records on the Air!

Your records need protection. From minor scratches, dust, dirt, and just too much handling, no matter what your program format.

Introducing Lifesaver with Disc-ProTec™ Formula. A one-step record preservative, anti-stat, and dry lubricant. One treatment lasts 50 plays or more (Len Feldman* proved Lifesaver lasts 100 plays, but we'll be conservative).

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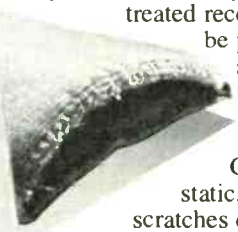
A quick "spritz," a gentle buffing, and you've dry-coated the record with an anti-stat/lubricant just microns thick. You can't see it even with a good microscope, you can't hear it, but you can feel the surface get slick and stay slick, and you'll notice no static cling of dust or record sleeves. Record cleaning is actually improved (Lifesaver is unaffected by any common wet or dry methods). And even years later, when you dig through your music library the Lifesaver-treated records will still be protected, still sound great.



Save Records, Save Money

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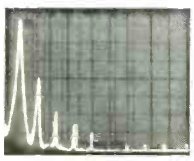
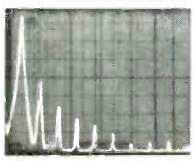
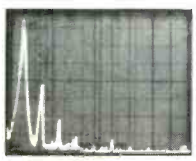
*Here's an excerpt from the Len Feldman report in Audio Magazine. We'll send you the full story with your order.



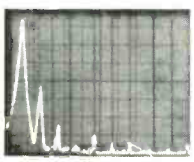
Harmonic distortion of an untreated disc during first playing.



Harmonic distortion of an untreated disc after 100 playings.



Harmonic distortion of an identical disc, first playing after LIFESAVER treatment. Distortion is immediately reduced.



Harmonic distortion of a LIFESAVER-treated disc after 100 playings. Distortion remains lower than a new, untreated disc.

Circle (83) on Reply Card

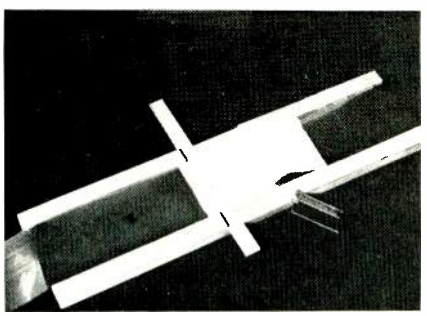
priced and capable of making clean edits. Even though early ¾-inch VTRs required extensive modification for use in a computer-assisted editing system, they were and still are accepted as the standard for offline editing. Current ¾-inch VTRs have been designed as editing machines with most, if not all of the needed features built into the VTR and usually accessed through a single remote connector on the back.

Although the early ½-inch reel-to-reel VTR was popular because of its low cost and ease of operation, it lacked many of the features required by today's time code and computer-assisted editing systems. Even though it was easy to use, the ½-inch VTR did not have the stability, speed or secondary audio channel needed for time code to be of practical value as an accurate editing tool. The ¾-inch VTR possesses all of these features and is capable of providing the user with more efficiency than its predecessor.

Joystick development

The next major advance was the development of the "joystick," a device that allowed the user to manipulate the videotape within the cassette with relative ease by means of a rotating knob, slider control, handle, lever or push-button. Because the ¾-inch videocassette by design did not allow the user to physically move the tape on a frame-by-frame basis, this means of externally controlling the tape was developed. One method was to vary the speed of the capstan or apply no voltage, which caused the tape to remain motionless, displaying a single field of video on the monitor.

Only helical-scan VTRs may be still-framed or put into a variable motion display while allowing a recognizable picture to be seen on the monitor. On the other hand, quadraplex 2-inch VTRs cannot be still-framed directly, because by their very design, physical damage would occur to the videotape and/or the video head assembly itself. This is caused by the intense head-to-tape pressure needed to generate the video signal. With the video head engaged, it would cut the tape apart if the video head were allowed to remain in contact with the tape without any forward motion of the tape.



First splicing block, designed to splice 2-inch videotapes.

Visible time code

It was mentioned earlier that a new dimension was added to videotape editing with the development of the video time code character generator, which printed the 8-digit SMPTE time code numbers in the picture area in a visible form. It was soon discovered that if another set of visible time code numbers relating to the master or workprint times was displayed alongside the source material, a definitive relationship would be set up, allowing the user to calculate offsets and determine edit points for optical effects with relative ease avoiding pencil, paper and error in the process. Computer-assisted editing in the '80s makes visible time code on videotape workprints even more important, because it reduces the chance of error and simplifies the mechanics of editing.

Once an edit list has been stored in a computer-assisted editing system, what does one do with all of these numbers? As a general rule, an edit list generated during an offline edit session may contain several tries of a single edit, over recordings and other types of errors encountered while working with time code numbers. In today's style of computer editing, lists of 1000 edits or more are not uncommon. This is partially because of the single camera techniques frequently used to give the director as much control of the final product as he now has in film editing.

Before conforming a videotape from an edit list created in an offline editing session, the list must be "cleaned up" and organized in such a manner that the corrected edit list will generate a smooth and efficient assembly. In order to generate an edit list that will reflect only the final version of the edited workprint, redundant edits must be deleted, edits put in an efficient assembly order, over recordings removed and, in general, the edit list prepared so that an orderly assembly will take place in either a sequential or checkerboard mode. Cleanup of an edit list in this manner is called edit list management. A detailed report on edit list management may be found in the August 1979 issue of the *SMPTE Journal.*

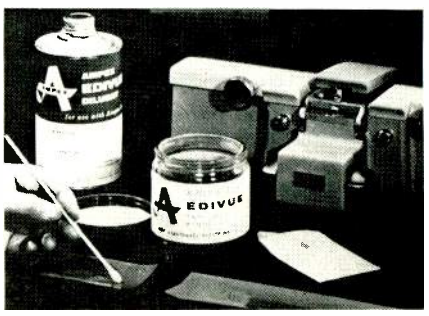
Two software tools have been introduced to the TV industry in the past several years that assist the editor in solving list management problems. The first is a cleanup program appropriately named "409." It is designed to scan an edit list and perform the functions just outlined quickly and efficiently. List cleanup takes only a few minutes, depending on the number of edits to be scanned and cleaned. Upon completion, a new list is generated in a corrected and cleaned format. Outputs in the form of a punched paper tape, magnetic floppy disc and a hard copy printout are available to the user.

The second tool available to the industry is a software program known as "Trace." It is designed to take several levels of edit lists generated by copying or duping down the editing workprint each time a change is required, and trace the resulting edit lists back to the original source material reel number and time code. This process allows the editor to make creative changes without having to rebuild the worktape each time a new version of the program is desired. Each time a tape is copied, the new version of this tape retains only one set of time code numbers: those found on the latest version. Therefore, when copying a tape in making new versions out of old ones, all original reel number and time code data is buried in the various layers of data created by copying those tapes by the editing process described. Trace is designed to ferret out this information quickly and accurately.

Each time a new version of the worktape is generated, the changes are also stored on paper tape or floppy discs. The final version of the worktape also generates an edit list, which is called the "final" tape. Each punch tape derived from the various versions plus the final tape are loaded into the computer. The Trace program now researches all of the edit lists to determine the correct reel number information from which a new composite edit list is generated. This new list reflects the continuity of the final version of the edited workprint but with the original reel numbers and time code inserted, so that a proper and efficient assembly may take place.

Film-tape-film editing

Another trend the film industry



Second generation tape splicer, developed by Ampex.

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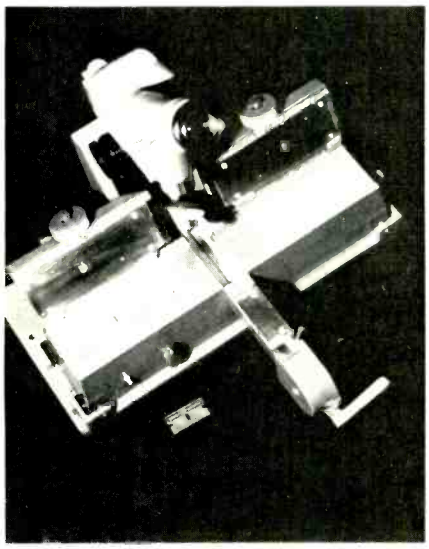
Offline editing

seems to be starting is that of shooting on film, editing offline on videotape, conforming the film negative and finishing the film in the conventional manner for release to theaters. Several versions of film-tape-film editing are currently available, they do require some preparation of the film to work efficiently. Expect to see more of this as techniques and software are improved.

The biggest advantage of editing film using a videotape workprint is speed. Another feature is that film workprints are not needed, because the camera original may be transferred directly to tape. Polarity is reversed at the time of transfer, and the editor has a color positive image to work with on cassette. By speeding up the editing process, enough money may be saved to pay for a complete offline editing system.

Currently, there is an SMPTE subcommittee working to develop an industry-compatible edit list format. There is still the problem of edit list compatibility between manufacturers. Several generate edit lists within their own systems that cannot be used on other systems. Limited reel number availability, wipe patterns and special effects are just some of the problems facing the subcommittee. Creating a compatible edit list standard is a formidable task which was started nearly three years ago. A progress report should be published soon in the *SMPTE Journal*, input from users of computer-assisted edit systems would be helpful to the subcommittee.



L. S. Smith third generation videotape splicer, still in use today.

Ampex tape splicer in use.

Software features

In the past few years, a new crop of software features has been made available to the TV industry. One such feature is known as "Automatic tracking edits." This useful, non-recorded bookkeeping edit is used exclusively to locate source material time codes and their corresponding record time code numbers needed to create optical effects such as dissolves and wipes, as well as tracking 2-play VTRs with the record VTR in order to obtain a special effect such as manual control over the video switcher or simply to mix two audio sources in a non-automatic fashion. In the past, editors usually had to try to calculate this information in their heads or figure it out with pencil and paper; in many cases, a long trial-and-error process was required to finally get the results they wanted. Today, automatic tracking edits (or "zero length" edits, as they are also called) are generated by a single key stroke that tells the system how to compute this information automatically and insert it in its proper place in the list, essentially requiring no mathematical computations from the editor.

Another popular feature offered on many computer-assisted editing systems is the storage of edit lists on magnetic floppy discettes. These come in two sizes: 5- and 8-inch discettes. The 8-inch size may hold up to several thousand edits on a single side of one discette. These magnetic discettes or discs, as they are also called, are inexpensive and reusable. Edit files may be written on to the disc or read from the disc into the computer's memory. Some versions also provide a table of contents or directory of what files are written on the disc. The obvious advantage of floppy magnetic discs is the massive amount of storage at low cost and the elimination of the need for bulky paper tape storage of edit list data. Within a few years, most manufacturers of time code editing systems with memory will undoubtedly store all edits on these discs.

Videotape post-production in the '80s seems to be leaning more and more toward the use of the single-camera technique, primarily because

Offline editing

of its flexibility over the switched live technique commonly used today. Instead of having to commit to video switching in the field, directors seem to prefer the more artistic approach of either using a single camera or isolating several different video feeds to several isolated videotape recorders, allowing directors to make creative decisions in the editing room.

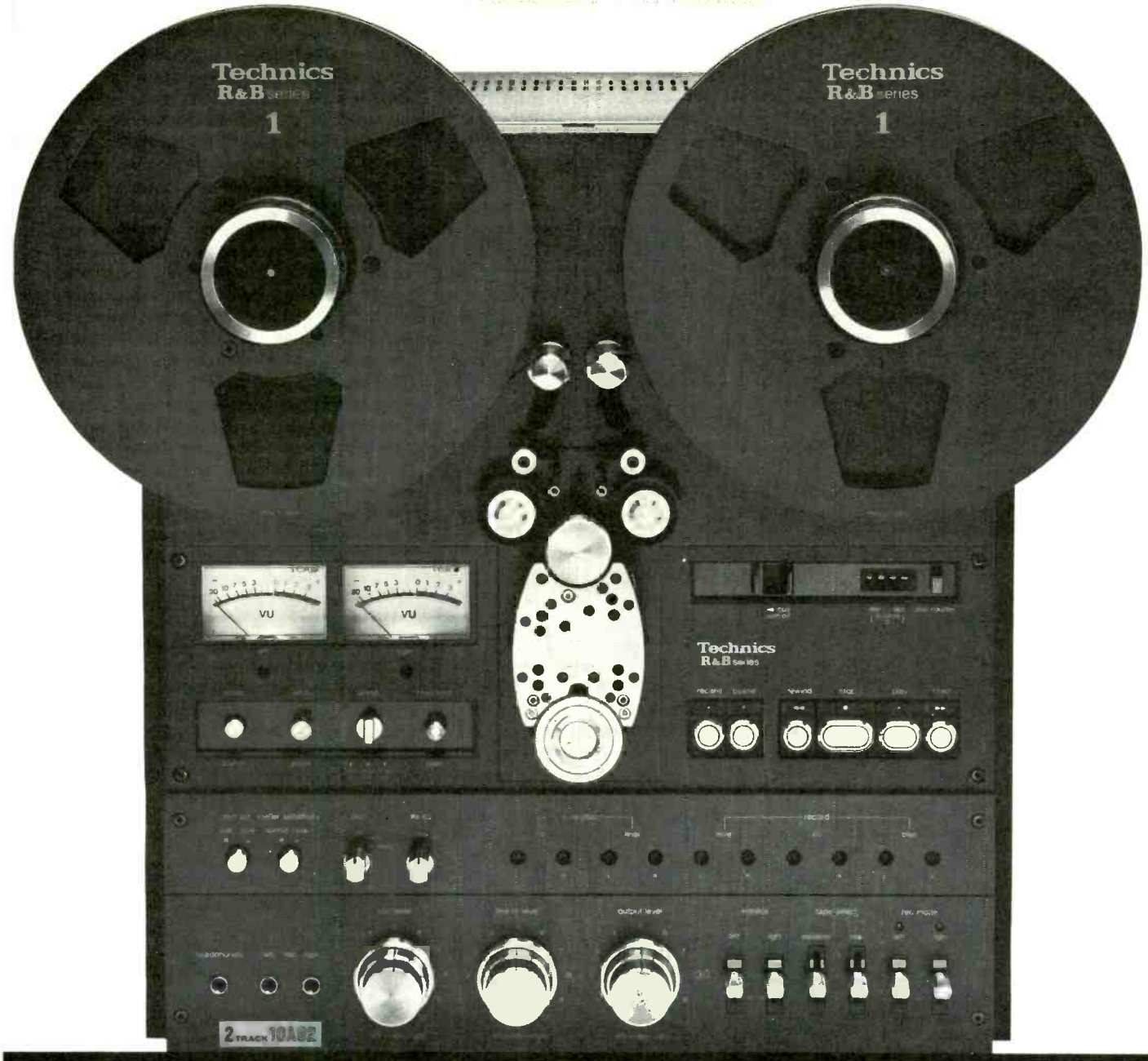
In this manner, directors are able to concentrate more on the performance of the actors. After talking with many directors, I am certain that this method of shooting and editing single camera style or using multiple isolated feeds will eventually replace most of the presently switched camera techniques.

Editing instruction

People often ask me where they can get training in videotape editing. In the Los Angeles area, there are several colleges and other institutions offering varying degrees of training of this type. The benefits one might get from attending one of these classes varies with the individual's determination to learn. Some classes are overcrowded and may not use the latest equipment, which makes it difficult to get "hands on" experience. Some instructors do not have the experience to explain the complexities of time code editing. Many colleges do, however, offer the simpler control track type of editing system, which presents a chance to learn the basics. Unless you have purchased an editing system, it may end up costing you up to $500 a week plus expenses to get training on the latest equipment. Also, you may be sharing the hands on time with other people from TV stations around the country.

In Los Angeles, the motion picture film editor's guild has purchased a computer-assisted editing system to train those members wishing to learn more about tape editing. The training course has been operating for many years and has generally proved successful. This training is available only to guild members and not to the general public. To date, more than 300 guild members have participated in this program. Once the technique of editing has been learned, whether the medium is film or tape, the knowledge stays with you, and learning to use a keyboard attached to a computer instead of insplicing film on a Moviola is just a matter or learning to use a new tool.

At last count, there were nearly 150 individual computer-assisted time code editing systems in the Los Angeles area made up of at least eight



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different brands of edit controllers, each with its own unique keyboard. Although a given function by a specific key on one keyboard may give the same results as the same key on any other brand of editing system, the amount of "keyboard calesthenics" required to make even the simplest of edits on some systems may make editing difficult and time consuming for any but the most experienced editor.

There are, however, many systems that use simple English commands, which allow the user to concentrate more on the aesthetics of editing and less on the math and mechanics of making an edit. These types of systems ask almost nothing of the user, yet generate the same result as a more complex system.

During the past several years, a near saturation point has been reached in the sales of high technology editing systems, which may cost up to $1 million per system. This includes not only the cost of the edit controllers themselves, but also the expensive VTRs, switchers, digital effects generators and the other peripheral devices needed to build an efficient videotape editing room.

The viability of ¾-inch

With the advent of the new generation of ¾-inch VTRs such as the Sony BVU-800 series introduced at this year's NAB show in Las Vegas, the trend seems to be leaning toward recording and mastering on ¾-inch and transferring the edited tape to 1-inch or 2-inch for broadcast. However, there are many things one should take into consideration before attempting to edit in this manner, such as the quality of the cameras and the recording tape used, lighting and a host of other details that could affect the overall quality of the end product. As technology improves, it is certain that mastering on ¾-inch equipment will play a bigger part than it has in the production and post-production of TV programming, partly because of the great savings in the cost of equipment and tape stock over 1-inch or 2-inch.

Because of this trend and others, it has become apparent that a need exists for simple, low cost editing systems that generate workprint quality tapes. Such a system should have the capability of making a cuts-only videotape workprint. A useful and sometimes extra cost option would be a means of storing the edits in either a memory or on a storage device such as punched paper tape or a magnetic floppy disc. However to simplify the system and keep costs low, this function is optional. A pencil and a sheet of paper can be used to log the edit information.

It is not mandatory that this type of system be able to read time code unless you need frame accurate edits. Control track style editors are the lowest cost systems because they make edits by counting control track pulses, not by reading time code. When the VTRs backup to cue the tapes, they may slip; therefore, edit accuracy cannot be guaranteed.

A solution to help solve the inaccuracy problem of the control track editing system is to have work tapes made with the 8-digit time code numbers imprinted in the picture. After completing an edit on a control track style editing system by means of any frame-by-frame device on the system (such as a joystick control or a push-button), slowly move the tape to the edit point, stop and write the number displayed on the screen as one of your edit points and find the other side of the edit either by going forward or reversing a frame at a time. If you know that the edit should have been made at a frame other than where it actually was made, modify this time code number seen on the monitor to reflect the actual edit

ARRI HMI® LIGHTS:

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

HMI is the first new light since quartz halogen. ARRI HMI lights are also new: specifically designed to make the most effective use of the HMI bulb's efficiency.

By now it's common knowledge that a 4K HMI bulb puts out 102 lumens per watt at 5600 degrees Kelvin; whereas a tungsten bulb, filtered for daylight balance, puts out between 15 and 20 lumens per watt.

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

HMI bulb efficiency has made it worthwhile to overcome the drawbacks – notably flicker. ARRI began on that early. We've been making motion-picture lighting equipment since the Thirties. In the Sixties, we began experimenting with HMI's forerunner, Radium street lights. In 1972, we pioneered the use of HMI for filming, at the Olympic Games.

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

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

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

Peter Edwards is Supervising Lighting Director at CFTO-TV in Toronto; and he is Chairman of the Society of Television Lighting Directors, Canada. He has won two Emmy Awards for lighting. He ran side-by-side tests for CFTO of the ARRI HMI 4K and two other brands of imported HMI 4K lights. "At 40 feet and full flood position, the best of the other two measured 150 foot-candles; the ARRI measured 200 foot-candles," says Mr. Edwards.

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

Tube frame protects ignition housing, acts as floor stand.

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Offline editing

editing because it is relatively low-point, and write this number in your log. This way, you will be able to create a frame accurate paper log. However, the videotape workprint may not be an accurate representation of the final product.

This may seem slow and tedious, and it is, but this is the alternative to spending a lot more money for time code reading equipment, to get frame accuracy. Offline editing systems and their associated peripherals should be in a dollar range that will allow film producers and others to take the first step into video without depleting their pocketbooks. They should provide basic film style features and uncomplicated dialogue if they are to be effective and flexible tools.

It would not be cost effective, for example, to replace all the film editing equipment on a film lot with the same number of offline editing systems costing many times more than the Moviola they might be replacing. It would be helpful if systems' manufacturers asked potential users what they would like to see in an editing system by conducting mail surveys. Terms such as "fetch and dump," although part of computer language today, should not be part of basic systems if they are to interest customers in trying videotape editing for the first time.

Conclusion

Videotape editing techniques have come a long way since the first splice with the razor blade was made more than 25 years ago. From the agonizing and time-consuming method of finding edit points "on the fly" to the versatile frame-by-frame motion control of helical-scan VTRs available today, videotape editing has finally become an art. Because of the relatively high cost of building an edited master directly online, offline editing systems have proliferated the industry, delegating most of the creativity to these systems while using online editing systems as conforming devices, and dramatically reducing the cost of mastering through automatic assemblies.

Space-age technology has taken us into the future, accelerating the design of sophisticated editing tools and making the job of the videotape editor easier than ever before. The decade of the '80s will see the development of film-to-tape-to-film editing systems, allowing the film producer to take advantage of the speed of videotape editing and yet still release to the theaters as he has in the past.

Voice boxes are available today that may be coupled to computer-assisted editing systems, allowing the editor to give editing commands even in a foreign language instead of pressing keys. The new touch-screen editing system shown by Ampex this year at NAB allows the user to select a function by pointing a finger at the edit screen and the command will be executed instantly.

Today we are able to make edits with videotapes running at speeds from twice normal forward to half-speed reverse to variable motion control to freeze frames—all with broadcast quality. New memory and storage devices are available to control video switchers, allowing the editor to rehearse, modify and repeat complicated effects with ease. Digital special effects units are able to take a TV picture and squeeze it, change perspective, zoom it, spin it, flip it, pull it apart and put it back together again with amazing speed.

Before the 1980s are over, we are likely to see digital video stored not on videotape but on some other medium, eliminating the need for time consuming searching. Instead, the sound and picture information will be made available instantly, allowing real-time assemblies of complete programs without stopping. □

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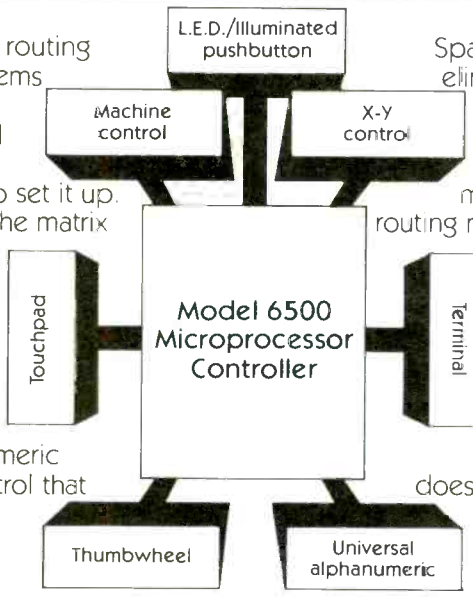

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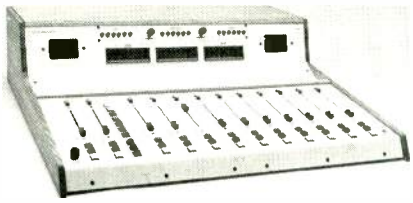
new products

Stereo console

Howe Audio Productions has introduced the Howe 8000 Stereo Console. The Howe 8000 has all the features of the 7000 series consoles.



The 8000 also offers: professional-grade linear faders, all push-button operation, switchable peak or VU reading fluorescent meters, full logic control of ON–OFF–CUE functions and seven LED status lights for each fader.

The Howe 8000 also contains the Option Panel, which was introduced with the Howe 7000 series consoles. The panel is a full-width surface of metal between the fader panel and the display panel, which allows the user to "customize" his console for specific applications.

Circle (219) on Reply Card

Calorimetric line terminating systems

Bird Electronic Corporation has introduced two new calorimetric line terminating systems, the series 8631 (10kW) and 8645(25kW) MODULOAD RF Calorimeter/Load Resistors. A large digital display indicating power in kilowatts with an accuracy of 2½% can be located remotely several feet from the load for operator convenience. The systems' MODULOAD RF load resistors are self-cooled.

The 8631 can handle power from 1kW to 10kW on continuous duty, requiring three minutes for stabilization. VSWR is 1.1 maximum from 1kHz to 1000MHz. The 8645 offers a 1kW to 10kW range as well as 10kW to 25kW and is rated for 25kW continuous duty. The VSWR of 1.1 maximum covers a frequency spectrum from 1kHz to 900MHz. The low VSWR contributes to measurement certainty, assures accurate termination of 50 lines during off-line or off-the-air tests and allows maintenance of transmitters in locations where water supply is unreliable, expensive or unavailable.

Circle (217) on Reply Card

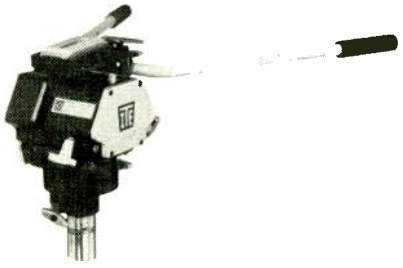
Switcher interfaces

Datatron recently announced the availability of its newest interface to the ISI-1201 and 1206 switchers for its Tempo series videotape editing systems. Datatron also offers interfaces to the Grass Valley 1600 series, Vital Industries 114 series and Industrial Science Inc. 1200 series switchers.

Circle (218) on Reply Card

Camera head

A camera head that represents a new concept in a viscosity drag control system for both pan and tilt operations has been introduced by *Innovative Television Equipment*. The new ITE-H10 Hydro Head incorporates an adjustable center of gravity control that permits counterbalanced load control, thus providing constant camera balance. The nine-pound aluminum die cast head is adaptable to all ITE tripods, and will support cameras weighing up to 40 pounds.



The ITE-H10 comes with control handle, quick-release adapter and spirit level; dual handles are optional.

Circle (220) on Reply Card

Cable clips

For situations in which raceways, conduit or troughs are not available for cabling, *FASTEX*, a division of Illinois Tool Works Inc., has introduced a series of clips for attachment to walls. TAPIN® clips are made of clear polycarbonate material. For smooth, clean, hard surfaces an adhesive backed series keeps added wiring in order. The series of clips are intended for use with RG-59, RG-6 size cables.

Circle (224) on Reply Card □

people

Dr. John D. Holm has been appointed technical director of 3M's Magnetic Audio/Video Products Division. Dr. Holm joined 3M in 1967 as a senior research engineer in what is now the Magnetic Audio/Video Products laboratory. His most recent assignments have been research manager and technical service and product maintenance manager for the division.

Central Dynamics Corporation recently announced the appointment of **William E. Amos** as executive vice president and general manager of American Data Corp., Huntsville, AL. Amos will be responsible for all operations at American Data at the Huntsville plant including manufacturing, engineering, R&D, and US and international sales.

Joseph Novik has been appointed vice president/marketing manager of Elcom-Bauer, which recently purchased the radio transmitter operation from the Cetec Broadcast Group. Novik was previously the national sales manager of Sintronic Corporation, subsidiary of Singer Broadcast Products.

Deborah Harter was recently named national sales manager for Convergence Corporation, manufacturer of microprocessor-based videotape editing systems. She was promoted to that position after serving as Western regional sales manager. Harter will be responsible for all domestic sales activities, including managing the Convergence full-line dealer network throughout the United States and Canada.

California Microwave Inc. has promoted **George M. Stamatis** to national sales manager for the Telecommunications Division, with responsibility for all division field sales and service activities. Stamatis joined California Microwave in 1977 as eastern regional sales manager—Telecommunications Products.

Wataru Hino has been promoted to vice president for Anritsu America Inc. Hino continues his responsibilities as secretary-treasurer of the company. He is now also in charge of marketing planning. Previously, Hino served as supervisor for sales to South Asian countries for Anritsu Electric Company Ltd., Tokyo-based parent company of Anritsu America.

Susan E. Steinberg has joined Logica Inc. in the newly created post of director of public relations. For the past two years she has served in a similar capacity with the Monchik-Weber Corporation, New York, a software consulting firm.

Richard T. Sanford, national sales manager of Thomson-CSF Broadcast Inc. has announced that **John A. Nash** of Coon Rapids, MN, will be the regional manager of the newly established Central Plains region. In this capacity, Nash will be responsible for the sale of all Thomson products throughout Iowa, Kansas, Minnesota, Nebraska, North Dakota and South Dakota.

C. W. "Willie" Scullion has been appointed national sales manager of Ampex Corporation's Audio-Video Systems Division. Scullion will direct US sales activities for the division's complete line of professional audio and

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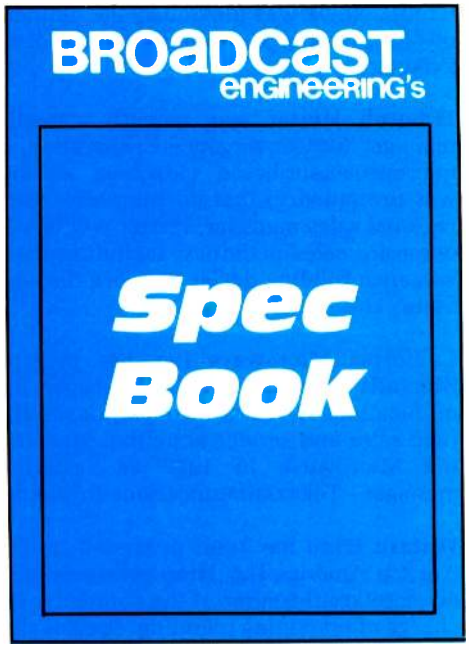

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Spec Book was conceived by BE and will be edited by BE's highly experienced editorial staff, including Spec Book Editor Carl Bentz, and a number of recognized industry experts. With this all-out editorial effort, Spec Book wil provide essential information available for you nowhere else in such a convenient, easy-to-use format. A book for everyone involved in buying and specifying products.

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Published as a 13th Edition of Broadcast Engineering
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videotape recorders, broadcast cameras, switching systems, and computerized editing and video storage systems.

Victor Brody has joined Peirce-Phelps Inc., Video Systems Division, in the position of marketing services director. Brody was formerly promotion director for Learn Inc., TV program producers and publishers in Mt. Laurel, NJ.

Jim Guthrie has been named national sales manager for Sony Professional Audio. In his new position, Guthrie will be responsible for implementing marketing strategy through Sony Professional Audio's network of representatives and dealers.

Hank Wilks has been promoted to general sales manager of Videomedia Inc., manufacturer and distributor of video systems and equipment. Wilks will be responsible for coordinating all Videomedia sales, national and international, of both distributor and manufactured products.

Panasonic has announced the appointment of **Joseph P. Dillon** to the position of general manager for the Electronic Components Division. Dillon's responsibilities will include sales and marketing for the complete line of Panasonic electronic component products.

Rick Plushner has been named national sales manager for Sony's Digital Audio Division. Plushner's most recent position was Western regional manager for digital audio sales.

UREI has announced the appointment of **Garry Margolis** as director of sales. Margolis will be responsible for all domestic and international sales.

Alan R. Davis has been named national sales manager at Asaca/ShibaSoku Corporation of America, Des Plaines, IL. He was previously with Rohde & Schwarz and most recently was national sales manager.

Robert R. Weirather recently rejoined the Broadcast Products Division of Harris Corporation as a member of the senior technical staff. Weirather will serve as consultant on advanced developments. Weirather will be responsible for providing technical guidance on new product development to aid in the on-going expansion of Harris' product lines.

Hugh Wilcox has been named general manager of Cetec Broadcast Group. Wilcox has been director of engineering of the division for two years, having joined CBG as design engineer in 1977. He came to Cetec from Broadcast Electronics, where he was senior systems engineer.

Joseph C. Volpe has been appointed division vice president, broadcast transmission systems, for RCA Commercial Communications Systems Division in Camden, NJ. Volpe is responsible for product management and engineering for RCA's line of radio and TV transmitters, broadcast antennas and technical services.

Benton Everett has joined Compact Video Systems manufacturing group as national sales manager. Everett directs sales for all manufacturing group subsidiaries including Compact Video Sales, RTS Systems Inc., and Skirpan Lighting Systems Inc.

ad index

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FCC GENERAL RADIOTELEPHONE operators license through cassette recorded lessons at home plus one week seminar in Boston, Washington, Detroit or Philadelphia. Our twentieth year teaching FCC license courses. Bob Johnson Radio License Preparation, 1201 Ninth, Manhattan Beach, Calif. 90266, Telephone (213) 379-4461. 8-81-tfn

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ONE STOP FOR ALL YOUR PROFESSIONAL AUDIO REQUIREMENTS. Bottom line oriented. F.T.C. Brewer Company, P.O. Box 8057, Pensacola, Florida 32506. 7-71-tf

TAPE HEAD RE-LAPPING worn Audio heads recontoured for original performance $25.00 per stack. (Ampex 350, 440) We quote on others. Morrison Company, 891 Coventry Road, Kensington, CA 94707 (415) 525-9409. 10-81-3t

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BROADCAST ENGINEERING SERVICE COMPANY: TV-FM-AM field engineering emergency maintenance—turnkey installation system design—survey and critique interim maintenance or chief engineer. B E S Company, New Port Richey, Fla. 33553, (813) 868-2989. 7-81-6t

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BROADCAST CRYSTALS: for AM, FM or TV transmitters, frequency change, repair or replacement of oven types. Also vacuum types for RCA, Gates, Collins, CCA, etc. transmitters. High quality products, reasonable prices and better delivery! Don't be without a spare crystal. Frequency change for FM and AM nomitors. Over 30 years in this business. Eidson Electronic Co., Box 3751, Temple, Texas 76501. Phone (817) 773-3901. 4-61-tfn

HELP WANTED

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

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

HELP WANTED (CONT.)

TV MAINTENANCE ENGINEER: Must have FCC First Class or General Class Radio/Television license and several years of actual maintenance experience with state-of-the-art television studio equipment and associated systems. Salary commensurate with experience. Contact Jack Cowart or Bernie Wimmers. 305-377-0811, ext. 130. WCIX-TV 6, 1111 Brickell Avenue, Miami, Florida 33131. Equal Opportunity Employer. 10-81-1t

HIGHLY SKILLED in contacting broadcast and cable facilities—promoting sales of Ikegami, Sony, Panasonic, VTR and editing systems. We're looking for a self-starter ready to move into a position with the largest and fastest growing sales and equipment rental organization on the East Coast. Excellent benefits and salary commensurate with experience. Reply in confidence to: Dept. K, P.O. Box 462, Radio City Station, New York, NY 10101. 10-81-1t

ELECTRONICS TECHNICIANS (VIDEO MAINTENANCE). Major dealer of television equipment seeks several bench technicians for expanding technical services department. Needed are technicians experienced with broadcast and industrial cameras including, HL-79; TK-76; BVP-300; XC-700; ITC-350; editing systems, TBC's; digital effects systems; ½", ¾", and 1" VTR's; TV receivers and monitors. Liberal salary and benefits, factory training and we pay for relocation. Reply with resume and salary requirements in confidence. Dept. K, P.O. Box 462, Radio City Station, New York, NY 10101. 10-81-1t

Field Service Engineers

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

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

Interested and qualified candidates are invited to send a resume in confidence to Sylvia Smith, The Grass Valley Group, Inc., P.O. Box 1114, Grass Valley, CA 95945. An Equal Opportunity Employer M/F/H.

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A Tektronix Company

REMOTE MAINTENANCE TECHNICIAN: Experience in operation and maintenance of VPR-2, PC-70, Grass Valley switchers. Must have 2 years broadcast related experience, 2nd Phone, willingness to travel. Contact: John Anderson, MCI Productions, #10 Greenway Plaza, Houston, TX, 77046. Phone: (713) 741-0239 or (713) 627-9270. 9-81-2t

BROADCAST ENGINEER: Min. 2 yrs. college level training in analog & digital electronics + 2 yrs. field serv. or TV station experience maintaining video switchers, routers & machine control systems. Exper. w/equip. mfg. by GVG preferred FCC lic. req. Send resume to: Engineering Dept., KRON-TV, P.O. Box 3412, S.F. CA 94119 9-81-2t

HELP WANTED (CONT.)

CHIEF ENGINEER for newly equipped University telecommunications center. Facilities include 50KW FM, UHF, ITFS, CCTV, and production studio, EFP and remote units. BS in related field and 3 years engineering experience required. Competitive salary plus university fringe benefits. Apply to: Joel L. Hartman, Bradley University, Center for Learning Resources, Peoria, IL 61625, (309) 676-7611 X235 An Affirmative Action/Equal Opportunity Employer. 9-81-2t

UHF XMTR & STUDIO MAINTENANCE: Immediate job opening for person qualified to perform maintenance and proofs on UHF TV transmitter. Also must be experienced in maintenance of quad and C-format VTR's, studio switchers, cameras, etc. Competitive salary and benefits. Send resume and application to: R. Snow C/E, KTSF-TV, 185 Berry Street, San Francisco, CA 94107. (415) 586-2638. 9-81-2t

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We are seeking Senior Design Engineers interested in growth opportunity in the exploding world of Digital Video technology.

MICROTIME is a leading manufacturer of digital processing equipment used in broadcast, cable, industrial and educational video facilities.

Qualified applicants are encouraged to send resume in confidence to MICROTIME, Inc. Attention: Gene Sarra, Chief Engineer, 1280 Blue Hills Avenue, Bloomfield, CT 06002.

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BROADCAST MAINTENANCE TECHNICIAN. Maintains, sets up, operates, and repairs audio and video color equipment for public TV broadcast and production facility at West Virginia University. Need experienced applicants with solid electronic background including digital circuits. Prefer applicant with at least 2 years full-time experience in TV. Full benefits available—retirement—medical insurance—credit union—sick leave—vacation—full-time staff use of university facilities—plus other university benefits. Send letter or resume to: Keith Massie, Associate Director of Operations, Station WWVU-TV, P.O. Box TV-24, Morgantown, WV 26507-0897, or Telephone (304) 293-6522. West Virginia University is an Equal Opportunity/Affirmative Action Employer M/F. 10-81-2t

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ELECTRONIC TECHNICIAN—Responsible for the maintenance of all electronics or mechanical equipment. May be required to repair or maintain the physical facilities at station. This includes but is not limited to: plumbing, painting, carpentry, and set construction. May be required to perform other duties as assigned by Chief Engineer. Must have First Class Radio-Telephone License. Experienced in the maintenance of complex electronics and electro-mechanical equipment. Able to lift and carry 130 lbs. a distance of 200 feet. Normal hearing and color vision with vision correctable to 20-30. Must be able to operate a motor vehicle and be insurable. Send application, along with resume, to KIMO-TV, 2700 East Tudor Road, Anchorage, AK 99507, Attn.: Chief Engineer. 10-81-1t

HELP WANTED (CONT.)

Video Maintenance Engineer. Part-time. FCC 1st class phone license, formal electronic schooling and four years of experience in TV studio maintenance required. Duties include maintenance and routine alignment of studio equipment such as: Color and B & W cameras, ¾" VCR's, electronic editing system, telecine system, color production switcher, audio mixing and recording equipment, and associated components used in a modern black and white and color studio. Flexible work schedule on a fixed annual salary.

Submit resume to Personnel Department, Hofstra University, 1000 Fulton Avenue, Hempstead, New York 11550.

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Excellent opportunity in Corporate Communications for a person with at least 5 years experience in setting-up cameras, switchers, recorders, as well as maintenance and repair of broadcast quality video equipment. Candidates should have 5 years experience in digital technology, and knowledge of EFP/ENG technology. Manufacturer training and work experience with Ikegami cameras, CVS TBCs, ISI switcher, Sony 3/4" recorders, Video Media Z6 Editor and Quantafont Q7A preferred. Electronics degree and familiarity with Tektronix test equipment preferred.

Liberal starting salary/benefits package. Please write outlining training and experience to:
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HELP WANTED (CONT.)

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SENIOR ENGINEER: Position as Studio Maintenance Supervisor. FCC 1st Class Broadcast License required. Minimum 10 years experience. Equipment experience required: RCA TCR100, TR70 C-s, TR600, VPR2, VPR20, TK28 Film Cameras, TK44 Cameras, Ikegami HL79 A's Cameras, Grass Valley Switcher 1600 Series with NEC Digital Effects Package, AD-DA200 ESP Frame Storer System, Ward-Beck Audio Console and Microwave Associates Microwave Equipment. Send resume to: David Hendricks, KTBS-TV, Box 44227, Shreveport, LA 71104. EQUAL OPPORTUNITY EMPLOYER. 10-81-1t

TRANSMITTER TECHNICIANS—Voice of America has career opportunities available for qualified transmitter technicians at VOA stations near Delano, California; Greenville, North Carolina; and Bethany, Ohio. Duties include operations/maintenance of high power VOA transmitters and related facilities on shift basis. Applicants must have 3-5 years recent "hands-on" experience in technical operation of broadcast, TV, or military fixed-station transmitters. U.S. citizenship required. Starting salary $20,467. Full federal fringe benefits apply. Qualified candidates should send standard Federal application form SF-171 (available at U.S. Post Offices) to International Communication Agency, MGT/PDE, Washington, D.C. 20547. AN EQUAL OPPORTUNITY EMPLOYER. 10-81-3t

HELP WANTED (CONT.)

Expansion and continuing growth make possible this new position of

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SYSTEM DESIGN ENGINEER—CCTV. Must be able to specify, design, supervise installation and de-bug top quality industrial CCTV systems. Experience required. SYSTEM ENGINEER—AUDIO VISUAL and PROFESSIONAL AUDIO. Hands on experience with audio/visual equipment a must. Digital knowledge helpful but not required. Responsibilities include complete job oversee and client interface. Both positions provide paid health, life insurance, vacation, etc. Please call collect 201-288-6130, Stylist Systems, Teterboro, N.J. 9-81-tfn

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Engineers/Technicians maintain, install and modify the TV network equipment, with emphasis on the maintenance function. These jobs require an FCC First Class License, good troubleshooting skills and craftsmanship, the ability to climb a 65 foot tower, lift 75 pounds, and a valid driver's license. You will be working with a variety of TV equipment such as cameras, monitors, VCRS recorders, TBCs, film-chains, transmitters, microwave systems, etc. Candidates should have two years' TV experience. (An AA degree or four years' TV experience is required for senior level positions.) Salary range: $1513-$2181/month. Moving expenses are negotiable.

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ASSISTANT CHIEF ENGINEER—Major dealer of broadcast and industrial television equipment and systems seeks an engineer experienced with TV and B'casting equipment, systems, maintenance and applications. Top salary and benefits, factory training, liberal benefits. We pay relocation. Reply in confidence. Send resume with salary req. to: Dept. K, P.O. Box 462, Radio City Station, NY, NY 10101. 10-81-1t

COMMUNICATIONS TECHNICIANS: Applicants must be experienced in the maintenance of broadcast studio equipment such as ¾" VTRs, color TV cameras and 2-way radios, etc. Excellent benefits including tuition for you and your dependents. Send resume to: C. R. Dreher, University of Miami, P.O. Box 24-8021, Coral Gables, Florida 33124. Tele: (305) 284-5388. Equal opportunity affirmative action employer. 10-81-1t

MARKETING VICE PRESIDENT—Vlahos-Gottschalk Research Corporation is expanding its product marketing in the video industries. We are seeking an individual with 3-5 years engineering or technical marketing experience and knowledge of video technology and video production practices. Candidate selected will be involved in all aspects of marketing, including market planning and strategy, sales promotion and new product planning. BSEE degree is preferred and MBA is desirable. Some travel will be involved. Send resumes to: Vlahos-Gottschalk Research Corporation, 18607 Topham St., Reseda, CA 91335. 10-81-1t

WQRC-FM, CAPE COD, has immediate opening for chief engineer. This is a hands-on, not administrative position. Experience should include FM transmitters, automation, STL and RPU equipment and new facility construction. Company has CP for new AM and has recently entered the video production field. Facilities are new and among best in New England. Knowledge of 3-tube cameras and ¾-inch editing systems desirable. For specific job description phone or write Donald Moore, 737 West Main Street, Hyannis, MA 06201, (617) 771-1224. No collect calls. E.O.E. 10-81-1t

TELEVISION BROADCAST maintenance engineer—Experienced only; familiar with cameras, ¾", 1". 2" video tape recorders, ENG/EFP Equipment. Send detailed resume to Chief Engineer, WKRC-TV, 1906 Highland Ave., Cincinnati, Ohio 45219. 10-81-2t

TV ENGINEER: Independent production company seeks TV studio engineer to join its engineering department. Must be able to maintain VTRs, switchers, and cameras. Knowledge of international broadcast standards desirable. Send resume, salary requirements and references to Dept. 545, Broadcast Engineering, P.O. Box 12901, Overland Park, Kansas 66212. 10-81-1t

INTERNATIONAL BROADCAST: TV production company seeks an equipment engineer who can maintain, repair and set up video equipment using foreign standards (PAL/SECAM) equipment. AFRTS engineering background relevant. Send resume, salary requirements, and references to Dept. 546, Broadcast Engineering, P.O. Box 12901, Overland Park, Kansas 66212. 10-81-1t

MAINTENANCE SUPERVISOR: Minimum 5 years TV engineering experience, 1 year supervisory experience required. First Class Phone with expertise in maintaining broadcast equipment. Salary: negotiable. Excellent benefits. Resume to: WXXI-TV Personnel Department, P.O. Box 21, Rochester, New York 14601. EOE. 9-81-1t

BROADCAST ENGINEER: Applicant must be familiar with AM broadcast equipment, satellite downlinks, S.T.L.-Microwave equipment. Willing to work with small team-oriented staff. Salary for this 30 hour/week job is $20,000/year, adjusted D.O.E., plus full benefit package. Send resumes to: KBBI, P.O. Box 1085, Homer, Alaska 99603. Applications close October 20, 1981. KBBI is an Equal Opportunity Employer. 10-81-1t

SERVICE MANAGER: Professional Motion Picture and Video Equipment Supplier has an immediate opening for a Service Manager in its Detroit Office. Applicant must have a technical background in addition to personnel management experience. Department services "state-of-the-art" video equipment, ultra precision film cameras and related accessories. Excellent benefits with progressive, expanding company. Submit resume to: VICTOR DUNCAN, INC., Attn.: Linda Viglione, 32380 Howard, Madison Heights, MI 48071. 10-81-1t

HELP WANTED (CONT.)

TV MAINTENANCE ENGINEER... Minimum of 3 years experience. General class FCC license required. An Equal Opportunity Employer. Send resume to: Gene Rader, Director of Engineering, KBIM-TV, P.O. Box 910, Roswell, N.M. 88202-0910. 10-81-2t

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RCA-TK-76 camera with lense. Excellent condition, low hours. $24,000.00. 206-392-3011. 6-81-6t

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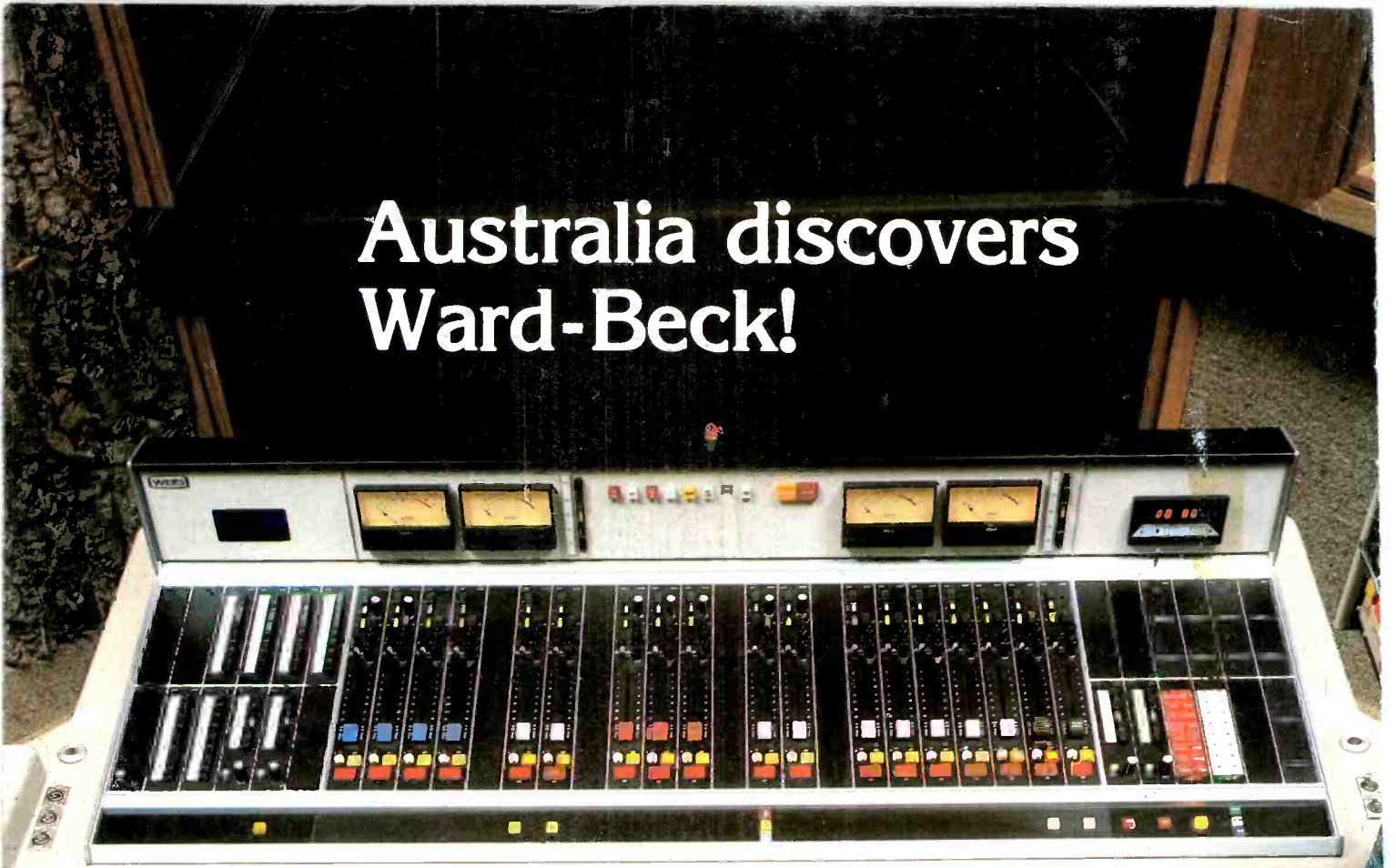

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