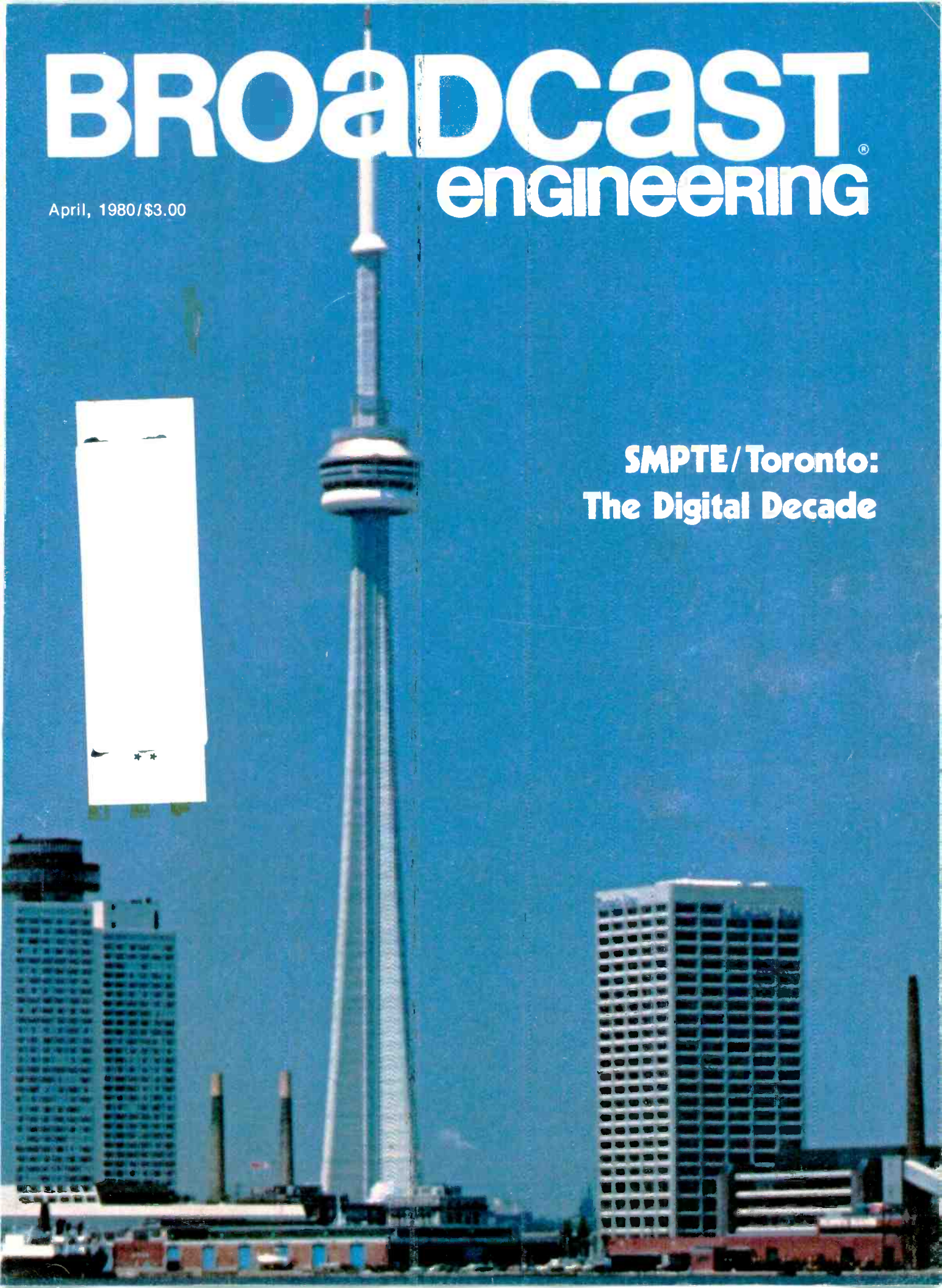


BROADCAST[®] engineering

April, 1980/\$3.00

**SMPTE/Toronto:
The Digital Decade**





The world's most advanced hand-held wireless microphone

After three years of extensive research, Vega proudly announces two all-new hand-held wireless microphones designed for use by discriminating professional performers, or anyone who must have superior sound quality without a mic cable. These microphones are a substantial improvement over all previous hand-held wireless mics, offering not only top audio performance, but also a revolutionary case/antenna system. Because the antenna is incorporated into the microphone housing, unsightly dangling wires and "rubber duckies" have been eliminated. This new design assures that the RF output is equal to, or better than, that which could be achieved with an external antenna—no matter how the microphone is held. Light weight and a gracefully contoured shape contribute to the mic's com-

fortable, well-balanced feel.

The Model 80 is equipped with an Electro-Voice EV-671 mic capsule, and the Model 81 utilizes a Shure SM-58 capsule. Due to very low distortion and a flat transmitter-to-receiver frequency response of ± 2 dB from 40 Hz to 15 kHz (± 1 dB 100 Hz to 12 kHz), the sound is as clear as you would expect from the best of conventional hard-wired microphones. Used with a Vega "Dynex" receiver, overall system dynamic range is better than 90 dB, eliminating the mixer gain control riding and distortion caused by compression and clipping. (The mics are available without Dynex for

compatibility with older Vega receivers or those of different manufacture.)

Both models use a standard 9V alkaline battery, offering from 7 to 9 hours continuous use, and a range of up to 1000 feet. Since operation is in the 150 to 216 MHz VHF range, there is no interference from CB radios or FM broadcast stations in normal use. An audio gain control on the bottom of the case lets the user adjust the mic's sensitivity. Optimum setup can be verified with an adjacent LED indicator that doubles as a battery monitor. The mics also include a Power On/Off switch, plus a separate Audio On/Off switch so you can keep the receiver quiet when you want to temporarily silence the mic.

When new techniques are developed . . . they're from Vega.



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"Broadcast Electronics' Control 16
not only made automation affordable for us...
but also indispensable!"
Jim Moll - Station Manager



KE WE

100 Stereo

OSTM

"California Light"

Mr. John Burtle
Director-Automation Products
Broadcast Electronics, Inc.
P. O. Box 3606
Quincy, Illinois 62301

Dear John:

This is a long overdue letter of appreciation to you and your staff for the help and professional assistance given us during the break-in period of our Control 16 automation system.

As for the operation of the system, your brochures do not tell half the story. The system has the cleanest on-air sound of any I've heard. The ease of operation is a big plus, too. The system really does cover operator mistakes without letting the entire audience know about it.

As you know, one of our prime concerns prior to the purchase of our system was the kind of service we could expect during and after initial set-up. To say the least, we are extremely pleased we went with Broadcast Electronics. Your staff is cooperative and very patient and willing to help out no matter what the hour.

John, I have worked with automation systems of all kinds over the past several years. I would not hesitate to recommend the Control 16 automation system for any broadcasting application. The Control 16 not only made automation affordable for our operation but also--indispensable!

John, if you haven't gotten my drift thus far, we are pleased with the system and your company's service. Please put us down in the column of very, very satisfied customers! I would be happy to talk with prospective clients of yours to sing the praises of the Control 16.

Sincerely,

Jim Moll
James H. Moll
Station Manager

2654 OLIVE HIGHWAY, SUITE B • OROVILLE, CALIFORNIA 95965 • (916) 533-3700

Write - or better yet call
John Burtle for immediate action.



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HITACHI | HR-200

New
from Hitachi

A Colossal One-Inch Step

One-inch is the VTR format of the future. It's too important a step forward for a scaled-up 3/4" or a scaled-down 2" system. It deserves to be totally original, with every advance designed in. That's how we approached the new Hitachi HR-200, after almost 20 years of experience making quad machines. The result: a one-inch Type C VTR destined to establish new broadcast standards everywhere. In every department, the Hitachi HR-200 is miles ahead of the one-inch competition!

Fast, sure, easy operation

Hitachi one-inch VTR's are loaded with features—many of them Hitachi exclusives. Like the brake release for easier threading. Both video and audio confidence. A "B-wrap" configuration, for reduced dropout. A *precision* moveable tape guide for easy loading, with an incredible 1-micron tolerance that's accurate for up to 2 million threadings! Plus a sloped design and easier-to-see top mounted drum for still easier threading.

Dazzling performance extras

Imagine shuttling a 1-hour tape end-to-end in just 80 seconds! It's possible, only on the Hitachi HR-200, because an internal air compressor injects a column of air into the tape guides to reduce friction and increase acceleration. The same air compressor provides air for the non-contact air drum, cushioning the tape when in the standby or fast shuttle modes. For fumble-free shuttling and jogging and fast editing, a single knob controls both. There is audio spot erase capability. And a Hall-Effect head on the third channel reads the time code more accurately, regardless of tape speed.

A microprocessor makes the built-in editor the most advanced you'll find today. And, just as important: it can be re-programmed to interface with editing systems of the future. Serial or parallel logic for remote control? Both have advantages, so Hitachi gives you both. Built-in cable compensation boosts the signal so you can use cable up to 300 feet.

Uniquely simple service

Serviceable components have been human-engineered for easy access and replacement. The PC modules are front-mounted and can be removed in an instant. The six heads come as a pre-aligned drum assembly that snaps out and snaps back in minutes.



HR-100 Portable Model

The HR-200 is available as a console, or for tabletop use or 19" rack mounting. Best of all, it costs no more than ordinary 1-inch VTR's!

Smallest Type C portable ever!

The HR-100 portable model has many of the HR-200 features, yet it's the smallest Type C portable in the world. And the most serviceable too, with plug-in PC modules. Die-cast uniblock construction makes the HR-100 durable yet extremely light. And like the HR-200, it has a non-dropout tape path. Plus an extended tape path for less edge wear, an auto back space assemble editor, and 3-way power with built-in battery pack, AC adapter or external DC.

Take a big one-inch step. See the New Hitachi 1" VTR's...today.

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BROADCAST[®] engineering

The journal of broadcast technology

April, 1980 □ Volume 22 □ No. 4

- 8 FCC update
- 10 Industry news

Association news

- 14 NAB
- 16 NRBA
- 20 Other associations
- 50 ASTVC

Digital technology

- 22 **SMPTE: The digital decade**
By Bill Rhodes, editorial director
- 32 **Digital Audio: A WQXR experience**
By Zaven N. (Doc) Masoomian, chief engineer, WQXR, New York
- 38 **Editing a video production with digital audio soundtrack**
By Roger Pryor, general manager, Sony digital audio division

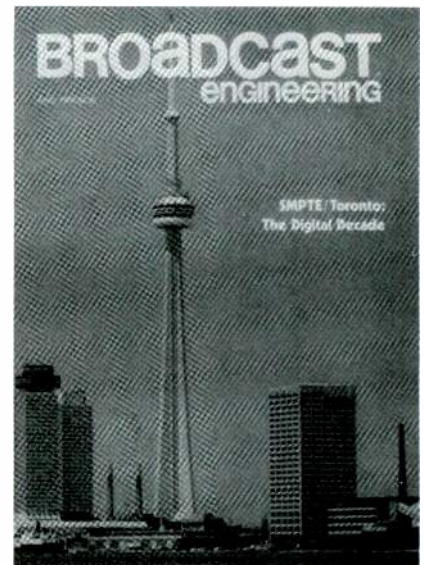
ARTICLES

- 44 **Audio mixers and processing equipment: user comments**

People in the news	52
Business news	56
New products	64
Meetings, events & seminars	74
New Literature	76

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THE COVER shows the CN Tower which dominates the Toronto, Canada skyline. The city of Toronto hosted the 14th Annual SMPTE Television Conference with its history-making program devoted to The Digital Decade. During this conference, John Lowry of Digital Video Systems invited all attendees to be his guest and take the trip to the top of Toronto's spectacular CN Tower.

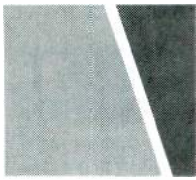
A replay of the SMPTE Conference, and more on the CN Tower, begins on page 22.

The graphics for the CN Tower were provided by, and printed with permission of, the CN Tower, Toronto, Canada.

Next Month

The May issue will highlight selected aspects of transmission technology and digital measurements.

- Transmission Technology: an Overview
- Getting the Most Out of Power Tubes
- Design of a 30kW FM Transmitter
- An FM Transmitter Roundup
- Using a Digital Oscilloscope for Broadcast Timing Measurements



fact: the SC39 Series meets all the unique demands of professional cartridge users

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- Recording
- Disco
- Transcription and other professional uses

The Professional Challenge: Undistorted playback, even of the toughest-to-track, "hottest" recordings.

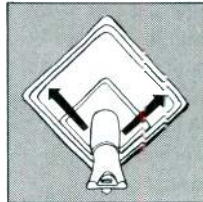
The SC39 Solution: The Shure-designed shank structure and bearing assembly gives trackability up to and beyond the theoretical cutting velocities of today's recordings. Frequency response is essentially flat across the audio spectrum, optimized for professional applications.

The Professional Challenge: Day-in, day-out rigors of slip-cuing, backcuing, and the inevitable stylus abuse that comes with the job.

The SC39 Solution: The internal support wire and special elastomer bearing insure stable and accurate backcuing without groove jumping. This, plus the following exclusive features, protect the SC39 from accidental stylus damage:

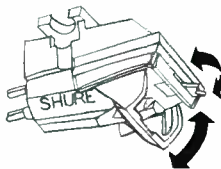
SIDE-GUARD Stylus Deflector

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



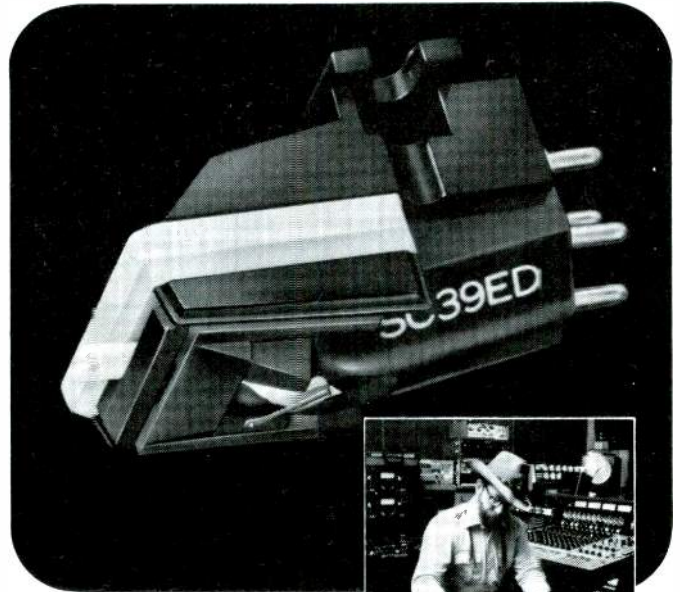
FLIP-DOWN Locking Stylus Guard

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



The Professional Challenge: Prolonged record (and lacquer master) playability without objectionable noise buildup.

The SC39 Solution: A unique Shure MĀSAR™ stylus tip is designed to minimize noise and cue-burn on records. Tests on lacquer masters show that the noise level on a record played repeatedly with an unworn Shure MĀSAR tip is significantly below that of a similar disc played with an unworn conventional stylus. The SC39 also reduces noise buildup on 45 rpm records made from reprocessed or substandard vinyl.



The Professional Challenge: A multiplicity of different applications, which no one cartridge can satisfy.

The SC39 Solution: The SC39 Series consists of the following three cartridges, for every professional and high fidelity application:

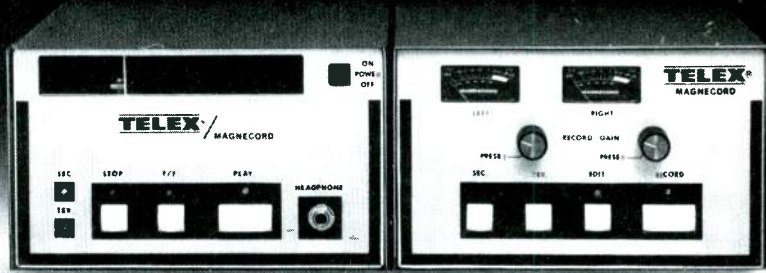
Cartridge	Stylus tip	Tracking force	Applications
SC39ED	Biradial (Elliptical)	3/4—1-1/2 grams	High fidelity, or where light tracking forces are a consideration. Transcription, recording lab, playback of lacquer masters, high quality broadcast.
SC39EJ	Biradial (Elliptical)	1-1/2—3 grams	Where heavier tracking forces are required. AM broadcast, disco.
SC39B	Spherical		

The SC39 Series Professional Phono Cartridges



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CANADA: Telak Electronics, Ltd., 100 Midwest Road, Scarborough, Ontario M1P3B1, Telephone: 416-752-8575

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FCC update



By Wally Johnson, ABES executive director

April, 1980

Region 2 AM Administrative Conference

In its first report, released January 8, 1980, the FCC stated that "The importance of the Conference to the US cannot be over emphasized." The results of this Conference will determine permissible interference levels for all classes of stations, determine power limitations, classify broadcasting channels and determine whether the channel spacing in our hemisphere will be 9kHz or 10kHz. Other technical matters to be resolved will include bandwidth of emission, frequency tolerance, protection ratios, ground-wave curves to be used, and protection of contours crossing national boundaries.

The first session is scheduled to take place in Buenos Aires from March 10th to March 28th. This session will develop the technical bases for the operation of AM stations in our hemisphere. The second session will be held in November, 1981, and will develop the details of a regional plan for our hemisphere based on the technical matters decided at the first session.

An Industry Advisory Committee was formed by the FCC to assist in the development of US positions. The committee is providing advice concerning proposals made by other countries, will assist in resolving incompatibilities between the two scheduled meetings, and will provide advice on recommended proposals for the second session of the Conference.

A 20-member US delegation to the conference is headed by Commissioner Robert E. Lee as chairman. The delegation has representatives from the FCC, National Telecommunications and Information Administration (NTIA), Navy Electromagnetic Spectrum Center, State Department, and industry.

The results of the conference will determine what changes may be necessary in the present technical operation of AM broadcasting stations and will form the basis for

future development. The importance of this conference cannot be over-emphasized.

Commission action on major AM rulemakings

AM Stereo—action on this matter is expected in March. It is important that decisions made at the Region II Conference do not prevent implementation of AM stereo.

Clear Channel proceeding—action on this item will not take place until after the Region II Conference.

Class IV Nighttime Power Increase—action on this item will also take place after the Region II Conference. It is anticipated that such power increase will be permitted.

Reduced FM channel spacing

The possibility of reducing the present 200kHz channel spacing to lesser spacing (such as 150kHz) is related to the National Telecommunications and Information Administration (NTIA) proposal for sweeping changes in the allocation and assignment standards in the FM broadcasting service.

Chairman Ferris, in a statement of February 18, 1980 before a subcommittee of the Senate Appropriations Committee, referred to five personnel positions the FCC had in fiscal year 1980 for the 9kHz AM study and stated that during fiscal year 1981 he expects this group will add several FM radio issues to its work. He further stated that he believes there is a significant inter-relationship between AM and FM radio in the study of the spectrum and that a change in the regulation of one service should not be considered in isolation from the other service.

The FCC is also considering rule-making proceedings which would permit Class A stations to operate on Class B-C channels and whether additional classes of FM stations should be adopted.

It is obvious that the FCC is embarked on a program to study

present allocation principles and change them where possible to permit the granting of additional AM, FM, and TV stations.

Personnel changes

Neal McNaughten, formerly assistant chief of the Broadcast Bureau for Engineering, has transferred to the International Staff in the Office of Science and Technology (formerly the Chief Engineers Office).

William Hassinger, formerly of the Field Operating Bureau, has been named engineering assistant to the chief, Broadcast Bureau. While with the Field Bureau, Hassinger authored the Broadcast Operator Handbook, and did a great deal of experimental work evaluating loud commercials.

Handicap coordinator

On February 13, 1980, the Commission designated an FCC coordinator to help the broadcasting industry accommodate the needs of the handicapped and to help handicapped persons with a view toward increasing their employment in the industry. The coordinator will operate an information clearinghouse program to facilitate the hiring of handicapped persons and will occupy a new position in the Office of Public Affairs. Of the coordinator and clearinghouse program the Commission said:

"We have determined that a clearinghouse program, which would provide information to licensees regarding methods of facilities and equipment modification, equipment availability and other means by which to increase employment of and service to handicapped individuals would be a proper service for the Commission to institute. It is our intent that the coordinator provide information to licensees on methods by which they may facilitate and increase employment of handicapped persons in all phases of licensee operations."

NAB Convention

Because of fiscal problems the Broadcast Bureau will send a limited representation to the Convention in Las Vegas. Richard Shibben, chief of the Bureau, Frank Washington, Dennis Williams, Wilson La Follette, and Milton Gross will be participating in various sessions and will be available to answer questions and discuss matters of concern and interest. The FCC will probably not have its regular booth in the exhibition area, but the attendees will be available in conjunction with the Field Operating Bureaus monitoring vehicle.

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all-inclusive automation system for under \$24,000!

Starting right now and ending June 1, Cetec Broadcast Group will build you a special System 7000 radio program automation center for under \$24,000!

The LIMITED EDITION comes complete — absolutely no add-ons or extra peripherals necessary. The three-cabinet system includes our excellent System 7000 multiprocessor controller, 1000-event memory, real-time clock, 48-cart Audiofile IIA multi-cart machine, three ITC 750 reel-to-reel tape decks, and a computer-grade video terminal.

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Please send full System 7000 brochure, including available options.

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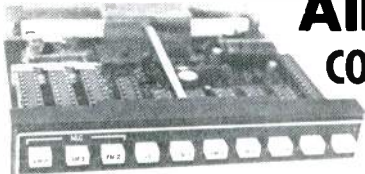
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Garner Erasers are now fulfilling the exacting requirements of many major organizations around the world...yet are so low priced that the smallest studio or station can afford one.

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—Ric Hammond, KNX Radio (CBS), Hollywood, Calif.



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Building includes garage design

The 63,000 square foot metal frame building developed to house the entire Winter Olympic broadcasting facilities for America, Europe and Asia was designed so that it could be converted into a municipal garage. The design made it less expensive to simply bulldoze out the interior of the building to convert it to a garage rather than dismantling the interior step-by-step. A major consideration was specification of a ceiling system that would offer good acoustical control, economy because of the temporary nature of the building, fast installation and pleasant appearance.

The Broadcast Center was built with grants from federal and state governments. Broadcasters paid rent during their use of the building.

More corresponding members for IBC

The organizers of the International Broadcasting Convention announced that invitations to become IBC Corresponding Members have been accepted by V. Ye Dementyev, director, OIRT Technical Centre, Czechoslovakia and Dr. Ryo Takahashi, director-general of Technical Administration and Construction, NHK, Japan. With these two important areas now covered, together with the areas already covered by existing corresponding members, the IBC has extensive representation around the world.

Other IBC corresponding members are: V. Balasubramanyam, director, ABU Technical Centre, Malaysia; T.K. Bourke, controller engineering, Australian Broadcasting Commission, Australia; J.A. Flaherty, vice president, engineering and development, CBS Television Network, US; R. Gressmann, director, Technical Centre, European Broadcasting Union, Belgium; N.R. Grover, vice president, engineering, Canadian Broadcasting Corporation, Canada; D.H. Mills, director technical services, South African Broadcasting Corporation, Republic of South Africa; T.J. Murphy, director of engineering, Radio Telefis Eireann, Republic of Ireland; R.L. Pointer, vice president of engineering, American Broadcasting Company, US; J. Roizen, president, Telegen, US; K. Sharp, controller of engineering services, Broadcasting Corporation of New Zealand, New Zealand; H.J.D. Swan, chief engineer, Oman Colour Television, Sultanate of Oman.

Audio-video imports show declines

January-September 1979 audio-video imports were marked by sharp declines in several major product categories, according to the US Department of Commerce.

By value, the 9-month imports totaled \$3.079 billion, an 8.6 percent decline from the \$3.369 billion registered during the comparable period last year.

Armstrong inducted in Hall of Fame

The name of Edwin Howard Armstrong, the inventor of FM radio and Columbia University professor for 20 years, has joined those of Thomas A. Edison,

THE ONLY NEW AUDIO TECHNOLOGY FOR THE 1980's.

NECAM "D", the most advanced TV sound post production tool available. Computer control and memory of up to 48 fader levels, 16 remote start/stops (on/off's), and of 999 events with advance/retard capability. SMPTE based for interface with video/audio machine synchronizers such as Adams-Smith Model 605. From small mixers to large audio consoles and NECAM, Neve's the world leader in broadcast audio technology.

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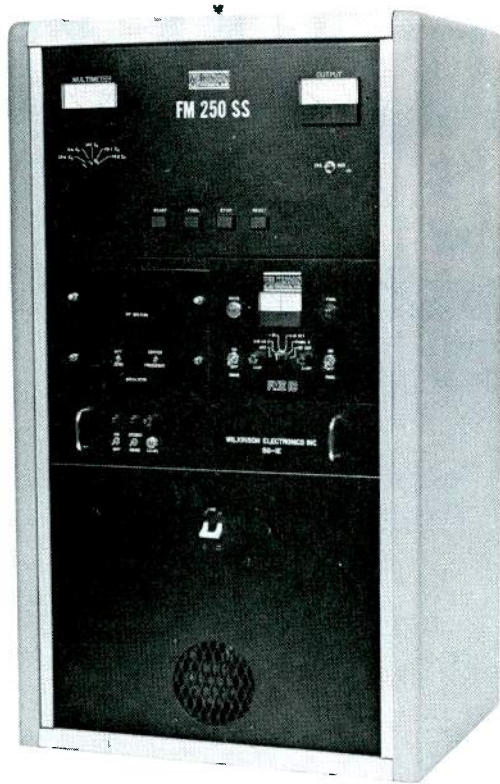
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250 WATT FM TRANSMITTER



- FEATURES - Pure Perfect Sound**
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 - Small - Light Weight - Requires Little Space
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 - Self-Testing Power Supplies
 - All Solid State including Timing Controls
 - Safe - Reliable - Efficient
 - Exceeds U.S. FCC Specifications

The Wilkinson Electronics FM-250SS all solid state FM broadcast transmitter is housed in a steel cabinet finished in a hard durable enamel finish. Only four square feet of floor space required and it is light enough for table mounting. All operating controls are on the front panel and access to the interior of the Power Amplifier is through the PA cubicle. A sliding drawer directly beneath the PA houses the power supplies and control ladder circuits. Overload indicators as well as overload reset controls are on the front panel of this slide-out drawer. All components of these circuits are completely accessible when the drawer is opened.

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Circle (12) on Reply Card

Alexander Graham Bell and Wilbur and Orville Wright on the roster of the National Inventors Hall of Fame.

Since his death in 1954, Armstrong has been ranked as "the US's greatest inventor since Edison" and "one of the last of the free-lance attic tinkers." At induction ceremonies February 10 in Arlington, VA., he was cited by Charles F. Schroeder, president of the Hall of Fame, for his invention during World War I of the superheterodyne receiver, which provided the breakthrough for the future development of FM radio.

W. Stevenson Bacon, an officer of the Armstrong Memorial Research Foundation, which was established in 1955 to support research to which the Columbia professor had dedicated his life, described the "superhet circuit" as "by far the most important and classic of Armstrong's inventions." Today it is still the basis of all electronics communication, from radio and television to long-range radar and satellite telecommunication.

3M grant supports VPA Monitor Awards

The first corporate grant to support the 1980 Videotape Production Association 'Monitor Awards' was made by the 3M Magnetic Audio/Video Products Division, revealed Morton Dubin and Joe DiBueno, VPA co-chairman. Since then, many other corporate grants have been received by the Association, they said.

The awards, established to recognize excellence in videotape production, is open to anyone who creates, produces or works with videotape. Separate categories have been established so that each tape may be judged against like entrants.

The categories are: national/regional commercials; local commercials; network, local or PBS broadcast programs; non-broadcast (medical, corporate, educational) programs; home entertainment (videocassette, videodisc, cable) programs.

Awards will be presented to the best in category; best director; best director of photography/lighting; with a concurrent award to the video engineer; best camera operator, best sound mixer; and the best editor.

RCA Americom files to launch SATCOM III replacement

RCA American Communications has filed separate applications and amendments with the FCC that together indicate satellite expansion and utilization plans to serve its various customer groups. In the filings, the company has outlined certain technical improvements in satellite design that relate to spare on-board amplifiers and higher power amplifiers.

In line with previously announced plans, the company has requested authority to launch a replacement for SATCOM III, which was lost on December 10, 1979, shortly after the apogee kick motor was fired. The new SATCOM III will be positioned at 132 degrees West longitude, and will carry cable TV.

In an amendment to its application of August 27, 1979, requesting authority to launch SATCOM IV, RCA Americom has indicated to the FCC its intentions to have an improved system to provide in-orbit restoration for failed transponders on its satellite system. Restoration will be provided through an increased number of preemptible transponders available only for occasional TV service.



Hat-trick!

NEC's new DME[®] offers 3 economical ways to meet your digital video effects goals.

Sports, weather, ENG, or real-time production applications, with NEC's Digital Mix Effects you can now get in the game with expanded production capability economically. NEC has taken a proven winner, DVE[®], with crowd-pleasing effects like Multi-Freeze[®], and made significant advancements to give you the go-ahead commercial edge. Choose from 3 different DME[®] systems to match your needs and your budget.

DME[®]-B: This basic system offers Full Frame Synchronization, basic Digital Video Effects, and Programable Digital Controls at a starting out price that's hard to believe.

DME[®]-1: In addition to Full Frame Synchronization, you get horizontal and vertical flip, tumble, and a new, one-of-a-kind Mosaic effect, all for 1/2 less than competitive equipment with less capability.

DME[®]-2: Two complete Digital Mix Effects systems allow you to operate with Full Frame Synchronization in parallel, series, or independently for maximum processing capability.

And if you already have NEC's DVE[®] system, contact us to find out how it can be updated to DME[®] capability. Stop playing catch-up... Go for it with DME[®], new from NEC Broadcast.

Call toll free 800-323-6656 24 hours a day.
In Illinois call 312-640-3792 or write:

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NEC America, Inc.

Broadcast Equipment Division
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Elk Grove Village, IL 60007

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association news



National Association
of Broadcasters

1771 N Street, NW
Washington, DC 20036

NAB supports move to drop unfairness standard from FTC act

The National Association of Broadcasters has urged the Senate Committee on Commerce, Science and Transportation to delete the unfairness standard from both Sections 5 and 18 of the Federal Trade Commission Act. NAB noted that oversight hearings demonstrated that in many instances the FTC had taken actions beyond the intent of Congress and said there is some necessity for clarifying the FTC's role and bringing its activities back into the bounds prescribed by Congress.

William Lilley to represent CBS on NAB television board

William Lilley, III, vice president, Washington, CBS, has been appointed as the CBS network representation on the National Association of Broadcasters' Television Board of Directors. He replaces Rae Evans who was temporarily filling the network seat.

The Television Board consists of 15 members representing geographic regions, market sizes and major networks.

NAB asks to participate in access appeals case

The National Association of Broadcasters has asked the US Court of Appeals for the District of Columbia for permission to participate in a case seeking review of the FCC's decision that an access system would not be considered compliance with the Fairness Doctrine.

Last October the Commission decided to continue its present method of ensuring that licensees comply with the Fairness Doctrine and, at NAB's urging, rejected a right of access plan proposed by the Committee for Open Media. The Committee is appealing that decision.

Kraus named assistant director of NAB broadcast management department

Susan M. Kraus has been appointed assistant director of the National Association of Broadcasters' Broadcast Management Department. The appointment was announced by Ron W. Irion, the Department's director. Since 1965, Kraus was employed as personnel director of Ross Roy, Inc., a Detroit advertising agency. In that position she administered salary, benefits, employee relations and affirmative action programs, conducted surveys and analyzed results in order to establish wage guidelines and personnel policies and researched and interpreted government regulations as applicable to personnel policies.

NAB announces winners in research grant program

The National Association of Broadcasters announced that 10 grants for research in broadcasting have been awarded in its 1980-81 competition. The program was established to encourage the development of qualified personnel for broadcast research. It is directed toward the academic community and seeks both to stimulate interest in broadcast research and to aid the professional development of researchers already in the field.

NAB conducting survey of AM audio performance

At the request of the National Association of Broadcasters' Engineering Advisory Committee, and in cooperation with the National Radio Systems Committee (NRSC), NAB has sent all AM stations a questionnaire regarding the audio performance of their technical equipment.

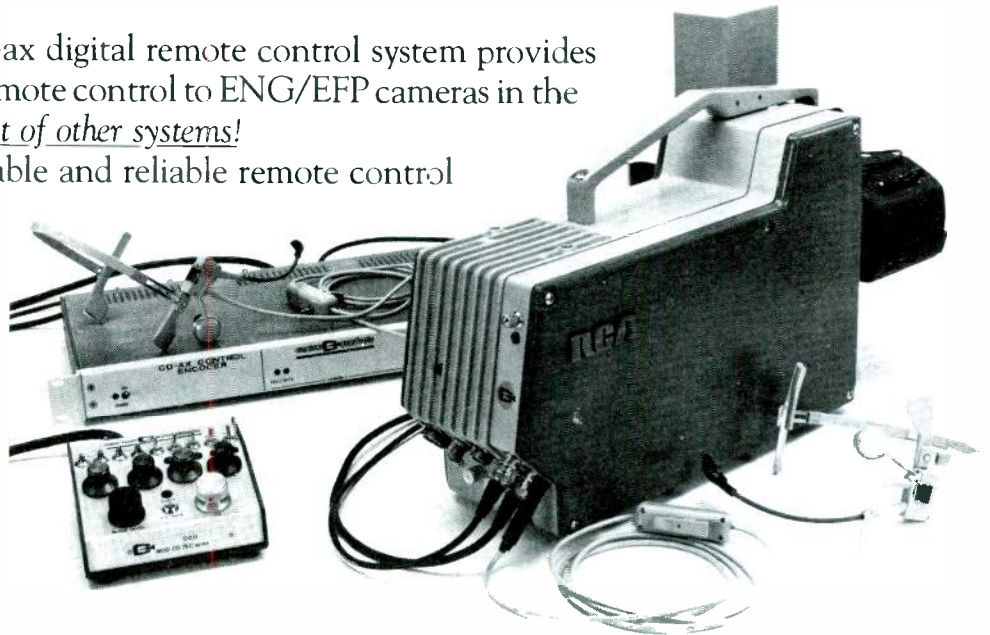
The purpose is to determine what the operating state of the art presently is for AM stations, particularly how they select and use audio processing equipment. This equipment is used to enhance a station's sound over typical automobile and home radios. The information will be used to assist NRSC in developing recommendations for improvements in radio transmitting and receiving equipment. The survey will provide a foundation for recommendations for the soon-to-be-established AM stereo transmissions.

Circle (14) on Reply Card

CO-AX DIGITAL REMOTE CONTROL

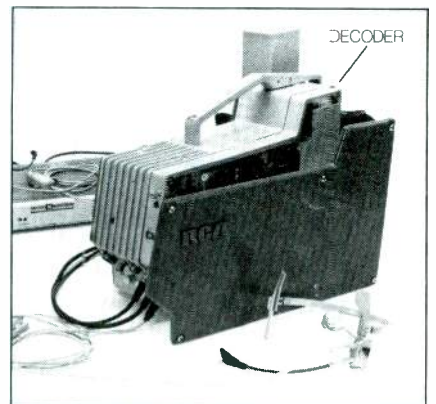
Our new and exciting co-ax digital remote control system provides dependable, studio-like remote control to ENG/EFP cameras in the field *at a fraction of the cost of other systems!*

It is the most affordable and reliable remote control system available on the market today. Easily interfacing with a full range of professional ENG/EFP video cameras currently in use, such as: Ikegami HL-77 and HL-79A, RCA TK-76B, NEC MNC-71 cameras, and many more.

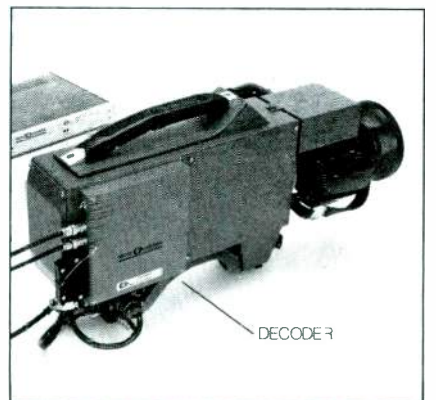


Outstanding Features:

- 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.
- 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.
- System is ideal for all extended shooting situations such as sports events, live concerts, political rallies, etc.



RCA TK-76B shown with decoder neatly "sandwiched" between camera body and door.



Ikegami HL-77 shown with side-mounted decoder.

For full details, call toll-free: 800-421-7486.

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New program origination and studio location rules

As part of its ongoing reregulation proceeding, the FCC has clarified, relaxed and renumbered its rules relating to AM, FM and television station location, main studio location and program origination.

Previously, each broadcast service—AM, FM and television—was governed by its own separate rules or policies with respect to station location, main studio location and program origination. In addition, there was a separate rule entitled "Authority to move main studio" for AM stations. However, all of these rules were essentially the same. As a result, the FCC has chosen to combine them into a single set of rules relating to all broadcast stations. The new rules are: Section 73.1120 (Station location); Section 73.1125 (Station main studio location); and Section 73.1130 (Station program origination).

The new rules differ from the old ones in only two notable respects. First, the previous AM and FM rules required that a "majority of the station's programs" originate from the main studio or from the other studios or remote points situated in the station's community of license. The only exception to this standard contained in the rules pertained to situations involving stations affiliated with networks. In those cases, the applicable program origination standard was either the "majority of the programming" or $\frac{2}{3}$ of the station's non-network programs, whichever was less. In the new rules the FCC has abandoned the " $\frac{2}{3}$ criterion" and has simply specified that a majority of the station's non-network programs must be so originated. This represents a substantial relaxation of the rules governing stations affiliated with networks.

Second, the previous rules did not contain an express requirement relative to the program origination obligations of television licensees. However, the Commission had, in a number of cases, simply applied the standard applicable to AM and FM licensees. The new rule incorporates this policy with respect to television licensees.

Station Costs

How much does it cost today to build a new radio station? NRBA polled several engineers and lawyers to find out. The Engineering Resource will give you a general run down on prices. Estimates include the cost of equipment, engineers fees and legal fees. Land acquisition, studio costs, operating expenditures and other miscellaneous fees are not included.

Special thanks to Harv Rees of Carl T. Jones and Associates and Harold Kassens of A. D. Ring and Associates for their assistance.

AM RADIO STATIONS

Class IV

Equipment	\$50,000
Engineering Fee	\$10,000
Legal Fee	\$3,000

TOTAL \$63,000

1kW; 3 Tower Directional

Equipment	\$110,000
Engineering Fee	\$20,000
Legal Fee	\$3,000

TOTAL \$133,000

FM RADIO STATIONS

1kW; 150 ft. Tower

Equipment	\$50,000
Engineering Fee	\$10,000
Legal Fee	\$3,000

TOTAL \$63,000

3kW; 300 ft. Tower

Equipment	\$61,000
Engineering Fee	\$10,000
Legal Fee	\$3,000

TOTAL \$74,000

20kW; 500 ft. Tower

Equipment	\$100,000
Engineering Fee	\$10,000
Legal Fee	\$3,000

TOTAL \$113,000

50kW; 500 ft. Tower

Equipment	\$120,000
Engineering Fee	\$10,000
Legal Fee	\$3,000

TOTAL \$133,000

FM Task Force

The Broadcast Bureau, as of January 2, 1980, established an FM Task Force designed to reduce the current backlog of 175 assignment petitions.

PORTABLE VIDEOTAPE RECORDING WITH THE AMPEX VPR-20:

Bringing Back Tape You're Sure You Can Use Calls for a Tough, "Smart" Portable Recorder.



Finally, you can videotape remotely without compromising the considerations that apply to studio work. Because Ampex engineers went far beyond the usual definitions of portable acquisition when they designed the VPR-20 one-inch helical.

Confidence Is Paramount.

On location, you have to know that you're capturing good material. So Ampex built a confidence feature into the VPR-20 that actually plays back the picture from the tape into the camera viewfinder during recording. When you see it in the viewfinder, you know it's on the tape. And you can have color playback in the field, thanks to the color stabilizer option, which mounts inside the VPR-20.

Production Flexibility for All Situations.

When the assignment is commercial production in the field, your VPR-20 can backspace itself for a flawless assemble edit. And color framing is standard. The advanced cueing system allows you to go back and look at the last shot, and either go on from there or retake the shot and eliminate unwanted material. Right in the field. As simply as pushing the appropriate button.

The Front End of a Special Effects Production.

Tapes recorded on a VPR-20 are fully compatible with every trick in the VPR-2 special effects book. Once you bring your material back to the studio, you can slow it down, speed it up or stop it on a selected frame with a VPR-2. And if you haven't seen the quality of VPR-2 special effects yet, you're in for a surprise.

If You Can Take It, Your VPR-20 Can, Too.

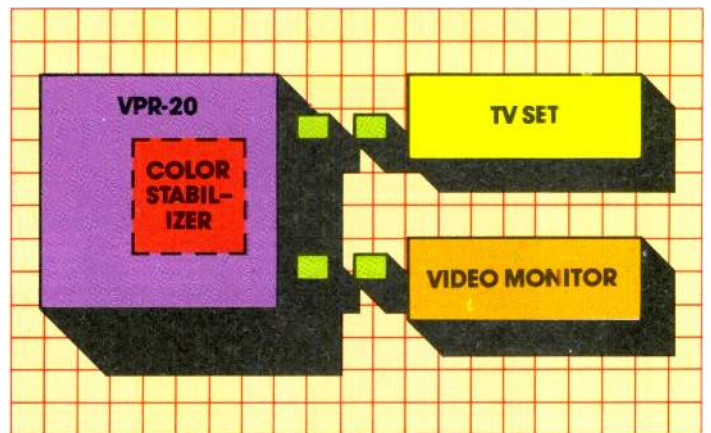
Environmentally, your VPR-20 can take nearly anything that your operator can. It shrugs off dust and sand in the air, tolerates a cloudburst, and stands up to heat and cold. Oblivious to the way it's held or positioned, the VPR-20 has an amazing resistance to the kind of gyroscopic conditions that go along with field recording. So you can take the VPR-20 for granted.

Enough Power to Finish What You Start.

The VPR-20 battery pack has more than enough capacity to record and rewind a full hour of tape. Then, when you're ready for more shooting, the quick-change battery pack gives you quick-change power. There's even a battery/charger system that brings you up to full power again in less than an hour. You'll really value the VPR-20's power-down memory. It keeps the tape timer operational during battery or power changes for up to two days if need be. This is portability with a punch.

If The Specs Don't Convince You, A Demo Will.

Somewhere within reach of your station, the tough, "smart" VPR-20 is turning the impossible into an everyday affair. Call us for the technical information, and then get your hands on a VPR-20. You won't want to let go.

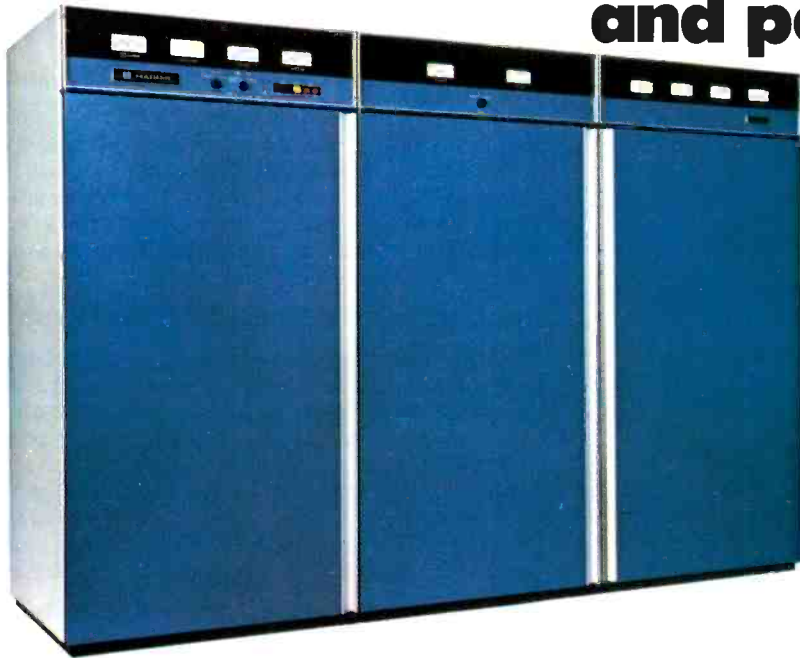


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CP* provides the Harris provides

Harris' TV transmitters lead the way to greatly enhanced reliability and performance.

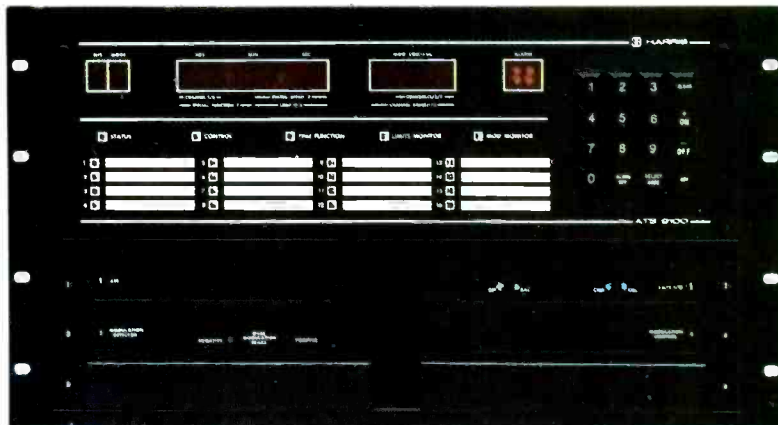


For example, the TV-50H VHF 50-kilowatt High Band color TV transmitter combines a solid-state driver with a three-tube design for field-proven dependability and reduced tuning requirements. Harris transmitters provide many other state-of-the-art features for proven superb color performance.

For high-powered stations, the TV-50H may be used in a 100 kW dual configuration that occupies the same space as previous 50 kW transmitters — ideal for converting to CP without the expense of a new building.

All Harris TV transmitters, ranging in power from 10 kW to 220 kW, Channels 2 through 69, can be used for your switch to CP.

Harris' 9100 Facilities Control System leads the way to lower operating expense.



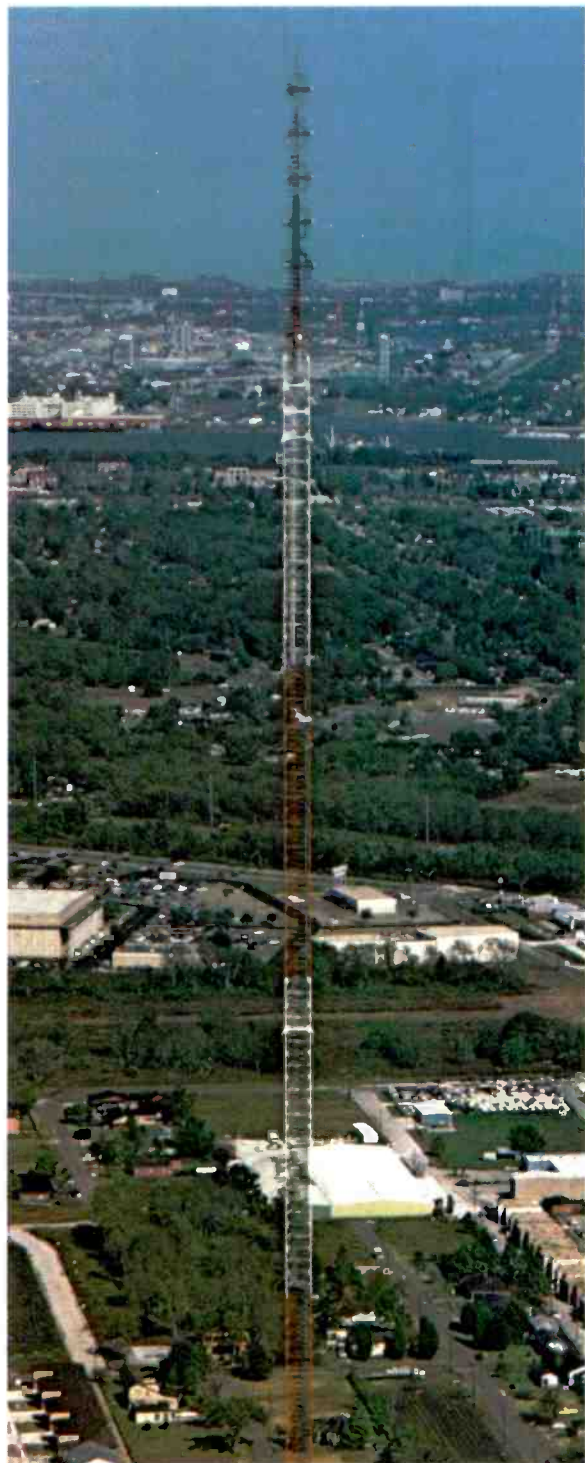
Harris' 9100 Facilities Control goes far beyond standard remote control systems.

The microcomputer controlled 9100 continuously surveys your transmission system and your physical plant and makes minor adjustments within normal operating tolerances. It instantaneously responds to abnormal levels by making automatic corrections and sounding alarms.

The 9100 lets you operate your equipment at maximum levels without violating FCC regulations.

If you are going CP or maintaining horizontal polarization, the 9100 assures the maximum performance of your transmission system.

best TV signal. the best CP system.



Harris' CP* antennas lead the way to vastly improved coverage and signal strength.

As the leader in the development of CP, Harris has sold CP antennas in more markets world-wide than any other manufacturer.

The Harris CPV permits you to convert to CP without replacing your present tower. And the Harris CBR (Cavity Backed Radiator) antenna is designed for a wide variety of directional patterns. Both antennas allow multiple stations to operate from the same antenna.

Harris CP antennas deliver excellent circularity, low axial ratio and low VSWR. Each has the flexibility to let you tailor broadcast patterns to your specific coverage requirements.

For the extra rating points that an improved signal can bring, use a Harris CPV or CBR advanced design CP antenna.

Harris products are designed and manufactured by the leading supplier of broadcast equipment and are backed by a 24-hour a day world-wide service organization.

Harris can help you meet your performance and financial objectives. Contact Harris Corporation, Broadcast Products Division, P.O. Box 4290, Quincy, Illinois 62301, (217) 222-8200.

*Circular Polarization



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The Association for Broadcast Engineering Standards (ABES) was started in 1963 by a group of broadcasters concerned about the adoption and maintenance of sound engineering standards for AM and FM broadcasting stations. ABES has been actively involved in matters

pending before the FCC such as 9kHz, Clear Channel proceeding, AM stereo, increased nighttime power for Class IV stations, and the Region II Administrative Conference for AM Broadcasting.

Wally Johnson, formerly Chief of the Broadcast Bureau, FCC for over



Wally Johnson (right) was captured in this candid shot last year at NAB in Dallas along with Gerald Vander Sloom of WOOD Radio. Johnson was then with the FCC but has since become the executive director of ABES.

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Comet Vacuum Capacitors measure up to the highest standards, are completely interchangeable and have been the choice of electronics professionals in 50 countries throughout the world for over a decade.

Comet Vacuum Capacitors are readily available for shipment anywhere in the United States. We maintain a large inventory of the more popular sizes of fixed and variable vacuum capacitors and for your special requirements, our unique component construction allows us to assemble and ship your special order more quickly than you would normally expect.

Every Comet carries the label "Made in Switzerland". We're proud of the precision and craftsmanship that represents; That's why we guarantee our products for a full year. That's why we manufacture our capacitors exclusively of copper and ceramic. That's why you can feel secure when you select Comet Vacuum Capacitors. Next time you need a dependable, precision-built vacuum capacitor... and you need it fast... ASK FOR COMET.



Comet also manufactures one of Europe's most widely used high voltage test units. It operates in continuous or pulsed modes and can be used to test vacuum capacitors or various other electronic components. This testing unit is powerful, portable, accurate and safe.

Manufactured by Comet-Berne

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seven years, became executive director for the association November, 1979.

Both William Potts, secretary for ABES and Wally Johnson are serving on the Industry Advisory Group for the Region II Conference and Wally Johnson is a member of the US delegation.

The Association initiates actions in areas of special concern, but also cooperates with persons or other groups interested in matters of mutual interest or concern. One of these is the National Radio Systems Committee (NRSC), co-sponsored by the NAB and the EIA. The NRSC's purpose is to investigate and recommend methods of improving the overall transmission and reception of the AM and FM radio broadcasting services. Membership is open to technically qualified individuals and organizations having a business or professional interest in radio broadcasting transmission and reception. The next meet is scheduled during the NAB Convention, Tuesday, April 15th, from 2:30 to 4 pm in Room F-3, Convention Center.

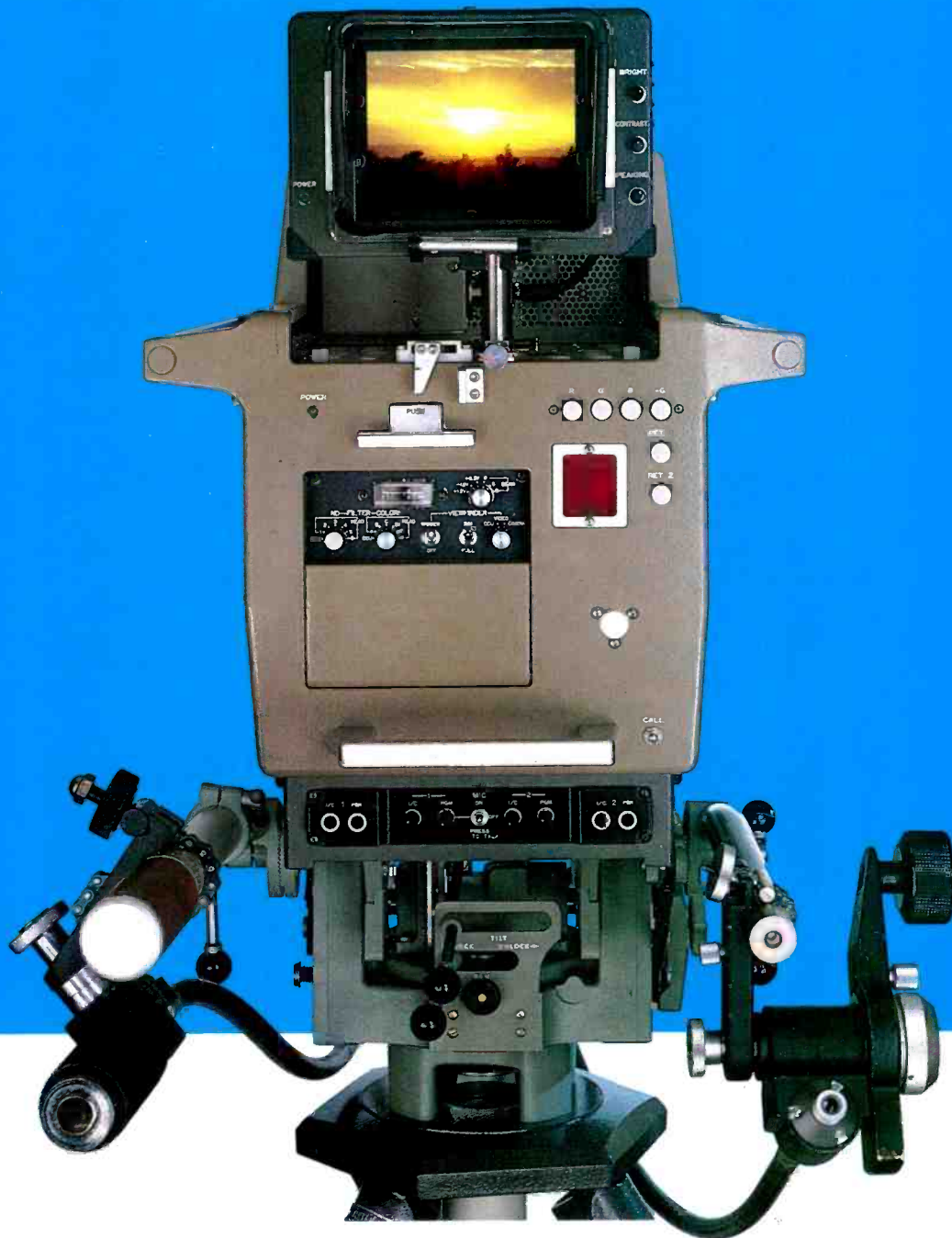
Also, the association will have a suite during the NAB Convention at the Frontier Hotel for engineers to discuss mutual concerns and learn more about ABES.

National Captioning Institute

Stanley Gerendasy has been named director of engineering and development of the National Captioning Institute (NCI). The announcement was made by John E.D. Ball, president of the institute.

Gerendasy has a varied and wide career in television engineering and management. Prior to his appointment at the National Captioning Institute, he was director of applications and senior research associate at the Cable Television Information Center of the Urban Institute.

Circle (53) on Reply Card



Ikegami has its eye on the 80's

In 1976, two pioneering ENG cameras revealed to a rapt world the shoot-from-the-shoulder delegate's view in color of the Democratic and Republican national conventions. Those two, the Ikegami HL-33 and the HL-35, soon became the ENG workhorses of the industry. The HL-77, Ikegami's first self-contained ENG camera, contributed to a major expansion in the use of ENG. And the current HL-79A, which opened up the era of the one-person ENG camera crew, has become the standard of the broadcast industry.

In 1977, Ikegami made a major contribution to the performance of studio cameras—the first microprocessor-controlled automatic-setup camera, the Ikegami HK-312. With hundreds of HK-312's now in use, Ikegami has expanded microprocessor control to its HK-357A field/studio and HL-53 EFP cameras.

Ikegami enters the 80's fresh from its triumphs at the Winter Olympics where 50 of its cameras contributed to the spectacular coverage of this event.

And while Ikegami enters the 80's

with a record of meaningful innovations and solid accomplishments during the last decade, what's most exciting are the products in the Ikegami engineering labs. So keep your eye on Ikegami. Ikegami Electronics (USA) Inc., 37 Brook Avenue, Maywood, N.J. 07607; (201) 368-9171. West Coast: 19164 Van Ness Ave., Torrance, CA 90501 (213) 328-2814; Southwest: 330 North Belt East, Suite 228, Houston, TX 77060 (713) 445-0100; Southeast: 552 South Lee St., Americus, GA 31709 (912) 924-0061.

Ikegami

Circle (22) on Reply Card

April 1980 *Broadcast Engineering* 21

SMPTE: The Digital Decade

A Replay of the 14th Annual Television Conference

By Bill Rhodes, editorial director

- Toronto, Canada
- February 1-2, 1980
- All-time record attendance, over 1,000 paid registration
- Extensive press exposure

Space Observation Deck: (1456 ft.; 477m). Enclosed in glass, this world's highest public observation gallery provides an awe-inspiring view.

Transmitter Rooms: 5 floors above the revolving restaurant.

Top of Toronto Revolving Restaurant: (1150 ft.; 350m). A popular spot for diners.

Outdoor Observation Deck: (1122 ft.; 342m). Specially-designed windows let observers look straight down the tower and feel the wind gusts...an exhilarating experience.



Photographs provided by and printed with permission of CN Tower, Toronto, CAN.

Top of the Tower: (1815 ft. 5 in.; 553.33m). The top piece of the antenna mast was positioned on the top of the CN Tower on April 2, 1975 by a giant Sikorsky helicopter. The height was recorded and entered into the Guinness Book of World Records as the world's tallest free-standing structure.

The Annual SMPTE Television conference has traditionally been marked as a historic event—and the 14th Conference in Toronto was no exception. The 14th Annual SMPTE Television Conference (The Digital Decade) marked: (a) the first all-digital television conference; (b) record attendance, with over 1000 persons registering by noon of the second day; (c) the lowest exhibit sign-up imaginable, with strict limitations by SMPTE to digital video equipment manufacturers; (d) an exceptional audio-visual program management utilizing the communications department students from nearby Ryerson Polytechnical Institute; and (e) according to Fred Remley, SMPTE vice president for television affairs, the first time that the conference has been videotaped.

Also, this may have been the first time that a nation has been applauded during a SMPTE conference for the courage and compassion of its people. During Friday's luncheon a formal tribute was expressed for the efforts of the Canadians in Iran who spirited away some Americans from the militants/students in Teheran. A standing ovation to all Canadians accompanied this tribute.

The resounding success of the SMPTE-Toronto TV Conference was due in part to its hot theme concentrating on "The Digital Decade" and to the outstanding work by program chairman Ray Brulé, 3M Canada, Ltd. and to the overall coordination provided by Maurice L. French, general arrangements chairman, Canadian Broadcasting Corporation. The 2-day conference was entirely focused on digital: digital standardization, advances in digital technology, and digital equipment. Each half-day session had digital subthemes. Friday morning was devoted to the all-digital TV plant. Friday afternoon covered digital signal processing. Saturday morning concentrated on digital transmission and testing, and Saturday afternoon wrapped up the conference with digital video recording.

SMPTE plans to publish the proceedings around the time of the Fall meeting, now planned for November 9-14, 1980, in New York.

Record attendance

Although pre-registration for the SMPTE Winter TV Conference was only 614, there was an air of anticipation that the conference—with its digital theme—would set new attendance records. An announcement by Robert Smith, SMPTE president, at the Saturday luncheon related that the conference had set a new paid registration record of over 1000.



Professor Robert Scott from the Ryerson Polytechnical Institute in Toronto addressed the luncheon gathering on Friday at the 14th Annual SMPTE TV Conference in Toronto. Shown at the dais (l. to r.) are: Don Breidt, SMPTE executive director; Maurice French, Canadian

Broadcasting Corp. and conference general chairman; Robert Smith, SMPTE president; Fred Remely, SMPTE vice president for television affairs; and Charles Anderson, SMPTE executive vice president.

Technical sessions

Traditionally, BE has provided a summary of the SMPTE papers as part of this conference review. A departure from this format is called for because the complete papers will be published by SMPTE in a booklet format within a few months. However, the highlights of selected papers are presented and a complete listing of the papers and authors is listed in an accompanying panel.

William Webster, RCA, reviewed the progress of 15 years of LSI technology development and pointed out that the majority of the LSI impact now in broadcasting is in the digital domain. An early example is in the sync-generator of RCA's automatic cameras where 1200 transistors are on a chip 216x210 mils. With device complexity doubling every two years and every doubling resulting in a 30% reduction in price, Webster sees in the 1980s an extensive penetration of LSIs into broadcasting equipment.

Davidoff, CBS, in his (professed) final SMPTE paper, reviewed the progress of the all-digital TV studio and described how digital technology has affected all areas of TV broadcasting.

He pointed out that the introduction of digital video into television broadcasting has previously been characterized as occurring in three phases:

- (1) The use of digital black boxes with analog inputs and outputs to perform functions not possible with analog circuits.
- (2) The use of digital black boxes with analog inputs and outputs to replace analog equipment having equivalent functions.
- (3) The use of an all-digital studio.

According to Davidoff, broadcasters are now well into Phase 1 with thousands of digital black boxes currently in use. Phase 2 lies on the horizon with feasibility prototypes of

digital videotape recorders having been demonstrated by several manufacturers. Phase 3, the all-digital studio, lies further in the future.

From his experience, he concluded that (a) the near-term prospects are very good for the use of digital video recording in program production and the use of digital editing suites in post-production; (b) the outlook for digital transmission will be a function of economic and operational factors; and (c) the all-digital television studio lies much further in the future, and its coming is very difficult to predict.

Davidoff received a standing ovation at the close of his paper and the announcement of his retirement from broadcasting.

Robert Hopkins, RCA, presented historical notes on the SMPTE Committee on New Technology and emphasized digital video activities and progress, including the digital interface TV standards. His complete paper is being scheduled for early publication in the June issue, SMPTE Journal.

He reviewed the committee workings through five study groups: (1) a study group on digital television; (2) a study group on digital audio; (3) a study group on time codes and codification of motion picture films; (4) a study group on video disc systems; and (5) a study group on high definition television. The Committee on New Technology held its first meeting in October, 1976 with Fred Remley as chairman.

However, even earlier digital standardization works preceded the information of SMPTE's Committee on New Technology. The Study Group on Digital Television was formed in 1974, by the Television Technology Committee, and was chaired by Charles Ginsburg to monitor and evaluate the progress of worldwide R&D efforts related to digitizing video and audio TV signals. The primary function of this group was to prepare tutorial material which eventually could be



Frank Davidoff, CBS Television Network, delivered a paper on *The All-Digital Television Studio* during the first-morning session devoted to the *All-Digital TV Plant*. His paper is of historical significance in that it is the last paper which he professes to present technically to the industry. Davidoff is retiring to pursue other interests, and the termination of his contributions to digital technology will be felt world-wide. Davidoff has served on both the international digital standardization committees and also on the SMPTE digital committees—and those who know him acknowledge that his participation has been very active.

Both at the luncheon on Friday and during the technical session, Davidoff was given a standing ovation for his years of dedicated service when his retirement from broadcasting was announced—a stirring tribute for his devotion to pushing forward broadcasting technology and to his contributions through papers and committee activities.

Broadcast Engineering joins the industry in saluting Frank and his service, in wishing him happiness in pursuit of his private ventures, and in hopes that he will return periodically to share thoughts of the industry with us.

used by a standards committee as a basis for recommending standards.

(Editorial Note: The SMPTE standards efforts are still in progress. The BE editorial staff sat in on the meetings of various groups, and significant progress has been seen toward standardization. However, no details are presentable without formal SMPTE approval—and this is not expected until well-established progress statements can be made for industry distribution.)

A paper by Doi and Nakajima, Sony, reviewed the tape format and rotary head specification for the digital audio recorder and showed the I/O format for digital audio communications. One of the conclusions put forth was that the digital disc would replace the analog disc in 10 years.

Jurgen Heitmann, Robert Bosch GmbH, followed Davidoff's theme of the all-digital studio but gave an insight from the European viewpoint. He reviewed current digitizing methods and suggested standards and led up to the fully digital TV studio. Such a studio, in his analysis, will be mainly characterized by no longer needing to take account of different color standards. Furthermore, it should fully utilize all possibilities of digital technology without further complicating program production. According to Heitmann, a digital color standard for a digital TV studio should be optimized with a view to production requirements.

Anthony Lind, RCA, also concentrated on progress toward the digital TV plant. He concluded that the potential exists for changes in future TV systems and plants that will rival the advance from b&w to color TV. Consequently, Lind pointed out, it is important that all digital system standards be developed with great foresight and careful deliberation.

John Lowry, Digital Video Systems, presented an overview of video processing, starting with the conversion of the analog television signal into digital data words, through a range of digital picture processing techniques, to the conversion back to an analog television signal for display, transmission, etc.

As we enter the 1980s, he noted, there is an ever-increasing number of new ICs becoming available that will make almost anything possible in digital video processing. The future appears to be limited only by the imaginations of designers, the budgets of users, and, in some cases, the man/machine relationship between the user and his

equipment. Digital effects, for example, have a potential far beyond the capabilities of the human interface as currently implemented.

John Baldwin, Independent Broadcasting Authority (UK), discussed in detail component versus composite coding for television signal processing. Analogue processing of 625-line color pictures in PAL countries is normally performed by operating on the encoded composite PAL signal in the same way that composite NTSC coding is processed in most 525-line countries. In distinct contrast, SECAM signals, which use frequency modulation to carry the chrominance information, is not convenient for signal processing and such signals have to be decoded to component form prior to such operations as mixing.

In the European Broadcasting Union, it was generally felt that, although a unique digital standard was very desirable, it was sufficient to adopt compatible standards in different countries if a satisfactory standard interface could be provided between countries.

About the beginning of 1979, the first signs of a general swing away from composite coding for PAL studios became apparent. At Montreux (May, 1979) it had become obvious that many considered component coding the optimum choice for television studios in PAL countries.

Looking to the future, Baldwin concluded that it may be possible to achieve a single digital component standard for the sampling of luminance and chrominance components on each line of the television signal, this standard being not only compatible with NTSC but also with PAL composite digital coding.

Teletext emphasized

The latest aspects of teletext were considered in four separate SMPTE papers by: (a) John Storey et al, Canada's Department of Communication, (b) Robert O'Connor, CBS Television Network, (c) Walter Ciciora, Zenith Radio Corporation, and (d) Bernard Mati et al., Antiope Videotext Systems.

Storey presented an overview of the broadcast teletext systems and described the "alpha-geometric" videotext system called Telidon developed by the Canadian Department of Communications. In this system, the graphic images in the data base are described in terms of geometric descriptors such as line, arc, polygon etc. These geometric descriptors, called *Picture Description Instructions*, permit graphic images to be described at the data



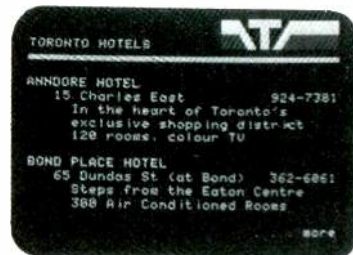
Professor Robert Scott: Does the advent of a universal teletext/videotext system spell the end of organized, institutionalized education as we know it? Quite probably, because teletext/videotext will create, in effect, the classroom without walls. But not before some fundamental questions of national and international importance are resolved.

FINANCE TODAY



HEADLINES RATE RISE PROMPTS CREDIT FEAR (DETAILS P 2) GROWTH OF INVENTORIES WORRYING ECONOMISTS (DETAILS P 3) IRAQI OIL THREAT REPORTED (DETAILS P 4) AIR MERGER SPURNS A SHAKEDOUT (DETAILS P 5)

Antiope was on hand to show its teletext system capabilities.



Telidon, too, was on hand to show the teletext capabilities of this celebrated Canadian system.

base in a way that is largely independent of terminal construction and resolution capabilities.

The broadcast version of Telidon, to be on the air of TV Ontario early in 1980, uses some of the better features of both British and French transmission methods. The concepts of network transparency, modifiable packet size and changeable transmission rate are similar concepts to those used in the design of the French Didon system. However, in a scheme similar to that used in the United Kingdom, page addresses are transmitted in fixed positions of the TV line to provide a higher degree

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SMPTE Technical Program

The All Digital TV Plant

Friday Morning, Feb. 1

Chairman: John Lowry, Digital Video Systems

Integrated Circuits for TV in the Digital Decade

William M. Webster, *RCA Laboratories, David Sarnoff Research Center, Princeton, NJ*

The All-Digital Television Studio

Frank Davidoff, *CBS Television Network, New York, N.Y.*

Report on the Committee on New Technology

Robert Hopkins, *RCA Camden, NJ*

When are Digits Going to Meet the

Action?

J.R. Sanders, *British Broadcasting Corporation, Research Department, Surrey, England*

Digital Audio Formats for Recording and Digital Communication

Toshi Doi and H. Nakajama, *Sony Audio Technical Center, Tokyo, Japan*

The Future of the Digital TV Studio

Jurgen K.R. Heitmann, *Robert Bosch GmbH, Darmstadt, W. Germany*

An Overview of Progress Toward the Digital TV Plant

Anthony H. Lind, *RCA Corp., Camden, NJ*

Digital Signal Processing

Friday Afternoon

Chairman: Kenneth Davies, Canadian Broadcasting Corp.

Digital Video Processing—1980

John Lowry, *Digital Video Systems, Willowdale, Ont.*

Component Versus Composite Coding for Television Signal Processing

J.L.E. Baldwin, *Independent Broadcasting Authority, Winchester, England.*

Three Dimensional Spectrum and Processing of Digital NTSC Colour Signals.

E. Dubois, M.S. Sabri and J.-Y.

Ouellet, *INRS-Telecommunications & Bell Northern Research, Nuns' Island, Quebec*

Current and Future Developments in Digital Switching and Effects

R. Dennis Fraser, *NEC America, Inc., Elk Grove Village, IL.*

Software-Based Digital Signal Processing

Richare Kupnicki, *Digital Video Systems, Inc., Willowdale, Ont.*

Digital Picture Creation

Richard G. Shoup, *Belmont, CA.*

Multifunction Digital Video Processor

Stephen Kreinik and Renville H. McMann, *Thompson-CSF Broadcast, Inc., Stamford, CT.*

Digital Transmission and testing

Saturday Morning, February 2

Session Chairman: Stanley Quinn, Canadian Broadcasting Corp.

Optical Fiber Transmission Technology and Its Impact on Television Engineering

R.R. Ferguson, *Bell-Northern Research Ltd., Ottawa, Ont.*

Network Distribution of Digital Television Signals

Denis J. Connor, *MacDonald, Dettwiler & Associates Ltd., Richmond, B.C.*

Overview of Broadcast Teletext Systems for NTSC Television Standards

J.R. Storey, H.G. Bown, C.D. O'Brien & W. Sawchuk, *Department*

of Communications Research Center, Ottawa, Ont.

Progress Report of the Subcommittee on Teletext of the EIA Broadcast Television Systems Committee.

Robert A. O'Connor, *CBS Television Network, New York, NY*

Architecture of the French LSI Set for Antiope Teletext Decoders

Yves Noirel, Bernard Marti and Alain Poignet, *Antiope Videotex System Inc., Paris, FR.*

The Technical Parameters of the Television Closed Captioning System

David Sillman, *Public Broadcasting Service, Washington, DC.*

The Users View of Teletext Systems

Walter Ciciora, *Zenith Radio Corp., Glenview, IL.*

Digital Recording

Saturday Afternoon

Session Chairman: Raymond Carnovale, CFTO-TV

Digital Recording: What is to be Done?

Dominique Nasse, *C.C.E.T.T., Rennes, France*

Digital Audio Recording for Television: Some Choices

E. Stanley Busby, Jr., *Ampex Corp., Redwood City, CA*

Digital Recording—Further Options

Charles E. Anderson, *Ampex Corp., Redwood City, CA*

Digital Video Recording in the 625-line System

Hubert Foerster and Josef Sochor,

Robert Bosch GmbH, Darmstadt, W. Germany

Experimental Digital VTR with Tri-Level Recording and Fire Code Error Correction

Yoshizumi Eto, Seiichi Mita, Yasuhiro Hirano, *Central Research Laboratory, Hitachi Ltd.*, and Toshiaki Kawamura, *Hitachi Denshi Ltd., Tokyo, Japan*

Digital Video Recording—Some Experiments and Future Considerations

M. Morizono, H. Yoshida and Y. Hashimoto, *Sony Corp., Kanagawa-ken, Japan*

Recent Advances in Digital Video Recording

C. Robert Thompson, *RCA Camden, NJ*

of security against page addressing errors.

Robert O'Connor presented a progress report of the Subcommittee on Teletext of the EIA Broadcast Television Systems Committee. This committee, known as BTS, is a long-standing industry committee sponsored by the Electronic Industries Associations (EIA). About a year ago, BTS established a subcommittee to develop a set of technical standards and system specifications for a system M (525-line, 60-field) teletext system for use in the US.

SMPTE Task Force: World-Wide Digital Television Format

SMPTE's Working Group on Digital Video Standards, in a meeting preceding the SMPTE's 14th Annual Television Conference, called for a task force to investigate the possibilities for a world-wide component digital television standard.

The Working Group is developing a draft for a composite NTSC digital television format. In this meeting, European efforts to achieve a common digital television format between PAL and SECAM nations were acknowledged as being extremely significant. Overwhelming support then developed to extend this concept to achieve worldwide compatibility.

Recognizing the timeliness of this action, the New Technology's Steering Committee established such a task force, under the chairmanship of Frank Davidoff, with directions to hold its first meeting before the end of the Conference.

SMPTE Digital Workshop At NAB-'80/Las Vegas

A workshop on "The Digital Decade—Its Impact on the Broadcaster," will be presented by the Society of Motion Picture and Television Engineers (SMPTE) at the upcoming convention of the National Association of Broadcasters in Las Vegas, it was announced by SMPTE Editorial Vice President K. Blair Benson, Video Corp. of America.

The workshop will be held Monday, April 14, from 8 AM to 9:30 AM in room A3A6 at the Las Vegas Convention Center. Benson, who will be chairman of the workshop, said the program would take the form of a panel discussion by a group of experts from the SMPTE.

The participants of the panel are William Connolly, CBS, chairman of the study group on digital television tape recording; Michael Fisher, ABC, chairman of the committee on television video technology; Robert S. Hopkins, RCA, chairman of the committee on new technology; Miguel A. Negri, NBC, member of the study group on digital television tape recording; and Roland Zavada, Eastman Kodak Co., SMPTE engineering vice president.

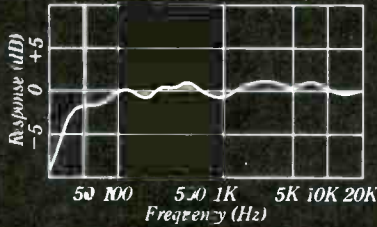
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The end product of the subcommittee's effort was to be a report to the parent committee which could then form the basis for a Petition for Rulemaking to the Federal Communications Commission (FCC) looking towards the adoption of such a system in the US.

The work of the subcommittee has been concerned with two major areas: 1. The basic technical parameters of a teletext systems, namely

SMPTE/Toronto Exhibitors

Because exhibit participation was restricted to firms displaying digital-only products, the exhibit portion of SMPTE/Toronto had to set an all-time record in numbers (16 companies) with an all-time concentration level for digital. The exhibitors included: Adda Corp.; Ampex Corp.; Antiope Videotext Systems; Colorado Video; Digital Video Systems; Fernseh, Inc.; Micro Consultants; Microtime; NEC America; New York Institute of Technology Computer Graphics Laboratory; Ontario Educational Communications Authority; RCA Corp.; Recortec, Inc.; Skotel Corp.; Sony Corp. and Vital Industries.

The result was an impressive array of equipment, and an exceptional concentration of digital-technology talent.

There was not much new in the way of digital hardware at this conference, but several exhibitors plan new releases for NAB-Vegas '80. So, look for their new items when you're at NAB.

Working on home turf, one firm, Digital Video Systems, made an impressive impact at SMPTE/Toronto. In presenting papers, chairing sessions, and inviting all attendees to be his guest at the CN Tower tours, John Lowry and his staff maintained a high level of visibility throughout the conference. Leitch Video is to be congratulated for sponsoring the transportation that made touring the CN Tower practical.



Attendees at SMPTE/Toronto were anxious to see the latest equipment as well as attend the technical sessions.



While the technical sessions were in full swing, exhibitors had to stand by waiting until the jammed sessions broke up. Booth attendance was brisk as long as digital papers were not in progress.

an appropriate data bit rate, data pulse amplitude and shape and the specific lines in the vertical blanking interval to be used. 2. The complete specifications for a teletext system, including the coding method, alphabets and graphics, special features and error protection methods.

O'Connor described the conclusions reached to date, the Subcommittee's views on a preferred teletext system, and paved the way for continued discussions of Teletext to be held at NAB-'80 in Las Vegas.

Ciciora analyzed the North American consumer's reaction to Teletext where a forecast is required since a consumer teletext system has not yet been implemented. While teletext has many potential categories of users and can be implemented in many different ways, Ciciora concentrated on broadcast teletext as an ancillary service for consumers. His analysis was based on considerations of technical feasibility and the constraints imposed by consumer behavior, resulted in important implications on system design. He concluded that the consumer will have to be convinced that teletext is useful and worth the cost, and introduced the lowest-form-of-life concept—that level of product which performs all essential functions at lowest possible cost.

The paper on Antiope, read by Dennis Dunbar of Detroit, described the architecture of the French LSI set for antiope teletext decoders. The decoder cost is regarded as the factor most likely to influence the commercial success or failure of a teletext system. As a result, a great deal of effort has been devoted to developing a design that, utilizing LSI circuit technology, reduces the cost of teletext decoders.

In a related paper, David Sillman, Public Broadcasting Service, discussed the technical parameters of a television closed captioning system. He pointed out that captioning of television programming is essential to the millions excluded from enjoyment of these programs by hearing impairments. Open captions (printing the captions directly on the transmitted pictures as done in subtitled foreign language films), would annoy the hearing audience if the practice were extended to all programming. In closed captioning, the transmission of captions by encoding leaves them invisible on the screens of conventional television receivers unless a special decoder is used; this permits captioning substantial amounts of television programming without the disadvantages of the open transmission method.

The requirements of caption editing and data signal generation were also reviewed and the means of meeting the requirements are described with technical details. These include the Caption Editing Console and a Line 21 Encoder System. The Caption Editing Console is a television program script word-processor which is vital in providing cost-effective caption production. The Line 21 Encoder System reads the floppy disc output of the Caption Editing Console, synchronizes the caption transmission by use of the SMPTE time code recorded on either a tape or film program master, and inserts the data in the vertical interval of the program video signal.

Finally, he described the receiving equipment which will be available early in 1980 through mass merchandising.

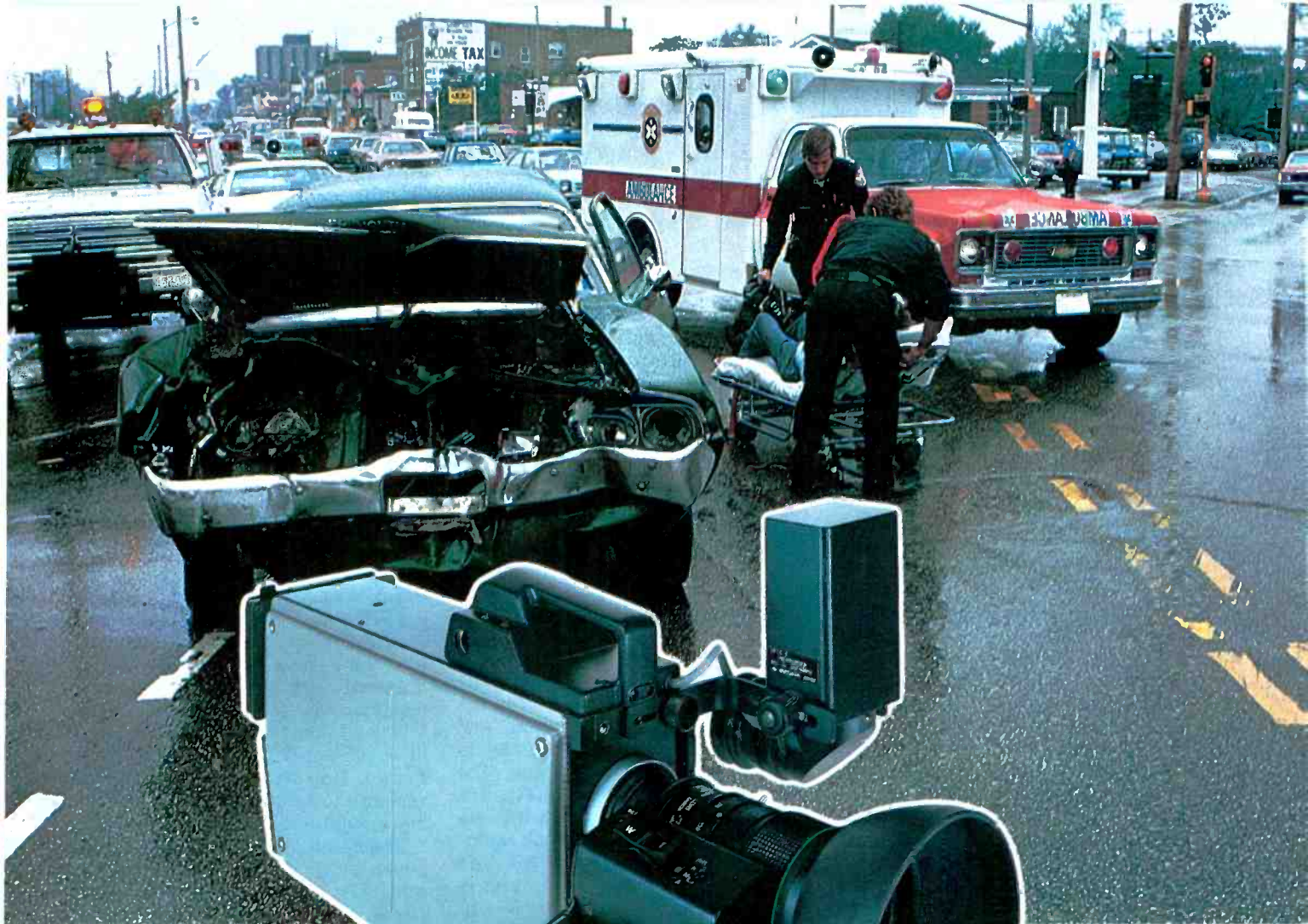
Digital recording

Dominique Nasse, CCETT, kicked off the final SMPTE session with a paper on what can be done in digital recording. Since recording is paramount in TV production, digitizing the recorder is a key step in the processes used in post production. The interest in dealing with picture components instead of the usual composite signals is now recognized, but the problem lies in the wide range of possibilities available. The role of the digital recorder must be fully defined as well as the requirements of television services. The most important feature that manufacturers and broadcasters are asking for is an acceptable standard. In Europe, Nasse expected an agreement to be reached on a digital video format by the close of SMPTE's conference.

Two papers by the Ampex staff, Stan Busby and Charles Anderson, covered aspects of digital in audio and video.

Busby's paper on digital audio for TV was tutorial, defining the technology available to designers of TV recorders and outlining the constraints and tradeoffs dictated by TV studio practices. He explained the difference between static and dynamic S/N ratios and discussed three techniques for digitizing audio signals in light of their influence on these two ratios.

Other aspects of digital audio covered by Busby included: (a) the relationship between sampling rate and bandwidth, with special emphasis to those derived from TV scanning frequencies; (b) the requirements of I/O bandwidth limiting filters, and how they differ for video and audio; (c) recording and playback of a stream of digital bits on tape; (d) efficient usage of tape



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Ikegami HL-78A

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April 1980 *Broadcast Engineering* 29

area in digital recording; (e) locating the audio record on a DVTR; and (f) concealment of audio errors.

Anderson, in a paper at the 121st SMPTE conference in Los Angeles, discussed the influences of desired options (such as continuously variable slow motion) on the choice of tape scanning format for a future digital video recorder. The conclusion was that none of the existing 1-inch helical formats, nor the quadruplex format, was suitable for use in a practical digital VTR.

A survey of broadcasters and production houses reveals that they are concerned that capabilities now available in 1-inch helical recorders not only be maintained, but be improved and that new ones be added while maintaining the quality and multigeneration capability of digital.

Furthermore, users feel that, in a complete change of a tape format; advantages should be taken of the opportunity to have a no-compromise approach. One of the desired features should be a portable version utilizing a cassette. Anderson's SMPTE/Toronto paper examined the system requirements from an engineering viewpoint and suggested a general specification for the cassette.

Bosch engineers Forster and Sochor discussed many aspects of digital recording, with emphasis on the 625-line system: (a) requirements concerning video signals storage; (b) the advent of digital semiconductors offering solutions to the problem of digital picture storage; and (c) multigeneration copy effects on the broadcast signal quality. They deduced that the traditional recording formats have reached their limits, and narrow-band modulation plays an important role in this development. Here, the recording of digitalized television signals could offer a true alternative as it is possible, by regeneration of

the play-back signal, to interrupt error propagation due to copying.

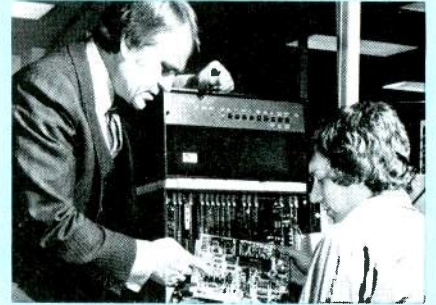
They went on to describe a Bosch experimental recording system that uses the Sub-Nyquist sampling method with 2xfs sampling rate offering error-concealment and good picture quality. The tape decks of the machine are identical to the BCN standard version. The rotational speed of the heads is twice as high and the tape transport speed twice as low as the analog BCN version. The bit rate of the transmitted signal is 80 Mbit/s with a transmission channel bandwidth of 50MHz. Considering that the video tracks occupy 83% of the tape area, the storage density comes up to 3.15 Mbit/cm² of the tape area.

A specific problem being dealt with is the recording of digital audio signals together with digital video signals on the same tape. The problem, in this connection, is the requirement of separate processing during electronic editing. One of the solutions being worked on uses the same heads for both video and audio signal recording, resulting in a combined video-audio track. The four digital audio channels are recorded on the tape with a bit rate of 1.2 Mbits each. The track space available on the tape for the recording of these channels is approximately 1.5mm, about 6% of the tape area.

Hashimoto *et al* reviewed Sony's experimental digital video recorder efforts, including an experimental NTSC recorder demonstrated at NAB, 1979, and two experimental PAL recorders demonstrated at Montreux, 1979 with the experiment of 50-generation-dubbing. Their paper summed up the technical details of the experimental NTSC recorder; discussed the problems that have been made clear through experiments; considered the future development of a digital VTR.

In Sony's experiments, 'C' type

A success story in digital technology




John Lowry (left) took the opportunity at SMPTE/Toronto: The Digital Decade to announce the success story of his firm, Digital Video Systems. In just four years he has turned his company from a \$100,000 to a \$20M business with his number-one product—the digital time base corrector.

1-inch VTR was chosen to be the basic transport. The only changes made were to the heads and record/replay processing electronics. Very good results have been obtained with the same tape consumption as of the analog 1-inch VTR and some inherent advantages of a digital VTR have been confirmed. However, much more work remains to be done prior to designing a marketable machine.

Thompson of RCA reviewed recent advances of digital video recording and concluded that much work remains to be done. For instance, the proper choice of certain key recording parameters for long term effectiveness and user value and format standardization are important areas that require careful consideration and intensive technical effort.

He described RCA's digital recording developments and addressed probable user requirements, transport technology, digital integrated circuitry, the transducer-to-medium interface, media consumption, picture and sound quality, and search rates.

To close the SMPTE/Toronto '80 Digital Decade conference, Connolly of CBS presented a progress report of work by SMPTE's Study Group on Digital Television Tape Recording. This group's effort has now resulted in an extensive questionnaire regarding the user needs in digital VTRs, and this form is being mailed to 1100 carefully selected, VTR experts/users. The results, when tabulated, will provide the basis for an industry-designed digital VTR. Connolly urged everyone getting this form to respond quickly, but with extreme care; the choice of features and format will greatly affect the ultimate cost, performance, and utility of the final digital VTR evolved. □



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Circle (26) on Reply Card

April 1980 *Broadcast Engineering* 31

Digital Audio: A WQXR Experience

By Zaven N. (Doc) Masoomian, chief engineer, WQXR, New York

Digital circuits are now significant tools in the average broadcast station. Advanced techniques produce equipment employing digital circuits which are providing not only greater functional ability, but also increased reliability. These advantages result because in most digital circuits, the transistors operate in an on-or-off mode. These two states are more or less impervious to transistor gain.

Another advantage occurs when digital circuits are coupled with logic circuits. Many other functions can be performed with ease. Programmed logic can issue commands and operate by the clock or in response to its own interrogations. Also, because of the on-or-off operation, an engineer with the basic knowledge of digital operation can easily detect malfunctions and troubleshoot.

Today, the big move is into recording and reproduction of sound digitally. This process reproduces sound as close to the original source as has ever been done. When compared with the analog signal, the digital signal, in essence, chops the analog sound wave into more than 40,000 bits and then transfers this information to a storage medium (such as a disc or tape).

Once in storage, it can be retrieved and reproduced almost flawlessly (impervious to dirt and scratches because your digital detector does not see them). Build into the system a speed control and error correcting scheme and you keep the storage medium at the proper speed. This also corrects most errors that may creep in and upset the steady stream of data as it flows from the disc or tape.

The specifications of the present generation of digital recorders and playback units read like theoretical limits. When finally standardized, they will provide a sound source that will be a challenge to every piece of audio equipment in the broadcast station's audio chain. First into the console, then through line amplifiers into the studio transmitter phone lines or the STL, then into limiters and/or processors and finally into the stereo generator and the transmitter out into the air. Of course, this will provide a challenge for designers to produce equipment capable of handling and faithfully producing better than 90dB dynamic

WQXR makes digital history

On June 7, 1979, the staff of WQXR/WQXR-FM in New York made its mark in broadcast history by airing a digital audio source. (This achievement was reported in August, 1979 *BE*, p. 24.)

WQXR was the first US commercial station to transmit the digital audio source. (However, this work was slightly preceded by KPFA, a noncommercial station in Berkeley, CA, with its digital broadcast on April 15.)

Key figures in the WQXR digital broadcast experiment were Doc Massomian, chief engineer; Robert Sherman, program director and host of WQXR's "Listening Room;" Michael Schulhof, Sony Industries president; and Roger Pryor, general manager, Sony Digital Audio Division, who helped implement the WQXR experiment.

In the WQXR broadcast experiments, the Sony PCM-1600 Digital Audio Processor was used, Sherman played four digitally-recorded arrangements, and interviewed Schulhof about the technology which made the airing possible. The first musical arrangement broadcast in FM stereo from a digital source was Franz Liszt's piano symphony performed by Yasua Watanabe. Watanabe also performed the second piece, Chopin's Etude in E Major. This was followed by a movement from Verdi's opera, *IL Trovatore*. The closing segment of "The Listening Room" featured the first movement of Grieg's A Minor piano concerto performed by Hiroko Nakamura.

Zaven "Doc" Massomian, chief engineer for WQXR described the sound as fantastic. "Digital is the way to go; there's no question about it. The digital system exceeds the performance of any FM transmitter. This new technology is definitely the wave of the future."

To let the WQXR listeners know what they were hearing, Schulhof described the technique used. "In digital recording," he explained, "the sound signal is sampled almost 50,000 times a second and then broken into a computer code. This computer code actually represents the music in numbered information instead of sound wave patterns used in conventional analog recordings. Because of this digital technique, when the computer is set for playback, the numbers are translated back to music and information is heard exactly as it

was first recorded, without tape hiss or distortion. The Sony system has been designed specifically for music, and we can expect a dynamic range almost 200 times better than the best tape recorders available."

In commenting on this broadcast Sherman said, "I found this program especially exciting. Not only did our listeners receive an excellent explanation of digital recording, but I think that the benefit of this revolutionary recording technique was realized for the very first time on (commercial) radio. To hear this material was marvelous. Even when the music stopped, the absolute silence was totally unexpected."

Following the experiments at WQXR, Pryor was interviewed about their significance:

Q. What feelings do you have for the future of broadcasting where a digital source is used?

A. I think the broadcast market is in the process now of upgrading their audio or looking very closely to that, and the natural upgrade is to digital. The interest is just starting to form as the whole system is upgraded to handle the increased audio ability. We would like to be at the beginning of this formation of higher audio quality. Our intentions are to do similar broadcasts through FM and television simulcasts using the digital unit. This should prove to the broadcast industry, both television as well as FM, that such a process as digital recording can be very advantageous to them and to their audience. We are now in the process of analyzing the major stations with the major markets throughout the US to conduct similar digital broadcasts to familiarize the public with the difference of digital sound, and allow them to make the evaluation in their own home. We're also interested in doing a television special using digital audio for the sound source.

Q. As of now are there any future digital projects planned?

A. No. I have just started approaching the different markets and people with the idea based on the wide response we received from the WQXR digital source broadcast.

Now, 10 months later, Pryor shares his latest thoughts on digital for broadcasters in an article elsewhere in this issue.

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"Our Sony video recorders have not only traveled the equivalent of fifteen times the circumference of the earth, but they've logged more than 2,500 hours of taping time," says Martin McAndrew, Vice President of Operations for Continental Colour Recording.

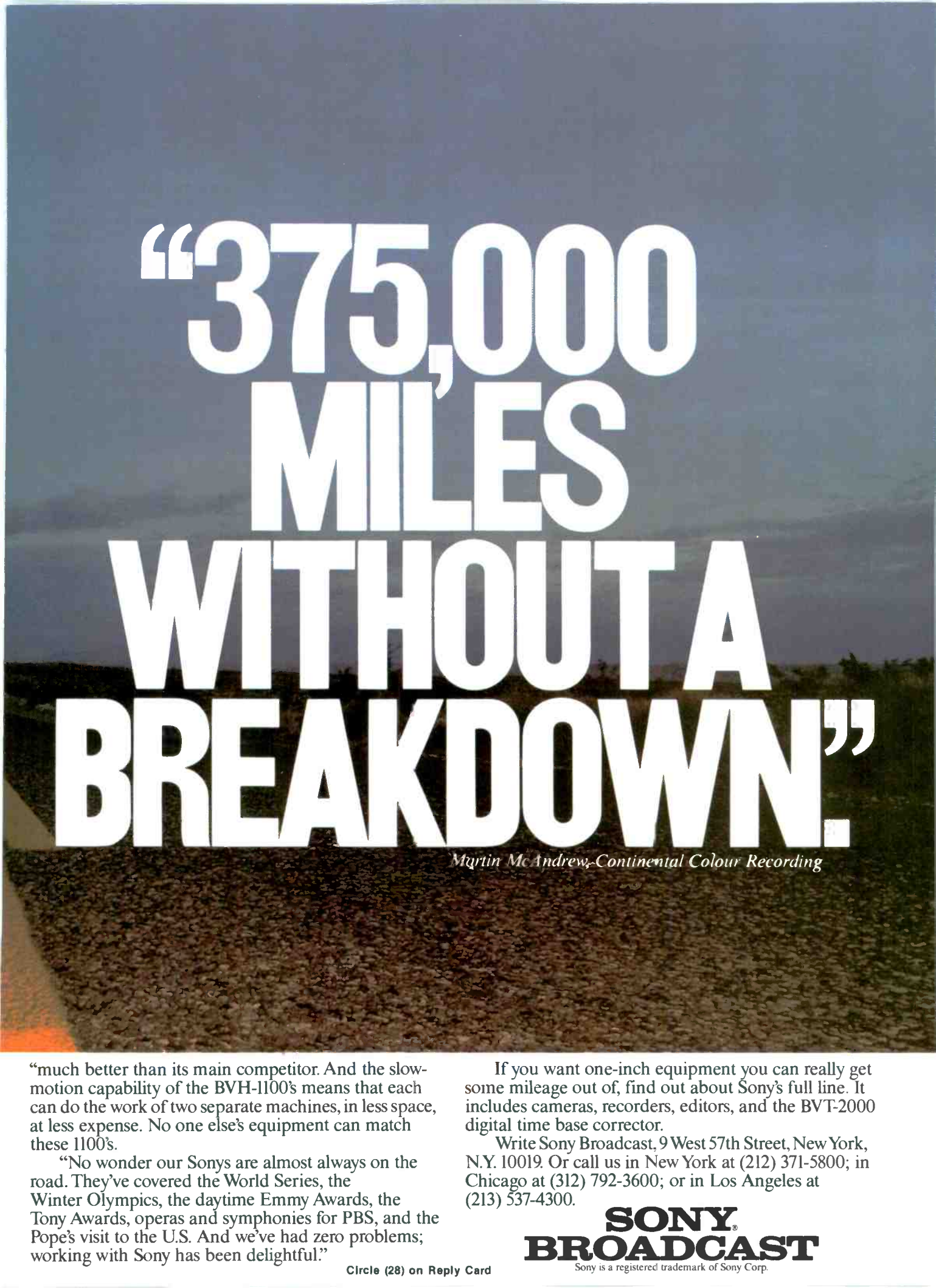
"Not one of these machines has ever broken down," McAndrew adds. "What makes that even more impressive is that they're constantly being used by different people with different ideas about how carefully to handle equipment.

"Seventy per cent of the time, our equipment is

used by ABC and NBC, but we also rent it to local television stations and production companies."

Continental Colour, the country's largest video equipment rental company, has specially built trucks and trailer trucks that are virtually television stations on wheels. Two of these trucks are equipped with one-inch equipment, including a total of two BVH-1100 and four BVH-1000 one-inch high-band video recorders. Continental has also purchased additional Sony recorders for its brand-new post-production facility.

"Sony picture quality is excellent," says McAndrew,



“375,000 MILES WITHOUT A BREAKDOWN.”

Martin McAndrew, Continental Colour Recording

“much better than its main competitor. And the slow-motion capability of the BVH-1100's means that each can do the work of two separate machines, in less space, at less expense. No one else's equipment can match these 1100's.

“No wonder our Sonys are almost always on the road. They've covered the World Series, the Winter Olympics, the daytime Emmy Awards, the Tony Awards, operas and symphonies for PBS, and the Pope's visit to the U.S. And we've had zero problems; working with Sony has been delightful.”

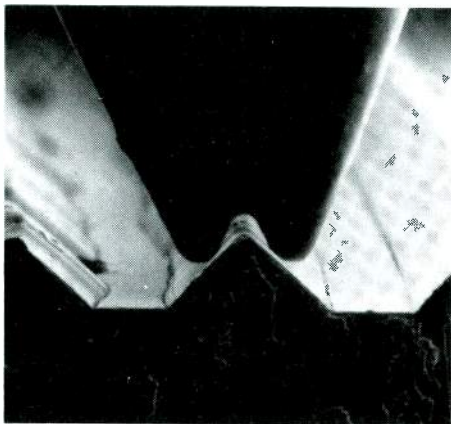
If you want one-inch equipment you can really get some mileage out of, find out about Sony's full line. It includes cameras, recorders, editors, and the BVT-2000 digital time base corrector.

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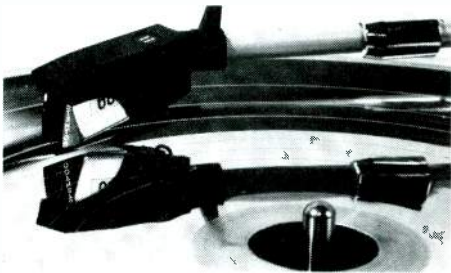
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Magnification of Bi-Point Stylus



BPS turntable system operates in reverse

Stanton-The Professional in the Recording Industry

Application—Stanton plays back the stamper

One step in the process of delivering recorded sound to you is the production of nickel plated stampers, which are negatives from which positive image vinyl phonograph records are pressed. The stamper has a ridge instead of a groove and until two years ago, there was no way to play back or evaluate stampers. At that time, Stanton designed and manufactured the world's first and only stylus and turntable system capable of playing back stampers.

The Stanton 681 BPS (Bi-Point Stylus) has two points which fit over the ridge enabling the stamper to be played back and evaluated.

From disc cutting to disco to home entertainment your choice should be the choice of the Professionals... Stanton cartridges.

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range and less than 0.05% distortion that is possible with digital.

For those plagued by dirt and scratches on LPs, even with the best tonearms and turntables available today, and who are plagued by on-air repeats and skips—this new medium for recording comes as a welcomed advancement. There is wow or flutter to speak of and no hiss. During the demonstration given by Sony over WQXR, our music director thought the machine had broken down during a pause in the music selection being played and came rushing into the control room to see what had happened. The 90dB of dynamic range is really that good.

Where are we going with this new discovery? Nobody really knows at this moment. Standards still must be set. Before that point is reached, much more research may be needed.

There are several digital schemes around and several formats. Although they are all good, they are not compatible. Therefore, the best format and the best mechanical elements must be selected and standardized before we can see the flood of software that follows.

We remember all too clearly the 45/33 RPM debates when the LP

was introduced. Then the four channel debates (still unresolved) that have virtually killed four.

Earlier in 1979 the EIAJ decided that all interested parties would concentrate on the 16-bit format while pursuing further research into digital audio. Then, in May of 1979, North American Philips demonstrated a compact disc system with digital 14-bit coding and laser optics in a demonstration at New York's Plaza Hotel. This move may have been a blessing in disguise—proof that research was going on in many labs.

Some in the engineering community feel the "standard," when finally arrived at, must be one that allows the possible use of higher sampling rates and more bits per byte. These are very important considerations that must be resolved by R&D going on right now. This will most likely be achieved before important developments in digital are finally offered to consumers.

We certainly hope the informal negotiations going on right now will resolve major differences as they arise. As the digital process is developed, all involved must be in agreement with the final product when it is unveiled and applied. □

Digital Opera Recording

The first digital multi-track recording of an opera was made during December and early January by Herbert von Karajan, for Polygram, utilizing 3M's 32-track digital mastering system.

The recording of Richard Wagner's 4½ hour opera 'Parsifal' utilized the Berlin Philharmonic Orchestra and the chorus of the Berlin Opera and took place in the Berlin Philharmonic Hall. Analog tapes were also made of the sessions.

Final decision to release the opera from digital tapes will be made in Summer 1980, following editing and mixdown of both the digital and analog versions. The digital tapes will be edited digitally with 3M's new electronic editing system.

The recording used 16 tracks of one 32-track recorder, while a second recorder was used to provide tape overlap for longer recording segments. According to 3M, recorders were in use approximately 6 h/day for 15 days. 'Parsifal' is the first Wagner opera recorded under Herbert von Karajan for the "Deutsche Grammophon" label since the noted 'Ring' cycle completed in 1970, and released in connection with the conductor's Salzburg Easter Festival, founded in 1967.



Jeff Mestler (left), assistant manager, and Carson Taylor (right), vice president and general manager of Audio-Video Rents discuss digital recording at an intensive operational and maintenance training program on digital equipment at 3M's headquarters in St. Paul, MN.

Bay Area Digital Progress

According to 3M, a number of professional audio studios in the San Francisco area have had "in-house" demonstrations of its new 32-track Digital Mastering System conducted by Audio-Video Rents.

The firm, a division of Accurate Sound Corp., San Francisco, bought the 3M unit in December. Since then, according to Carson C. Taylor, vice president and general manager, it has been busy with the demos to "show the superior quality of digital recording." Audio-Video Rents plans to provide digital mastering as a service to studios north of Los Angeles, and in Canada and Hawaii.

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Models 5050B & Mark II-4 shown in optional cabinets available from the Rus Lang Corporation, Bridgeport, Conn. (203) 384-1266



Sony's Digital Audio Processor (on top of the monitor) is key to an experimental live recording of *Don Carlo* at the New York Metropolitan Opera House. A sound engineer monitors the mixing console as the recording is being made and watches the performance on a closed circuit



television monitor. A videotape of the performance was made simultaneously. A similar system may be used for television simulcasts and syndicated radio programs employing digital audio soundtracks.

Editing a Video Production with Digital Audio Soundtrack

By Roger Pryor, general manager, Sony Digital Audio Division

Editor's Note: *Digital audio received major emphasis at the 61st Audio Engineering Society Convention meeting in New York City, November 3-6, 1978—with both Sony and 3M demonstrating impressive products in their hospitality suites.*

Since then, **BE** has published updates from these two firms and from other organizations as inroads have been made into digital recording. As part of this coverage, Roger Pryor of Sony speculated on an all-digital studio in our February, 1979 issue, pp. 76-77. In this article he reports advances, as seen from his position at Sony, in the digital audio/video studio and shares his thoughts on the impact of this technology on broadcasters and their audiences.

The video production business always seems to be playing catch up with current technology. As soon as a new technique is mastered or piece of equipment is designed to make life easier for production houses and more enjoyable for the consumer, there seems to be something just around the corner that takes things one step further.

Today's technological achievements for home entertainment productions have proven that video and

audio represent the perfect marriage. Promotional videotapes have been in use for some time now, and radio and television simulcasts have been syndicated from rock clubs and opera houses. And it's just a matter of time before the first videodisc players will become an integral part of the home entertainment system. But the question of stereo sound has not really been approached.

Several manufacturers have pro-

duction-ready Beta and VHS format videocassette recorders with stereo sound. But, until now, video soundtracks remain mono.*

The advent of digital audio has rapidly closed the gap between excellent video and less-than-adequate audio. Video techniques are so similar to digital audio that the application of both these techniques can easily be incorporated into a production. And the need for video productions with digital audio soundtracks is already evident.

SMPTÉ is key

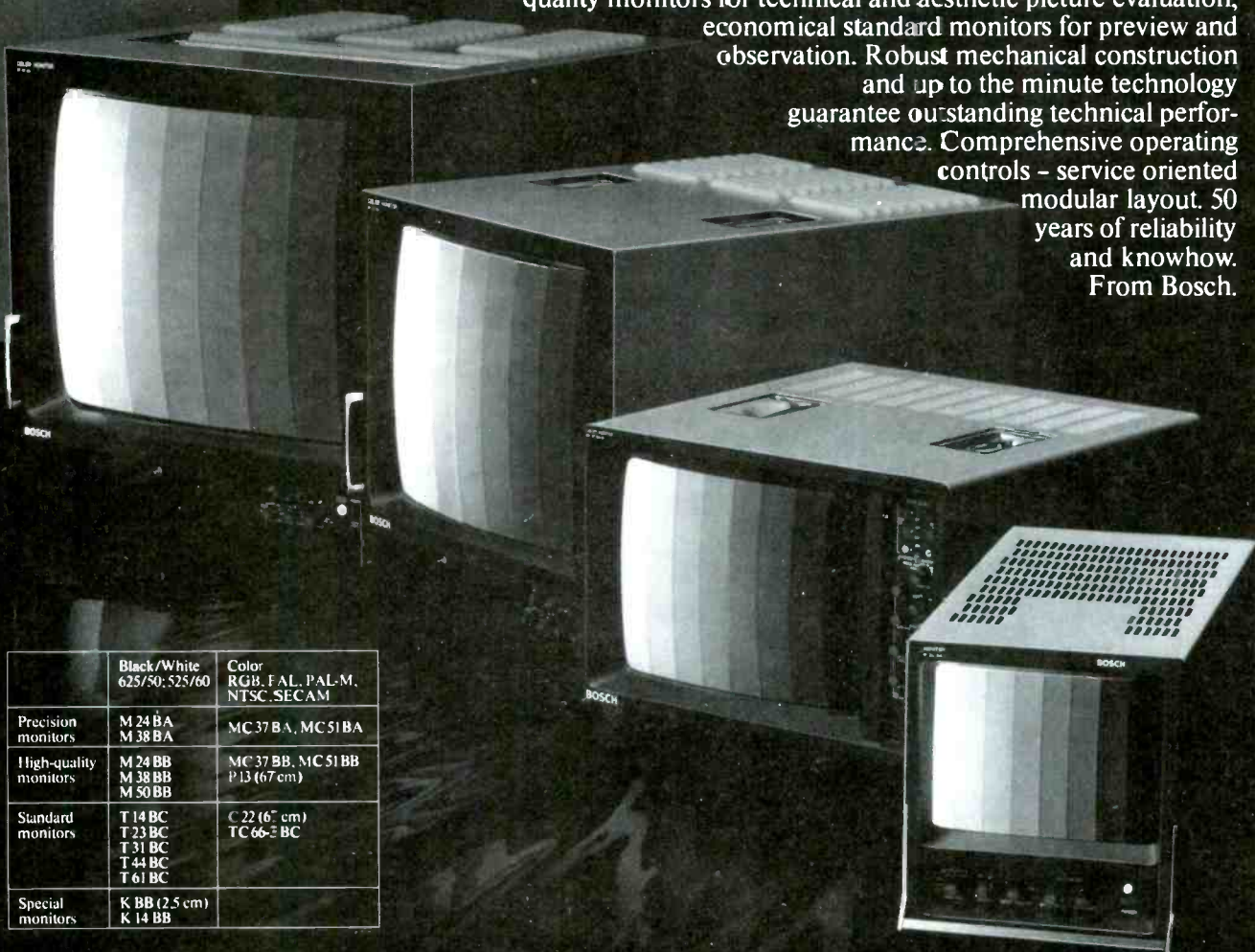
What has drawn these technologies together to the point of practicality is familiar to all videotape

*Behind closed doors at the SMPTÉ Convention in New York, October, 1978, during the digital standards committee meetings, stereo TV was demonstrated as seen and used in Japan, but the system can be used for bilingual broadcasting as well.

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productions—the SMPTE time code signal. Sony's digital audio recording and editing systems all incorporate a SMPTE track to be used as a reference during productions. The PCM-100 Processor and DAE-1100 Editor can be used by video production houses looking to incorporate stereo sound into the finished product. Thus, the key to all video/digital audio productions is synchronization of the SMPTE time codes for both video and audio.

With the PCM-100, the digital audio signal is recorded on a video track and can be used in conjunction with the U-matic or any Type C format recorders. Using 14-bit linear quantization, it achieves a dynamic range greater than 85dB, with less than 0.05% harmonic distortion. Frequency response is flat from 3Hz to 20kHz. Wow and flutter, of course, are beneath measurable limits. The PCM-100 conforms to the new digital recording standards adopted by the Electronics Industries Association of Japan (EIAJ).

The signal sampling frequency is 44.056kHz. But this exceptional sound quality, far superior to that offered by any analog mastering recorder, is just half of the digital sound story. The other half is the ability to make copies and transfers that are absolutely perfect replicas of the original master.

Video/digital audio editing

When recording, the same SMPTE time code signal is used to identify individual frames of the video and audiotapes. There is then an identifiable reference for editing both tapes separately.

If the video recorder is not equipped with a SMPTE track, SMPTE can be laid down on channel II of the recorder's two analog tracks. With the audio portion of the production placed on channel I, there is always a reference track to make sure all edits agree with the soundtrack.

To further ensure the accuracy of the edit points, an agreement should be made as to who will pick the edits first. For discussion, assume that the video edits will be selected before the audio because the video editor need not be more accurate than 1/30s, well within the DAE-1100's edit accuracy of 362s. It is also easier to pick out edits visually by watching a monitor.

When the video production team screens the tape for edits, both SMPTE time code numbers should be marked at the in and out points. A computerized video editor like Sony's BVE-5000 will store all the edit points in memory. This information also has to be available to the audio team to enable edits to be

accomplished without going out of sync with the finished video product.

The audio production team can then take all of the in and out editing points from the list of SMPTE time code signals received and place the same edit points on the audiotape using the DAE-1100 Editor.

The DAE-1100's unique remote controlled operation affords complete editing flexibility and permits the editor to be installed virtually anywhere. The remote control panel provides a large search dial to select edit points. By rotating the dial, an edit point can be selected and located in a way similar to locating the edit point of conventional analog open reel tape recorders.

The search dial provides complete control over playback speed in both directions. Once the edit point is selected, rehearsal editing is possible and the edit point can be shifted if necessary. Blinking lighted buttons flash in sequence permitting the editing operation to be conducted by the user by simply following the order. It also features advanced cross-fading adjustments that permit 10 selectable times from 1 to 100 milliseconds to eliminate signal level differences between the source programs at the edit points.

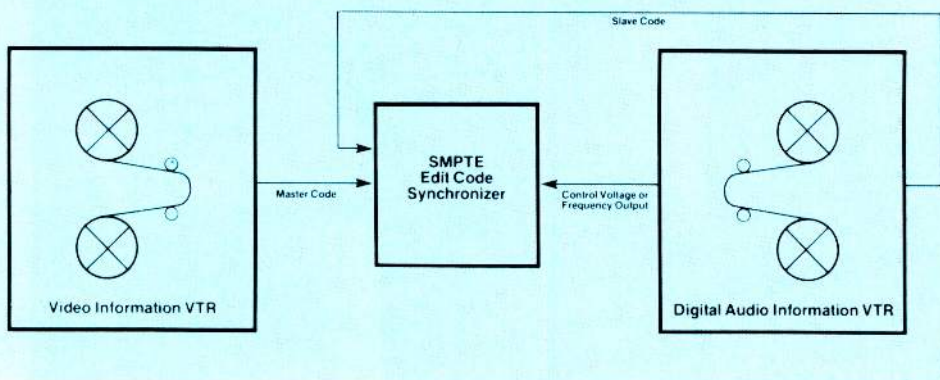
In addition, this digital editing unit incorporates a level within a +6dB, -∞ range. These controls can also be used to produce fade-in and fade-out effects.

Because the DAE-1100 must perform with codes rapidly changing (in nanoseconds), searching for the desired edit point is accomplished in two steps. First, a period of 6s that includes approximate edit point and its vicinity is stored in the memory circuit. Then, the editor trims for the exact edit point during this time span while listening to the reproduced sound. The search speed is variable in both directions with the search dial in the manual mode; in automatic, half-normal speed is used.

Finally, the DAE-1100 will accommodate two source players, so that takes from two different tapes can easily be combined onto the final edited tape.

Digital tape counters for both the recorder and player are capable of accurately displaying up to 23h 59m 59s 29 frames.

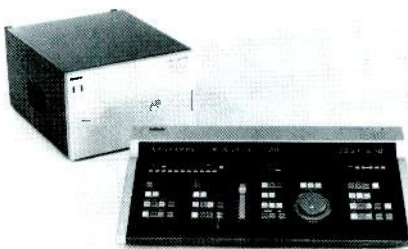
The BVE-5000 video editor combines SMPTE time code and Vertical Internal time code, which allows an editor to search at high speed in both forward and reverse to find an edit point quickly. To locate edits



The SMPTE Time Code is the key to synchronizing the video and digital audio information.



The Sony DAE-1100 Digital Audio Editor.



A computerized video editor like Sony's BVE-5000 will store edit points in memory.

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with precision, a jog mode allows an editor to position the tape reels as if he were moving them by hand.

The control unit executes editing automatically according to an edit list of more than 500 edits. Input from the BVE-5000 keyboard is displayed directly on a CRT, so an editor is always aware of the next operational sequence. The unit performs individual editing events including cut, wipe, dissolve, key, and even difficult SEG operations in separate stages. It can be used with Sony's 1-inch BVH-1000 or the BVU-200A videocassette recorders.

When completing the final edits, it would be helpful if both parties have audio and video capabilities. Whatever editing decisions are made based on the SMPTE time code, both the audio and video production can be completed separately. Being able to preview the entire production while editing will ensure synchronization.

Once the digital audio and videotapes have been separately completed, the tapes have to be synchronized for playback. Playback requires using one VTR for the videotape and another VTR for the

digital audiotape, with both tapes containing the SMPTE time code signal. To guarantee synchronization of both VTRs and to ensure proper lip sync, the VTRs are played back through a SMPTE synchronizer.

Applications

Practical applications for the finished product today are exciting, and what lies ahead in the next few years is even more so.

As discussed earlier, the encoded digital audio signal is really a pseudo video track, conforming to the NTSC 1V P-P standard signal. As a result, this would make the video/digital audio production suitable for today's television/radio simulcasts, an area that offers limitless possibilities that until now have not really been tapped.

Because the digital audio signal is video-based, it can be transmitted from a designated central station via satellite or microwave and translated by a PCM-100 on the receiving end at participating television stations in major markets. The digital audio track now in analog form can be easily sent to FM stereo radio stations participating in the broadcast via telephone lines.

But this is not the only application for video/digital audio productions. Videocassette recorders are now being introduced into the professional market with stereo capabilities. And soon, for the first time, the home entertainment system will be able to provide video productions with superior sound. At this time, however, production houses are not preparing for consumer interest in this area. But, if there is going to be stereo capability for home VCRs, there has got to be stereo capability for home VCRs, there has got to be software to enable these units to perform up to their expectations. Video/digital audio productions are perfectly tailored for this purpose.

With products like the video/digital audio disc player on the verge of introduction, it is obvious that manufacturers and consumers alike are preparing for the newest dimension in home entertainment. Completed video/digital audio projects for today will soon become the master tapes for the new generation of disc cutting facilities. Building up a video/digital audio library today will avoid the scramble for source material when the need is more immediate.

A choice has to be made: continue playing catch-up with current technology, or, for the first time in a long time, actually get one step ahead of the game. □

Case History #437

Electronic News Gathering is one of the toughest environments a microphone will ever encounter. Every mike we've seen has promised the demand for low handling noise, fine audio quality and virtual indestructibility.

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Electro-Voice DO56 Shock-Mounted Omnidirectional Microphone

pushes, the shoves, the rubs and finger taps in stride. And when handling *really* gets rough, the DO56's unique internal shock mount virtually eliminates the bell-like clang transmitted by other shock-mounted mikes.

Congratulations to the NBC Electronic Journalism Department in New York. You found the solution — the DO56.

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

resulting in a final product that doesn't accurately reflect the broadcaster's professional standards. NBC discovered that the DO56 takes the

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In closing, we thank the people who didn't know us but gave us a chance, then became our customers, and **MOST IMPORTANT . . . BECAME OUR FRIENDS.**

Sincerely,

Ronald R. Jones
Ronald R. Jones
President



P.S. Hope to see you at NAB!

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Audio Mixers and Processing Equipment: User Comments

Users respond to BE inquiry about design and performance features of audio mixers and processing equipment currently available.

Just before NAB last year **BE** conducted a quasi-poll of its readers on their opinion of current technology in audio mixers and processing equipment: (a) applications now possible because of advances in design and manufacturing; (b) innovations that are solving problems, or creating new ones; (c) shortcomings of present equipment, and potential solutions; and (d) improvements they would most like to see manufacturers consider in new designs. In many ways, this is precisely the information exhibitors at NAB seek concerning new prototypes being displayed or new designs being undertaken.

BE readers responded to this poll in a number of ways—new equipment or designs needed; improved materials; better QC and parts service; and critiques of equipment owned. But, the most frequent plea was for human engineering of equipment to meet broadcasters' needs.

While the **BE** poll was not an exhaustive survey of the industry needs, it does represent a cross-sectional sampling meaningful to manufacturers. Consequently, selected excerpts from the written returns are presented below for users to review and manufacturers to consider in their products. The listed comments have been edited only to the extent of deleting specific manufacturers by name; an asterisk* has been substituted. Insofar as possible, the original style of the many respondents was retained to reflect the mood of users as they discussed their equipment and needs.

Selected comments from poll

1. Better isolation between inputs. Mechanically better designs on

heavily-handled controls (pots). Better mechanical design to eliminate microphonics.

2. In audio mixers, get rid of the relays used to mute speakers. In this age of technology, manufacturers could develop a solid-state switcher for muting speakers. Relays are too much of a hassle to keep in operating condition.

3. Manufacturers are missing an opportunity to make input channels with optional 2 or 3 state (low, mid and high) equalization. Some inexpensive consoles are either too noisy or have high impedance outputs. There should be pan pots on all dual-channel consoles.

4. Better human-engineered layouts and more flexibility. Lower distortion. More compact portable mixers with 8 or more input channels and 4 or more output channels. Solo buttons on mixers to permit cue auditioning of inputs while they are active.

5. Equipment packaged for the small studio; many systems are over-kill.

6. Most audio boards are too noisy. And, the arrangements on those mixers are awkward to get at, making it hard for operation without some form of clocks and cart machines.

7. Make it RF free so it can operate within inches of 5kW transmitters. Modular parts that can be easily removed and interchanged. Design units for easy serving in tight quarters.

8. Improved field production features are needed.

9. Digitalize, make more easily serviced in-field. Put all ICs and

transistors in sockets. More built-in diagnostics.

10. Improvements in wireless mics and receivers needed.

11. Manufacturers are tending toward "pretty packages" and forgetting that thousands of heavy-handed tractor drivers will operate the gear. The failure rate of pots and switches is overwhelming! We need fewer technological (electronic) improvements—we must have bearings that bear-up in pots and switches that work reliably **after** the 90 day warranty.

12. Recording/production consoles need better resistance to CB & police radio interference. "Broadcast" type consoles should be designed with automation in mind, and remote or microprocessor switching and level control should be accommodated.

13. When do we get...a good cart machine for stereo?...digital without phase problems?

14. How about a 10-channel console for a small station that has "human" engineering applied.

15. Better QC: too many faulty units are being shipped.

16. Better square wave and transient specs needed in audio mixers...also peak program meters on mixers...more headroom!

17. None of the console manufacturers offer a good combo operator console. Not only is the console design unacceptable, the furniture offered is not "human engineered" for the combo operator. (To solve this problem we modified a custom console with the addition of our own design of support furniture for our combo operation.)

18. Too much emphasis on large, complex mixers and not enough on compact, versatile small units for average station uses. Also needed are suggestions and methods of setting up and checking out the audio performance of some of the more complex processor systems.

19. Illuminated switching for seeing

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ops "at a glance." Computer controls for boards.

20. Noise on step attenuators is a continuing problem...dc control creates problems associated with increased complexity of equipment... mixers should include more rugged switching, and more headroom is needed in most designs...more audio power built in would help too (for monitors)...would like to see PPM meters as option on production boards, in addition to VUs.

21. Current broadcast boards use cheap parts, fall apart quickly. Expensive recording studio boards are built well but are more than a station typically needs. Cheap push/lush switches and mini pots on boards are a ripoff; let's get back to basic designs like the old (*).

22. Need improved audio editing system with higher time resolution.

23. Need cue VU meter—and a little more emphasis on monitoring cues.

24. Consoles that are human engineered! Attention to what radio stations really need and want. We've seen the advent of really neat 8 pot boards the size of a cigar box, all the latest ICs, lots of LEDs, etc. They are impractical to work

with, and impossible to work on. Some manufacturers have gotten some good feedback—big boards with adequate handspace, telco-type switches, **real** VU meters, auxiliary input jacks, undedicated push switches. **Discrete** circuits, adequate RFI proofing if ICs are used, and **sockets**. Probably more than 50% of small-market station now use regular phone lines for remotes, so line feed networks in most consoles are probably never used. Headphone outputs that can only be used with Hi-Z phones can be worse than useless—dropping monitor and line levels when the easily available 8- Ω phones are inevitably used. In short, realize that modern technology has brought about many changes in radio and studio usage—but **not** the desirability of human engineered, rock-solid, dependable equipment that serves a true function.

25. Audio processing technology has been a time-consuming factor in videotape editing, and digital audio technology should improve this.

26. Our audio processing equipment is insanely sensitive to RF (be it CB, grid dip meter or our own transmitter). Maybe a bushel of ferrite

beads should be supplied with each purchase.

27. Incorporation of subcarrier for simultaneous/compatible transmission of digital stereo audio—enabling home reception of digital stereo data stream w/o analog processing.

28. The only problems we have are with lead-fingered DJs breaking the mountings on the audio switches.

29. Need more comparative data on all products—especially performance and specs.

30. With material costs soaring, manufacturers should consider serial-encoded data control and make possible greater distances between a machine and its control point.

31. Audio mixers are getting too complicated to understand (millions of knobs, etc.). A simple way is needed to describe them.

32. (*) and (**) very cost effective. For the dollars, (***) the **best** and easiest limiter/processor to use and maintain. (*) had a pair for 1 year. **No** downtime—have not had to even align heads.

33. More information on handling (mixing, switching, fading) of digital

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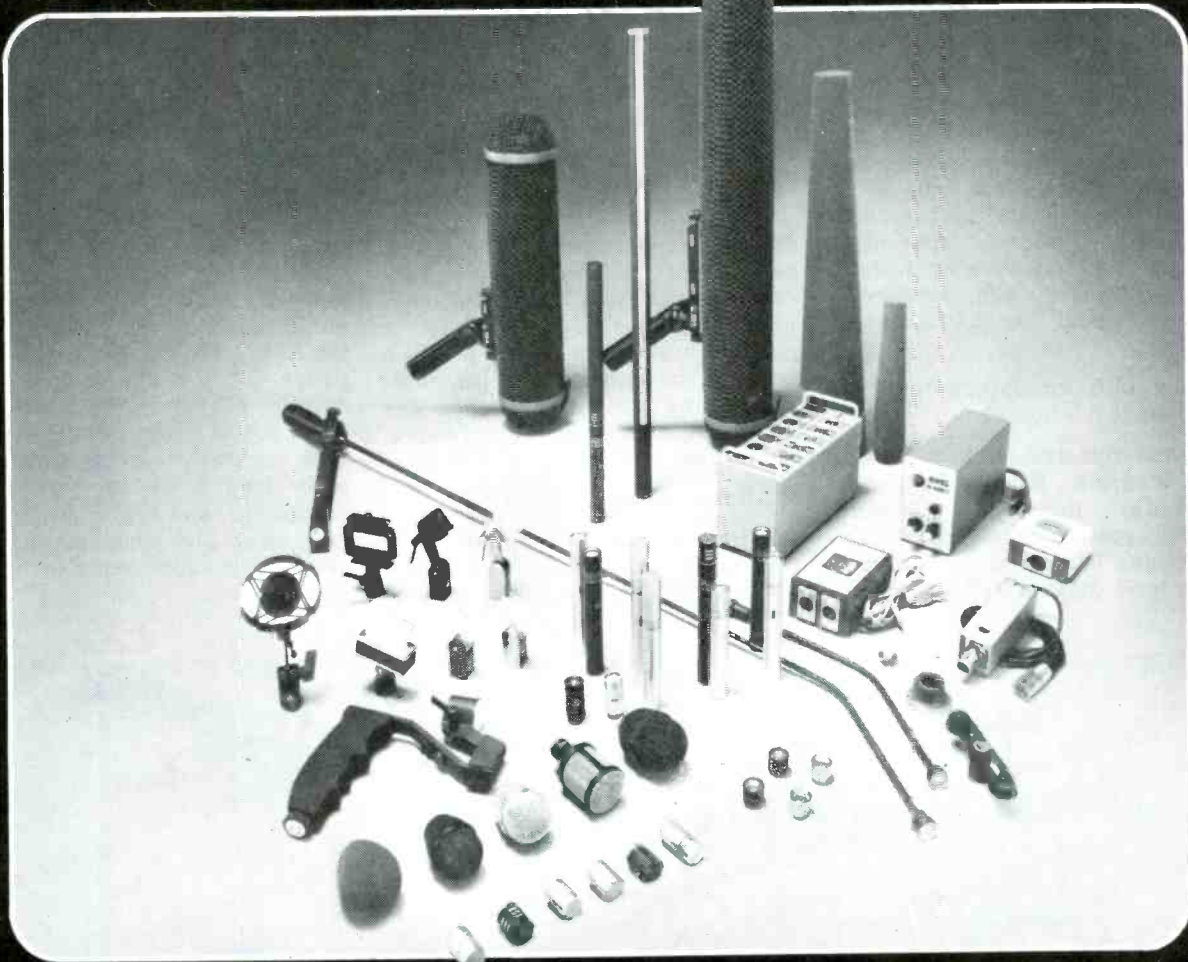
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audio needed since it is coming as a mic-to-transmitter format.

34. Lower noise and distortion ratings. Present levels are far too high: I personally modify my equipment to obtain decent specs. The commercial specs are terrible.

35. Problems with dirty pots and connectors. Need easily automated equalizers.

36. RENG equipment consolidation needed, i.e. mixer/phone (or RF) coupling packages, transparent limiters.

37. Would like to see someone design an audio switcher using LDRs because they are noiseless and distortion-free for use as a console (since most sources are line-level). A loudness controller that works on equalization instead of the level (as the CBS unit does); the unit would control apparent loudness.

38. Use LED indicators to show which input is selected.

39. Standardization of levels using "Peak Program." Remote control via serial data through a twisted, shielded pair. Dc control at the racks using D/A steps to determine the dc level that controls gain.

40. 2dB step attenuators must go if stereo is a reality—watch announcers record/dub at 4dB or more/channel unbalanced. (*) is on the track, but (**) should be pulled off the market until its units will pass an audio proof without cheating!

41. Our new (*) audio compressor lacks quality. Also have (**) AM transmitter (solid-state) but question the quality and long-term reliability. The service manuals are inadequate and the customer phone service is disorganized. Had same problem for FM transmitter.

Have new (***) console—not bad but lacked talkback for remotes and relays to control "on air" lights for the several studios.

42. An audio console with built-in switching panels would be a welcome component, allowing for operation—even in the event of pot or channel breakdown...there is still a need in the marketplace for audio processing gear that keeps the inherent quality of music and narration intact.

43. Better protection from RF!

44. Better types of dc-powered mixers for EFP use...with more features (like built-in filters). Also

need mixers designed for ¾-inch editing.

45. More miniaturization of studio equipment. More flexibility (input-output levels, impedances, connectors, etc.) of portable equipment.

46. Smaller power supplies, better human engineering, more versatile processing.

47. A standardized method of noise testing for audio consoles.

48. Audio awareness is needed. How about better broadcast quality? Why not stereo TV?

49. A better selection of turntables is needed along with cheaper, high-quality condenser mics.

Final comments

BE readers took the time during this poll to air their view on other topics, such as: the 9kHz question; the AM stereo deadlock; and anticipation for the approaching digital decade. BE will address these, and other issues in the months ahead.

In addition, manufacturers and users may write BE with further comments on audio mixers and processors and we'll consider publishing a grouped reply in a future issue. □

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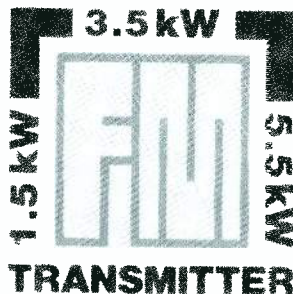
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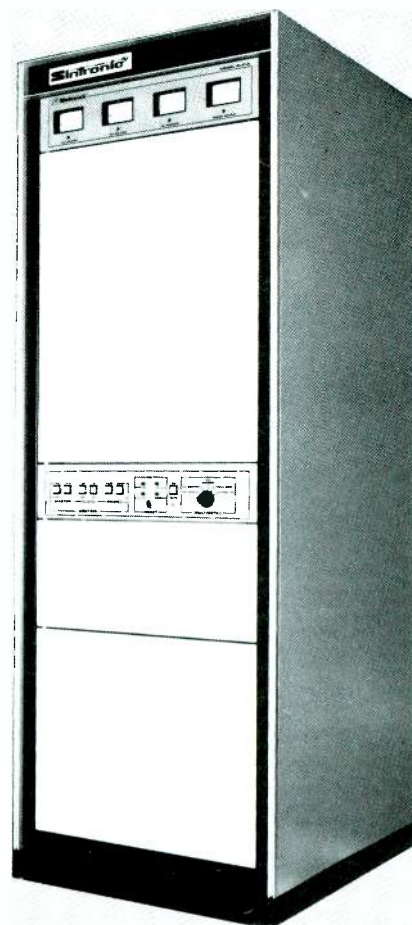
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Take 1: Upcoming in BE Cameras, Careers, Courses and Casualties.

We're going to follow the paths of several of our correspondents (member and non-member alike) and let the readers of **BE** see how some of these aspirants have made out, or struck out, in their quest for a career within the TV industry. We'll examine their schooling (vocational or college), their resumes (how effective) and we'll attempt to learn why some are successful and why some are not.

For starters: (from a high-school senior) "Gentlemen: I am a high school senior interested in (TV

camera-work as a career field. Please forward any information you have regarding career opportunities, training or educational requirements and earnings common to this field."

From a June '78 college grad with areas of study in solid-state Electronics and CommArts: "Dear Sir: In (a recent) issue of **BE** there was an article (dealing) with many of today's college graduates in communications going out into the world to find jobs without any luck. Chalk up this letter as one more unemployed. I have applied to all the major networks and have received a very kind letter saying 'thanks, but no openings right now.' What is a person supposed to do? You figure with experience like mine I could at least get summer replacement at a network. I would like to know what you people suggest one does to stay in their chosen field. As things stand right now, the closet I'll get to broadcasting is being a technician at an aircraft manufacturing plant. How about a suggestion? Very truly yours, MRG" (**Editor's note:** Read the above carefully and see if you

can spot any flaws in the above letter.)

Lastly, from three gentlemen who seem to be off to a good start: "Dear Sirs: In regard to your recent article in **Broadcast Engineering** we, as university graduates, would like to recommend our school as an excellent training ground for broadcast personnel. It provides a broad spectrum of classroom and hands-on experience in both TV and radio. The students train on state-of-the-art equipment including RCA TK-760s and other related equipment. The school was one of the first to give training in film-style single camera electronic field production techniques. We feel our training has made us valuable commodities in the commercial television market, as well as being graduates, we are currently employed as cameramen at WKYT-TV, Lexington, KY (and) we would be interested in the (ASTVC) membership information... Sincerely, Mr. RG, Mr. CGN, & Mr. JMK..."

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**people
in the news**

Harold E. Ennes dead at 68

Harold E. Ennes, well-known electronics writer, died of cancer on February 28, in Beech Grove, IN. He was 68. At the time of his retirement in 1973, he was employed by WTAE TV, Pittsburgh. Previously, Ennes had worked for WIRE Radio, Indianapolis, and Dage Television, Michigan City, IN. He had been elected as a Fellow in the Society of Broadcast Engineers and was an active member of the SBE Certification Committee. A scholarship fund in his name has been established by the SBE.

Ennes is known throughout the broadcast engineering industry for his numerous articles and books, all aimed at educating engineers in the current state-of-the-art. He was considered by some to be one of the foremost authorities on broadcast equipment today.

Radio/Television

Mike Worrall has joined KRUX, Phoenix, as chief engineer. Worrall holds a Bachelor of Science degree in telecommunications and film from San Diego State University.

Bill Ellis was recently selected as director of engineering for public television station KOZK, Channel 21 in Springfield, MO. Ellis succeeds **Bill Curry** who has retired.

Edd C. Monskie, chief engineer of WLPA (AM) and WNCE (FM), Lancaster, PA (Licensee-Hall Communications) has been named director of engineering for the Hall Communications group.

Manufacturers/Distributors

John F. Watter has resigned as president and as member of the board of directors of Multronics, Ft. Lauderdale, FL. Details of his resignation and/or Watter's plans for the future were not disclosed.

Donald R. Reynolds has been named product marketing manager at Orrox, Santa Clara, CA. He was formerly product manager for the compositor product line at the Telemation division of the Bell & Howell Company, Salt Lake City.

Mark G. Fehlig has been promoted to marketing manager of Moseley Associates. Fehlig, a registered professional engineer, joined Moseley in November 1975, and has held the position of broadcast sales manager for the past two years.

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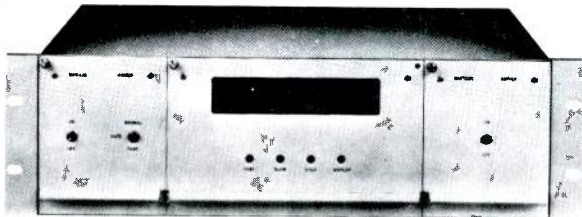
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Stanley Silverman has joined Ampex in the newly-created position of director of market planning. Silverman will evaluate and forecast the trends and requirements of the markets served by Ampex's four manufacturing divisions in his new position.

The appointment of **Jay Campbell** to director of the Modern Satellite Cable Network has been announced. Campbell will continue to oversee non-broadcast activities at MTI, Modern's New York based video teleproduction affiliate.

John E. Leonard Jr. has been promoted to president of Moseley Associates. Leonard joined the company in 1968 and has held the position of executive vice president and general manager for the past 1½ years. **John A. Moseley**, founder and president of Moseley Associates since 1961, will assume the responsibilities of chairman of the board.

Kozo Hirayama, formerly president and chief executive officer of NEC America has been appointed chairman of the board and chief executive officer of the company. **Dr. Ko Muroga** previously executive vice president, was named president.

The appointment of **Rudy Roscher** as vice president and general manager of American Data Corporation, Huntsville, AL, has been announced by Paul Bergquist, president of American Data Corporation and Philips Broadcast Equipment, Mahwah, NJ.

Clark Duffey has been named market development manager for professional audio products by 3M's Mincom Division.

Mike Barsness has been appointed North Central District sales manager of Vital Industries.

Communications Control Centers has announced the election of **Jason S. Fox** as president and chief executive officer. Fox was formerly president of CCA Electronics and CCA Telecommunications both of Cherry Hill, NJ. **W. W. "Boots" Wright** has moved up to the position of chairman of the board.

Electro-Voice has announced the appointments of **Robert E. Morrill** to the position of vice president, marketing; **Jim Edwards** to the position of commercial sound product manager and **M. Travis Ludwig** to the marketing staff.

W. B. Taylor Eldon has been named vice president of corporate development for HR Television, New York based national sales representative firm. Eldon is a veteran in the broadcast sales field having broken into the business in co-op sales for the American Broadcasting Company.

Michael J. Carney, formerly northeast regional manager of Fuji Magnetic Tapes has been appointed president of JSL Video Center, a new venture of JSL Video Services.

California Microwave has named **Russell Smith** field implementation manager for the Small Aperture Terminal (SAT) market segment of the satellite communications division. He is responsible for SAT installations in the radio and wire service satellite broadcast networks.

**New Products
From**

UTAH SCIENTIFIC

If you missed them in Las Vegas, just call or write and we'll send literature or a sales quotation on any of these newly introduced products:

- **LARGE MATRIX SWITCHING SYSTEMS** to 150 x 150 standard.
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ASK THE PEOPLE WHO OWN THEM

It's one thing to have the industry's best routing switcher specifications and widest variety of controls, but the "proof of the pudding" comes with user satisfaction—both with the product and the company that backs it.

That's why we freely distribute 100% (not 90% or 95%) user lists to our prospective customers.

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Talk to our users—any of them. Find out first hand why they bought Utah Scientific and how they feel about us.

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Please send me your users list and product literature on your routing switchers.

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Circle (47) on Reply Card

Signal and Ampex plan merger

The Signal Companies and Ampex jointly announced that the two companies have entered into an agreement in principle for the merger of Ampex into Signal through an exchange of common stock.

The terms of the agreement in principle call for the exchange of 0.79 Signal common share of stock for each common share of Ampex. Ampex has approximately 11 million

common shares outstanding and an additional approximately 1.7 million shares reserved for issuance upon exercise of employee stock options and conversion of convertible debentures.

The merger is subject to termination by either party if, anytime up to 10 days before it becomes effective, the average of the closing prices of Signal common stock on the New York Stock Exchange for any consecutive five-day period shall have exceeded \$51 per share or been less

than \$40 per share.

Completion of the merger is also subject to approval by the board of directors and shareholders of each company, a favorable tax ruling, and approval of various regulatory agencies. The merger should close in mid-1980.

The agreement was jointly announced by Forrest N. Shumway, Signal chairman and chief executive officer and Arthur H. Hausman, president and chief executive officer of Ampex.

Shumway stated, Ampex is a premier high-technology company, well respected in its markets. "Ampex meets our investment criteria in that it is non-cyclical and a leading company in a growth industry. It manufactures high quality products," said Shumway.

"Ampex is a well managed company with a great future. We contemplate no changes in its operating philosophy nor in its existing management," said Shumway.

Ampex is headquartered in Redwood City, CA. It principally designs, manufactures, and markets worldwide professional audio and video systems, computer memories and data handling products, magnetic tapes and accessories. At the end of its fiscal year ended April 28, 1979 it reported sales of \$380 million. It employs 12,000.

Signal is a worldwide, multi-industry company reporting sales of more than \$4 billion. It employs 53,000. Its units include The Garrett Corporation, Mack Trucks, Inc., UOP Inc., Signal Landmark, Inc., and Dunham-Bush, Inc. Signal's investments include Golden West Broadcasters and Natomas Company.

Richard Elkus, Ampex Chairman, noted that, "The Signal subsidiaries operate with an unusual degree of freedom, and if the merger is completed in mid-1980, Ampex would continue to operate autonomously. No changes in our management, research and development, or operations are anticipated."

He also said, "This new relationship should accelerate Ampex's ability to grow and prosper as we had planned."

California Microwave installs first terminals for satellite broadcast network

California Microwave completed installation in December of the first 15 small aperture terminals for the

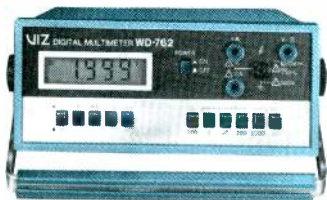
Only VIZ bench DMM's tell so much for so little

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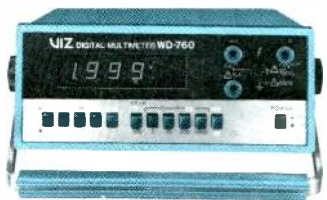
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LCD HOW MUCH
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Manual ranging



WD-762 LCD display \$210



WD-760 LED display \$199.95

Autoranging



WD-763 LCD display \$265



WD-761 LED display \$255

These are all laboratory quality instruments for bench or battery use. Supplied with AC adapter, spare fuse and deluxe probes. Features include:

- Accuracy 0.1% DCV
- Full range hi or lo power ohms, pushbutton selectable
- 10 amp AC or DC
- Fully shielded against RFI
- Voltage ranges from 0.1mV to 1000V AC & DC.

See your local VIZ distributor.



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Over 70 test instruments in the line

Circle (44) on Reply Card

Facts from Fluke on low-cost DMM's

Direct readings in decibels: Keeping track of your gains and losses.

If you'd rather forget about the last time you got wrapped up in an audio jungle, you'll want to respond to this ad.

Meet our new 4½-digit Model 8050A Multimeter — the first low-cost DMM with self-calculating dB features that let you keep your mind on your mission instead of on conversions and formulas.

While most analog meters read dBm referenced only to 600 ohms, the Fluke 8050A delivers direct readouts in decibels over a 108 dB range referenced to any one of 16 impedances (8 to 1200 ohms) with 0.01 dB resolution.

Push one button, and the microprocessor in the 8050A scrolls

through its reference impedances. Simply stop at the one that matches your system and get back to work. No more math; just action. And with the 8050A's relative reference feature you can measure gains or losses in dB throughout your system faster than you thought possible.

When you're dealing with voltage, current or resistance, an offset function provides a means of comparing stored inputs with all subsequent inputs, automatically displaying the difference. A real timesaver.

And there's more. True RMS measurements to 50 kHz; 0.03% basic dc accuracy; conductance (measures leakage and high resistance); extensive overload protection and safety features; a full line of accessories; and a low price of \$349 U.S.

For all the facts on how to maximize your gains with the 8050A, call toll free 800-426-0361; use the coupon below; or contact your Fluke stocking distributor, sales office or representative.



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Mountlake Terrace, WA 98043
(206) 774-4811
Telex: 152462

IN EUROPE:

Fluke (Holland) B.V.
P.O. Box 5053, 5004 EB
Tilburg, The Netherlands
(013) 673 973
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BE 4/80

- Please send 8050A specifications.
- Please send all the facts on Fluke low-cost DMM's.
- Please have a salesman call.

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Mail Stop _____

Company _____

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Ext. _____

For technical data circle no. 50

Transmitters Love Our Modulimiter.

The Competition Will Hate Your New Sound.

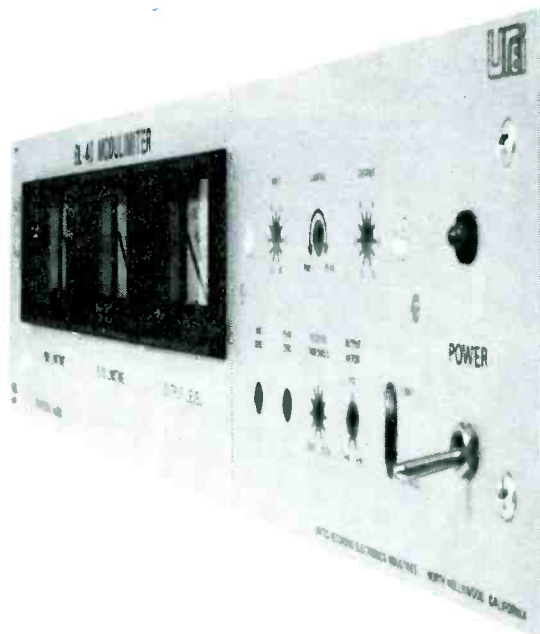
The BL-40 Modulimiter is a unique automatic AM broadcast limiter, which will maximize modern transmitter performance. Whatever your format—hard rock to classical, Modulimiter will increase transmitter efficiency and extend coverage.

The BL-40's patented electro-optical attenuator provides smooth, unobtrusive, true RMS limiting. An ultra fast F.E.T. peak limiting section assures absolute protection from unwanted over modulation without peak clipping. Attack time is essentially instantaneous.

Three separate meters indicate RMS LIMITING, PEAK LIMITING AND OUTPUT LEVEL, simultaneously. All critical adjustments are behind a front security panel. A "phase optimizer" maintains most favorable signal polarity permitting up to 125% positive modulation without negative undershoot. "Its the limit" in today's broadcast limiters. UREI quality of course.

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Circle (51) on Reply Card

Mutual Broadcasting System's satellite broadcast network.

The installations, made in the Eastern area of the US and accomplished under severe weather conditions, were reported as being smooth and routine. The terminals, which utilize 15-foot antennas erected on concrete pier foundations, were the first to be installed following the FCC's deregulation of small aperture receive-only earth terminals in October 1979.

Video Masters announces changes

Video Masters has moved its corporate headquarters to a new 22,000 square foot facility located at 1616 Broadway, Kansas City, MO. They will feature sales, service manufacturing, engineering and systems installation. Also, they have added a sales and full service branch at 119 Church Street, Suite 131, St. Louis, MO 63135, (314) 291-6620, (314) 524-1311.

Other news from the company reports that Don Higgins has been appointed branch manager in Omaha, NE.

Survey by Technics

Technics recently conducted research on the most-listened to US radio stations and their use of Technics direct-drive turntables. The results showed that 73 of the top 100 stations used Technics direct-drive turntables, or 6 to 1 over the nearest competitor. There are 11 commercial classical music stations in the top 10 markets; 10 of these 11 stations use Technics. In the top 20 markets, 12 out of 15 commercial music stations use Technics.

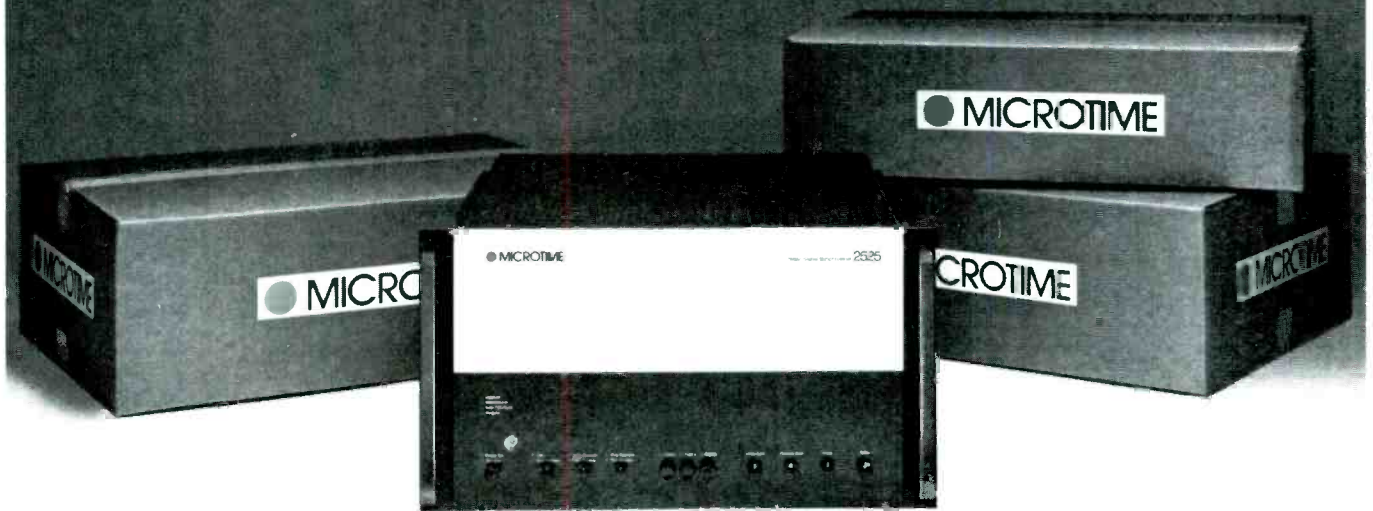
Tannoy push for greater share of US monitor market

The Audio Engineering Society Convention at the Los Angeles Hilton May 6-9, will mark the start of a major push by Tannoy of Great Britain to capture a greater share of the US studio monitor market.

David Bissett-Powell, international marketing manager professional products, and Alex Garner, technical manager, will be demonstrating the Buckingham and Super Red Monitors which use the Tannoy Dual Concentric driver for high power handling and sensitivity. The new, unique Tannoy X05000 Electronic Dividing Network with parametric equalizer will also be on show.

Bissett-Powell will also be seeking to establish marketing links in order to increase distribution in the US of

Microtime Introduces Intelligent Products For The 80's



Expanding on many years of digital processing experience and the successful 2525 Video Signal Synchronizer, Microtime has developed new products for the digital decade of the 80's.

These intelligent systems include

- Smart Proc Amps with Frame Stores
- Digital Effects
- Low Cost Synchronizers

The use of microprocessors, a choice of optional features that enhance capabilities, highly human engineered controls provide optimum cost performance ratios...intelligently.

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Tannoy monitors which are used by many leading recording studios around the world.

Video technology center to be separate corporation

Sony's Video Technology Center in Palo Alto, CA, the company's first research and development facility to be located outside Japan, has been upgraded to a separate corporation and named Sony Technology Center, Inc., it was announced today by Koichi Tsunoda, president of Sony Video Products Company in New York.

"The separate corporation was established to reflect a broader charter than video alone," Tsunoda said, "and is further made necessary by the fact that manufacturing responsibility is being added." The technology center was originally established as a division of Sony Video Products Company in 1977.

Joint venture forms new company

Anderson Laboratories announced the formation of a new company, Signal Technologies, Ltd., formed in a joint venture with the Plessey

Company, Ltd., (UK). The company is located in Swindon, England, and began operations on February 1, 1980. Signal Technologies will concentrate in the design, development, production, and marketing of SAW signal processing devices and sub-systems.

As a result of the pooling of the combined resources of Andersen Laboratories and Plessey, both Anderson and Signal Technologies now have an offering of over 200 standard SAW products. In addition, both companies will offer custom design capability capitalizing on the R & D activities in SAW which have been actively pursued in both the UK and the US for the last 10 years.

First editors roll from new plant

On December 14, 1979, over 45 days ahead of schedule, the first ECS-100 editing systems were shipped from Convergence Corporation's new remote manufacturing facility in El Paso, TX. Gary Land, vice president of operations at Convergence, said that the 18,000 square foot facility began operation in September 1979 and presently employs 25 people. An additional 35 employees are forecast by late 1980.

Datron expands facilities

Datron announced that it has acquired a new 61,000 square foot facility in Orange County's Tustin Industrial Complex to house the manufacturing and administrative operations of its Video Systems, Semiconductor Tester and Magnetics Groups, and its Shelly Associates Subsidiary. The new facility more than doubles the space currently occupied by these operations in two leased buildings located in Irvine and Anaheim, CA. The expanded facility is required to accommodate increased engineering and manufacturing activity in all of the company's product lines. Move-in is scheduled for mid-summer 1980.

Faroudja expands and sports new logo

Yves Faroudja, president of YFI, has announced the acquisition of new, larger facilities at 946 Benicia Avenue in Sunnyvale, CA 94086. At the same time, the corporate name has been changed to better reflect the range of development activities they are involved in. The new corporate logo is Faroudja Laboratories, Inc.

The new research and manufacturing facility was necessary to accommodate the growth in both

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automated broadcast controls

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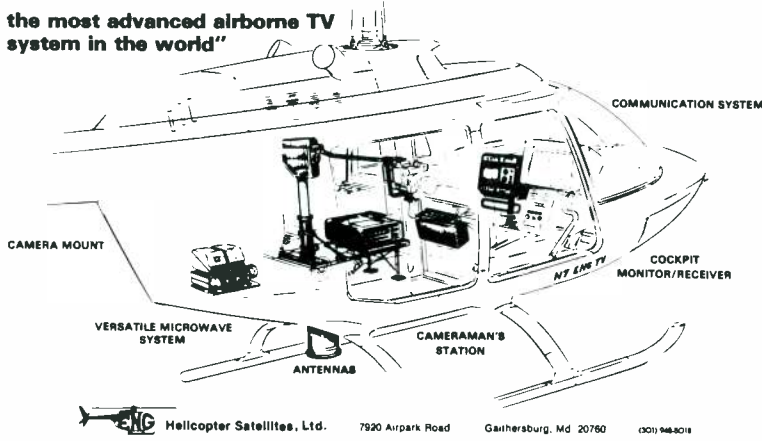
2501G 25 Hz Tone Generator 2501S/2504S Tone Sensors from Automated Broadcast Controls

Building or updating an automation system, Automated Broadcast Controls' 25 Hz Tone Generators and Sensors keep you in control. Each solid-state unit gives you all the flexibility and performance you'll ever need. And all the economy you'll ever want.

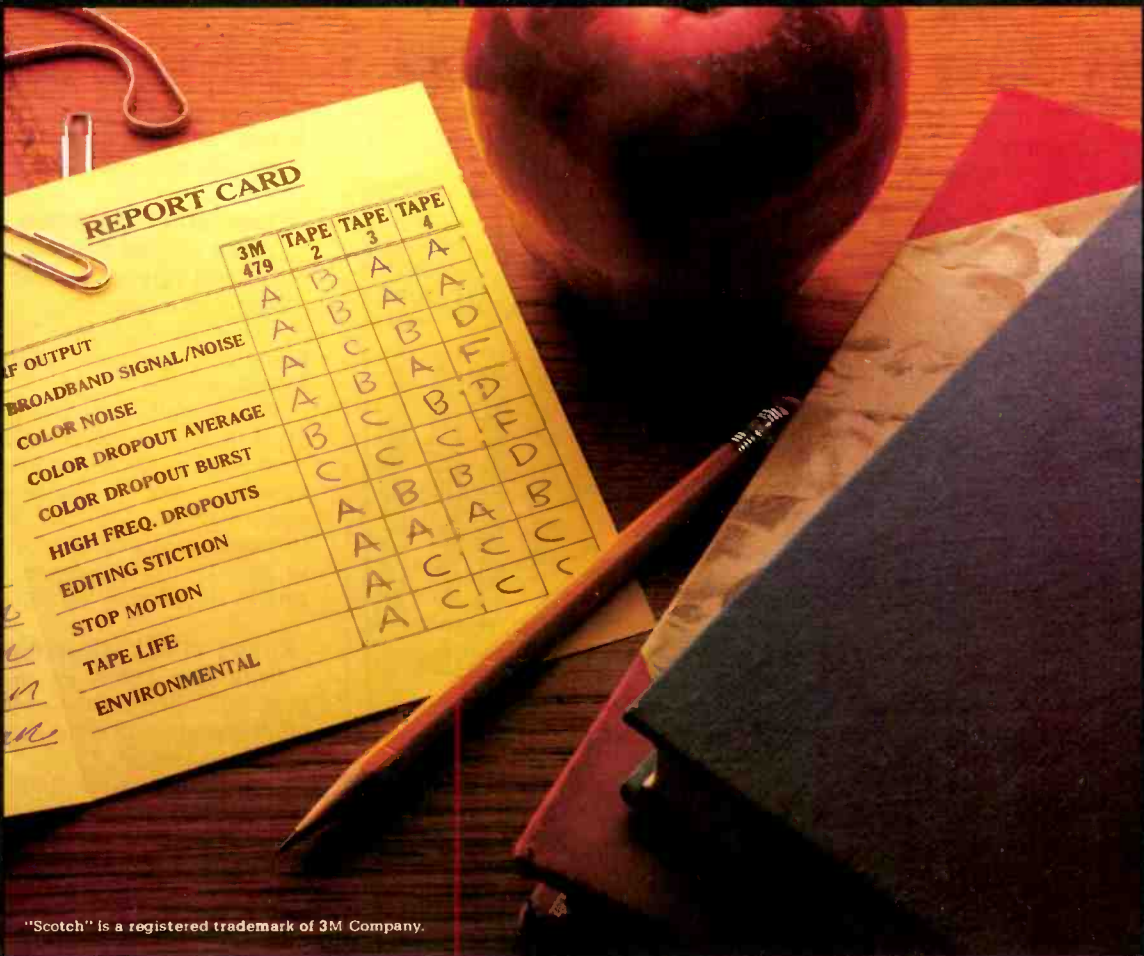
- 2501G**
Works from all audio sources
Eliminates bias pops and other noise
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Fixed tone alarm for source switching flexibility
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Integrated package of four separate modules sense tones
Relay outputs actuate/advance system

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"and now, live from ENG Helicopter Satellites
the most advanced airborne TV system in the world"



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"Scotch" is a registered trademark of 3M Company.

IN A TEST OF ONE-INCH VIDEO TAPES, WE ACED OUT THE COMPETITION.

When we tested the top four brands under strict lab conditions, the overwhelming performance leader was Scotch 479 Master Broadcast Video Tape. In fact, we came out on top in all ten performance categories.

If that isn't reason enough to make us your choice, maybe this is. We're the only one-inch supplier that winds your tape onto a special cushioned flange reel to protect against shipping and handling damage. And we pack and ship our tape in a flame-retardant case to give you even more protection.

We're the people who pioneered the development of video tape 25 years ago. And according to the pros who know video tape best, we're still the best video tape. Give or take an inch.



SCOTCH 479

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THE FIRST CHOICE YOU MAY NOT HAVE KNOWN YOU HAD!!!

FOR: Audio Op Amps, discrete or hybrid



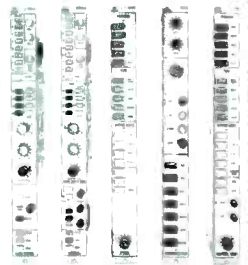
OR: Rack Mounting Self-contained units



OR: A series of Cards for 3 1/2" Card Frame — "IMPAC"



OR: Consoles



OR: Panel Mounting Components for new designs or retrofits



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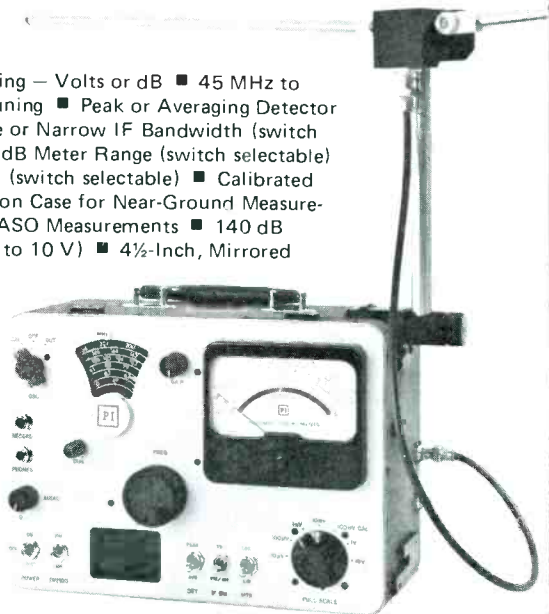
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NEW FM AND TV FIELD STRENGTH METER FIM-71

- Accurate — Direct Reading — Volts or dB ■ 45 MHz to 225 MHz — Continuous Tuning ■ Peak or Averaging Detector (switch selectable) ■ Wide or Narrow IF Bandwidth (switch selectable) ■ 20 dB or 60 dB Meter Range (switch selectable) ■ AM or FM Demodulator (switch selectable) ■ Calibrated Dipole Antenna, Mounted on Case for Near-Ground Measurements or Removable for TASO Measurements ■ 140 dB Measurement Range (1 μ V to 10 V) ■ 4 1/2-Inch, Mirrored Scale, Taut-Band Meter
- Front Panel Speaker
- Recorder Output
- Rugged, Portable Package ■ Calibrated Signal Generator, 45 MHz to 225 MHz
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Circle (55) on Reply Card

areas of business last year. The current space of 5000 square feet, up from 1500 square feet at the Los Altos building includes administrative offices and an expandable fabrication area where present product production includes comb filters, video enhancers and other video oriented devices.

Microdyne equipment selected for armed forces radio and television service

Microdyne has been awarded a contract by Satellite Transmission Systems to provide satellite receiving equipment.

The overall systems will be supplied to RCA American Communications and will be utilized by the American Forces Radio and Television Service to supply video entertainment programming via satellite to various international and domestic US military bases.

Prices affect equipment costs

With spot prices for gold soaring over \$800 per ounce at times, and other metals following suit, Varian's Electron Device Group has been forced to institute price adjustments. Its Communications Transistor Corporation unit employs precious metal surcharges, and its Eimac, Beverly, and Palo Alto Microwave Tube divisions are considering similar approaches. The nature of each product and the type and quantity of precious metals it utilizes will dictate the extent of surcharge or price increase.

Greater Star Link builds common carrier uplink in Detroit

Greater Star Link, a video common carrier in Detroit, has received authority to add uplink service to its present facility and is gearing up for Republican Convention coverage.

Two 10 meter antenna systems have already been installed and Scientific Atlanta has been awarded the contract for transmitters and associated equipment. A third antenna is slated for installation sometime this summer. The earth station has been frequency coordinated for all satellites and all transponders.

ERRATA

Through an error of BE, the full-page ad for Digital Video Systems on page 79 of our March issue carried the correct photograph of the DVS Digital Phaser but the incorrect text. Please consult May BE for the correct information.

Quality

is the only language we speak!

No matter where you are, performance is the one standard common to professional broadcasters the world over. Ampro/Scully has established a reputation for providing a complete line of professional studio equipment with service and sales outlets locally available.

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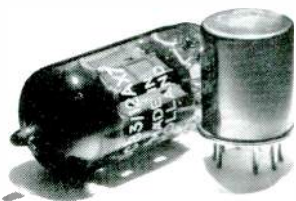
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April 1980 *Broadcast Engineering* 63

Sound Advice

The Problem: Selecting a first play-back stage, low noise tube for an Ampex Professional Audio tape recorder.

The Solution: Replace the tube with a VIF 1006 JFET device that has lower noise, higher amplification, and will last about 600 times longer than an equivalent tube without drift or aging.



The Price: \$33.00 each. Some Ampex models require an Adaptor, available at \$16.00 each.

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Circle (76) on Reply Card

new products

Report 200

Arriflex has announced first deliveries of their Arri 200W HMI light, the Report 200. The light features ac and dc operation through a modular power supply incorporating a square wave ballast for flicker-free operation. Dc operation is accomplished using quick chargeable, sealed Ni-Cad batteries. The lamphead is lightweight, focusable and can be hand-held or lightstand mounted. Accessories include barn doors, gel holders, dichroic filters and case.

Circle (80) on Reply Card

Broadcast processors

Orange County Electronics has announced the availability of the VS-2 AM stressor and the VS-3 FM dynamic range processor. These two dedicated broadcast processors feature simplified front-panel design with maximum flexibility inside the unit for tailoring the parameters of limiting, compression and expansion. Both units have input and



output controls and a meter showing overall gain reduction on the front panel. Inside the units, however, are mini-dip switches which allow the user to change the compression ratio, threshold, attack and release time.

Circle (81) on Reply Card

Precision amplifier series

The MicroAmp series, a line of compact, high performance stereo turntables, dual microphone and dual line amplifiers has been introduced by ATI. All units in the series utilize the first integrated amplifier designed especially for audio applications. The result is high output

WXXX-TV
 COMPUTERIZED WEATHER

DAY	TIME	DATE
MON	12:47:23	6/22
TEMP	HI	LO
78	83	71
WIND	FROM	GUSTS
11	SSE	15
TONIGHT	PARTLY	CLOUDY
TOMORROW	CHANCE OF RAIN	
	TURNING TO SNOW	
	TOMORROW'S LOW	25

CHARACTER GENERATOR DISPLAY OF HEATHKIT® WEATHER COMPUTER

Live local weather information direct from the HEATH DIGITAL WEATHER COMPUTER and displayed on the BEI "MARQUEE" CG-800 character generator.

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Regardless of whether your programs originate from another city, a local sporting event, or an ENG assignment, your video transmission links have to maintain the same high quality standards. Day in and day out.

No manufacturer of video transmission equipment is more aware of that fact than Farinon Video. That's why we offer the finest lines of microwave radios, receivers, and related video transmission equipment available.

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- FV-F Series Heterodyne Microwave Radios provide almost transparent signal transmission in all available spectrum allocations worldwide.
- FV40 Transmission Equipment provides extreme flexibility for conditioning video and audio signals applied to any transmission medium.
- FV43 Audio Transmission Channel System allows simultaneous transmission of high fidelity mono or stereo sound with the video signal.

Remote Pick-Up Links

- FV-P Series Portable Microwave Radios offer frequency agility, fingertip tuning and rugged construction.

ENG Links

- FV-MP Series Miniature Portable Microwave Radios are extremely lightweight, compact, and completely self-contained.
- FV-MF Series Miniature Microwave Radio Transmitters provide a high degree of flexibility for airborne or vehicular installation.
- FV-CR Series Central Receivers feature synthesized channel selection, unsurpassed dynamic range, superior selectivity, and excellent inherent RFI protection.

To satisfy the particular requirements of your system, we also offer a variety of ancillary equipment, including low-noise preamplifiers, power amplifiers, and portable test units.

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with lowest noise and minimum harmonic and TIM distortion.

Circle (82) on Reply Card

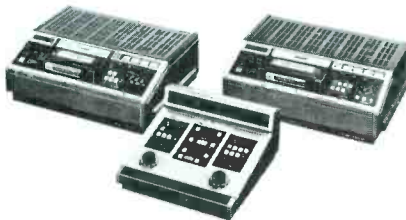
Return loss bridge

Hedco has introduced their 75 Ω return loss bridge (RLB-1), a simple to use self-contained bridge/attenuator that requires no power and uses a standard oscilloscope and signal source. Readings are fast and accurate through the use of direct reading switches on the front panel. Initial setup adjustments compensate for selected signal sources over the frequency range of 30kHz to 6MHz with a measurement range of 20dB to 62dB of return loss.

Circle (83) on Reply Card

Videocassette editing system

Panasonic Video Systems has introduced its next generation high performance $\frac{3}{4}$ -inch videocassette editing system that offers high-quality video, system versatility, timesaving edit, precision editing and reliability. The system, designed for



$\frac{3}{4}$ -inch video, consists of the direct-drive NV-9240 recorder, NV-9600 editing/production recorder and NV-A960 editing controller. All units offer selectable voltage operation (110, 120, 220, 240V), 60/50Hz.

Circle (84) on Reply Card

Video switcher

AVL Digital's model VAS-10 is a self-contained broadcast-quality audio-follow-video switcher. Compact in size, the unit is ideal as an



input selector for use as a monitor switcher. Video switching is in the vertical interval, by means of a signal derived from the outgoing video. Video inputs are bridging loop-through. Input expansion is accomplished through the use of an internal eleventh crosspoint and control to allow up to 10 frames to be interconnected.

Circle (85) on Reply Card

Portable camera lights

Two lightweight 14-ounce all metal construction Frezzi-Lite camera lights have been introduced by **Frezzolini**. These portable lights are for the motion picture and television broadcast industries. The model FL-250 includes a 1-hand control thumbwheel focusing light, choice of one 150, 250 or 350W tungsten-halogen 30V, 3400°K bulb, removable swing-away dichroic filter, perma-

... a legacy of innovation ...

He's been our hero for a long time, that father of modern innovation, Benjamin Franklin. Through his example and Moseley's dedication to broadcasting we've built a reputation for being first in the industry. Moseley finds itself jumping into the forefront once again with a new line of audio processing equipment, engineered with the quality today's listeners demand.

The TAL-320 AM Audio Limiter brings AM broadcast sound to the quality level it deserves. With the advent of AM stereo, Moseley offers a product that maximizes the AM station's modulation while minimizing those undesirable by-products commonly associated with audio processing. The TAL-320 does just that.

Moseley's TFL-280B FM Audio Limiter, in service around the world, allows TV and FM stations loudness and clarity without distortion caused by old-fashioned clippers. Built-in 15 kHz audio lowpass filtering provides protection to the pilot and subchannels.

The TGR-340 Audio Gain Rider complements these limiters perfectly by subtly riding gain on the program line. A recovery-enabling gate freezes the gain-riding activity during pauses in program, preventing background noise from creeping up or fading down. Switchable, treble AGC cleanly solves the problem of STL, satellite-feed or tape-deck overload due to the pre-emphasis in those items.

The TAL-320, the TFL-280B and the TGR-340 join the Moseley family of products responding to today's needs in the broadcast industry. If listener fatigue is of concern, consider the Moseley audio line.

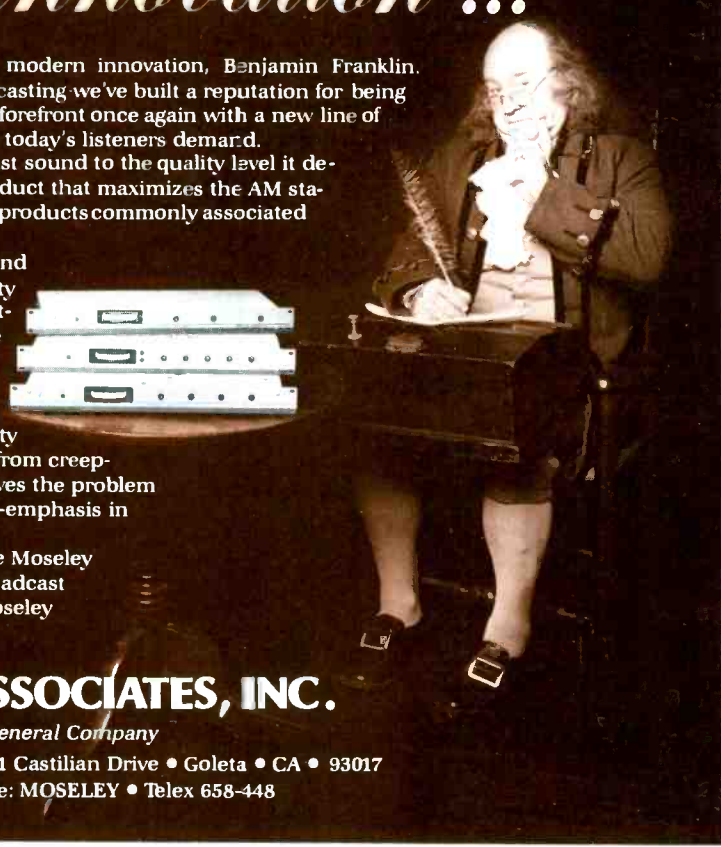
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If you're in television production or radio syndication, you've probably already heard something about the impact digital audio will have on your business.

The question is, do you take advantage of the technology now or wait until you have to catch up with your competitors?

Sony has a remarkable new piece of equipment that provides the answer.

INTRODUCING THE PCM-100. UNTIL WE CAME ALONG, YOU COULDN'T GET SOUND THIS PERFECT.

The Sony PCM-100 two-channel digital audio processor is especially suited to all television and radio broadcast production.

It offers a dynamic range greater than 85 dB. And you get flat frequency response from DC-20,000 Hz, with harmonic distortion at just 0.03%. That's a 30% improvement over most analog equipment.

The PCM-100 also lets you record separate takes and edit them again and again, without the slightest signal degradation. And you use the PCM-100 with either a U-matic or Betamax video recorder: machines that are already being used in the industry.

Furthermore, Sony people will help adapt the PCM-100 especially to your needs and even train your people in using it to its best advantage.

YOU'RE JUST A FEW DIGITS AWAY FROM THE DIGITAL REVOLUTION.

When used in simulcast applications, the PCM-100 produces a transparent sound unequaled by analog equipment.

When you master tapes for syndication, it lets you make each copy identical to the original live performance.

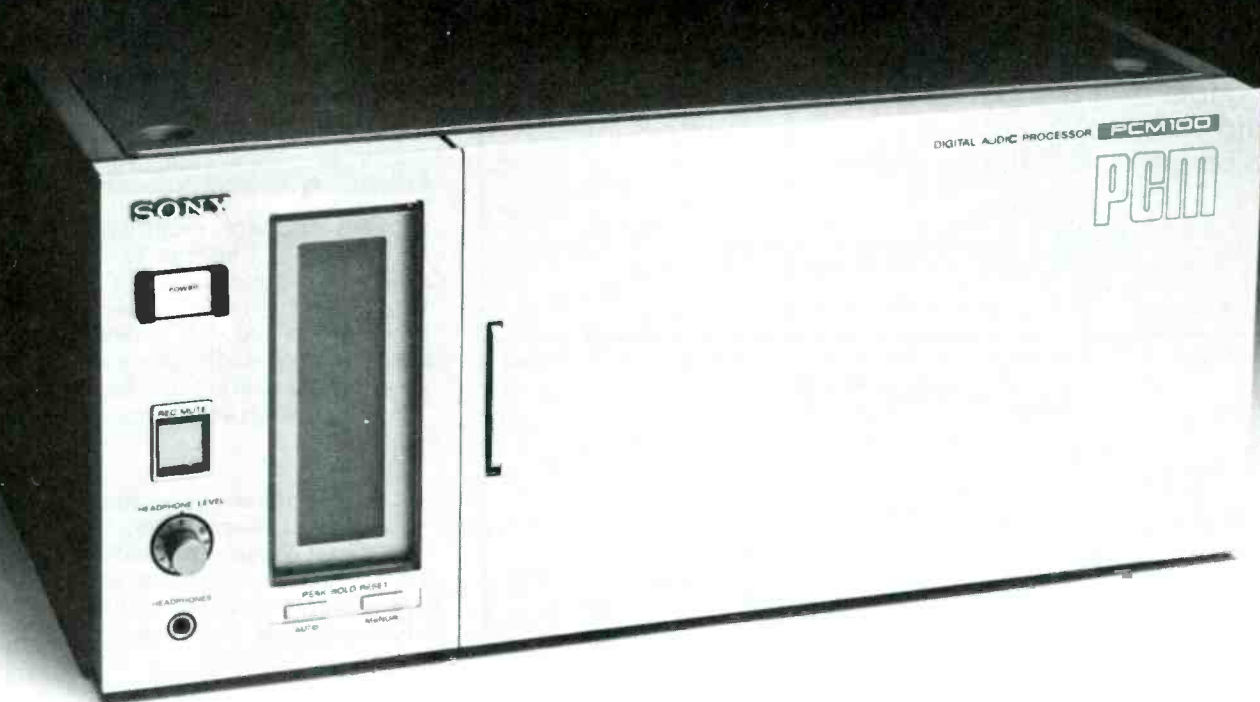
And the PCM-100 helps provide the software in demand for stereo television and video/digital audio disc players.

Of course, nothing you read will convince you of the superiority of the PCM-100 as much as your ears will.

So pick up the phone today, and call Sony Digital Audio for a demonstration. In New York, call Nick Morris at (212) 371-5800. In San Francisco, Roger Pryor at (415) 467-4900. And in Los Angeles, Rick Plushner **SONY** Digital Audio at (213) 537-4300.

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The Dictaphone 4000 Logger, a complete broadcast recording-retrieval system, is the answer to a radio station's need to know. And show.

Now, from one dependable unit, you get an automatic, around-the-clock record of all essential broadcast information. It's all there, ready for quick retrieval and replay. So if advertisers want proof that their commercials are running on schedule or if the FCC wants to check your station breaks or public service announcements, you've got it all. On the record.

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For more information on the 4000 Logger, fill in this coupon or call toll-free:

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Circle (62) on Reply Card



nently-attached 5-foot (1.52m) long cable which terminates in a standard Amphenol 2-pin female plug. The model FL-100 is similar, except for 100W 11.5V bulb and cable termination in a standard Amphenol 3-pin female plug.

Circle (86) on Reply Card

Computer software systems

Interactive Market Systems has created a wide variety of computer software systems for ad agencies, newspapers, magazines and the radio and TV industry. The IMS system is the only one with the



capacity to store programs within the calculator from run to run. The system, a combination of the Hewlett-Packard H-P41C calculator system and the CAL-100 system which features four media planning modules, can be carried in a briefcase.

Circle (87) on Reply Card

Test pattern generators

The Signal Source 1205, 1206 and 1208, from **Visual Information Institute**, are new selectable scan rate test pattern generators that allow rapid switching from one scan rate

BROADCAST MAINTENANCE/TROUBLESHOOTING SEMINARS

For Radio and TV Broadcast Engineers and Technicians

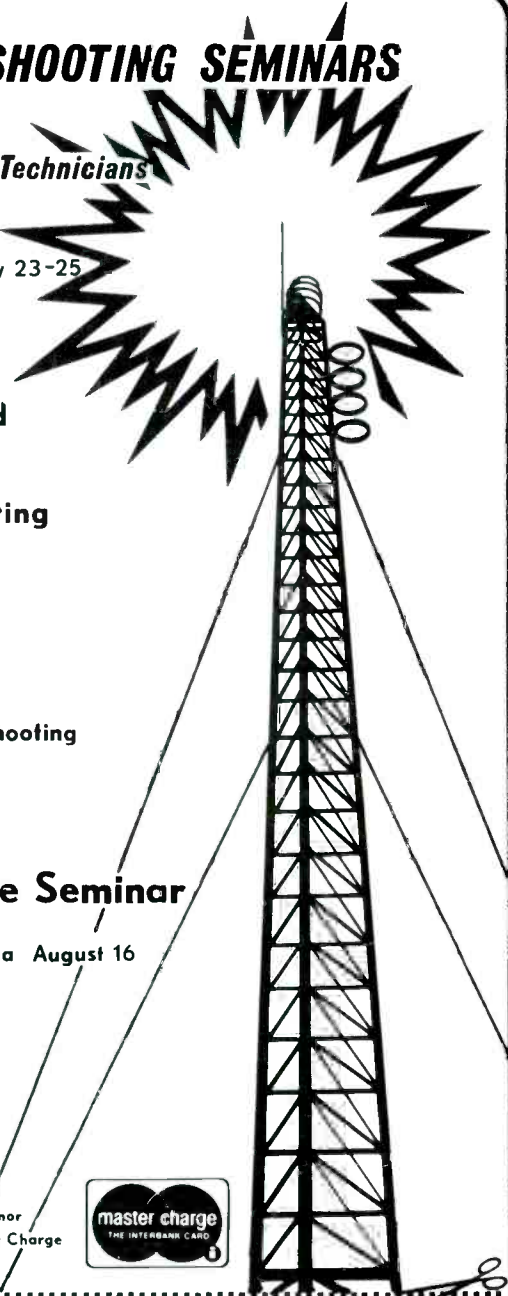
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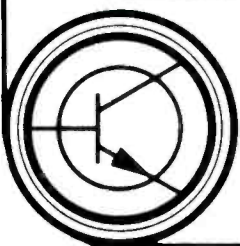
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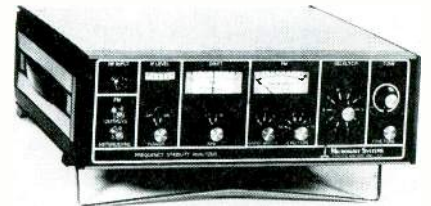
be of value in television format testing of monochrome or RGB systems. The instruments are housed in a cabinet convenient for laboratory bench use.

Circle (88) on Reply Card

Frequency stability analyzer

A frequency stability analyzer that provides direct measurement of microwave oscillator short and long-term frequency stability has been introduced by **Microwave/Systems**. Features include selection of modulation (FM disturbance) bandwidth; FM disturbance waveform and het-

to another without instrument recalibration. Scan rate is selected by front panel thumbwheel switch, with no necessity for internal programming. These instruments can operate at virtually any scan rate, interlaced or non-interlaced. They provide all the functions known to

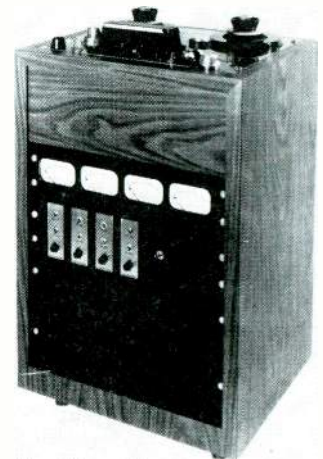


erodyne predetected outputs for fine-grain spectrum analysis; and drift and deviation meter reading outputs for long-term recording.

Circle (89) on Reply Card

Low cost rack

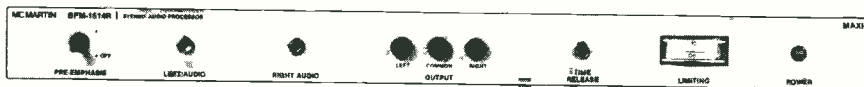
Ruslang has developed a low-cost versatile, studio quality electronic rack cabinet designed to accept tape decks 19-inches wide by up to 21 inches deep. The RL200 tape transport console comes wholly as-



sembled and is available with easy-rolling casters to provide operating flexibility. It is built with standard EIA tapped steel rails that facilitate attachment of electronic equipment. Overall height is 31¾ inches without casters, with a front opening that measures 19 inches wide.

Circle (90) on Reply Card

Your Broadcast Signal can be Louder and Clearer with a MAXI-1 monaural or stereo processor



BFM-1514R Stereo Processor



BFM-1515R Monaural Processor

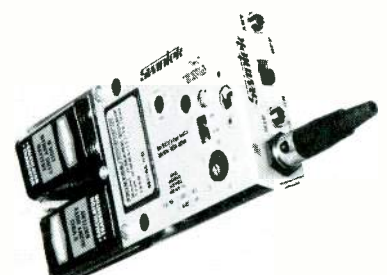
Now there's a McMartin Maxi-1 audio processor for **every** station: AM, FM, TV — even SCA and CATV. Stand alone audio processing with sophisticated gain control totally free of the annoying effects of clipping. A Maxi-1 can increase your station's loudness while giving you a signal that's cleaner and clearer than that from any other processor.

Model BFM-1514R for stereo, BFM-1515R for monaural.

"McMartin is What You've Been Looking For"

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ENG system
Swintek has announced the availability of its new ENG system. The electronic news gathering system features a new and innovative 20dB

The Audio-Technica philosophy:

EQ should be used to improve the sound... not to fix the mike!

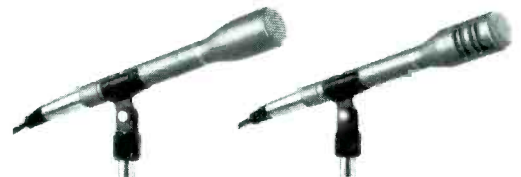
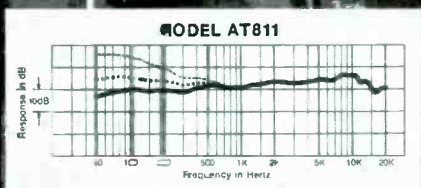
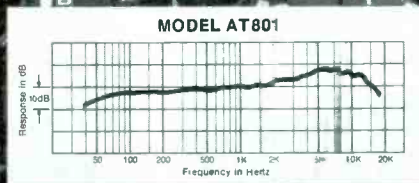
Introducing affordable smooth sound. The remarkable AT801 and AT811 Electret Condensers. With curves so smooth you would have to pay a bundle to match them anywhere else.

Response like this has a number of benefits. First, your EQ is used only to touch up the sound, not to correct built-in errors of the microphone. Which leaves more leeway to control the overall sound.

And without unwanted peaks you have more usable headroom. That's vital when you're working near the dynamic limit of a preamp or line amp. Sound stays clean and sharp. Compressors or limiters sound less forced, because they are controlling peaks in the *sound*, not peaks in the *mike!*

But perhaps the biggest advantage is the versatility of these A-T condensers. Because they have just the right amount of presence for today's recordings, they're not limited to just one kind of instrument...just one type of voice. Put them *anywhere* in the mix: brass, reeds, percussion, chorus, or strings. Then listen. What you hear in the studio you'll hear at the console. Which is a great place to start in miking any session.

At their highly affordable prices, these are two of the best bargains you'll find these days. Reliable, clean-sounding, and the most predictable microphones you can use. Make them a mainstay in your studio today. Write for spec sheets and dealer list.



Model AT801 Omnidirectional Electret Condenser

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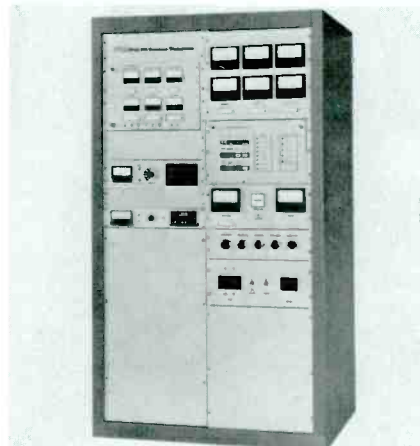
Circle (65) on Reply Card

gain microphone pre-amp for level transmission requirements. The system also features two standard 9V batteries, which will give the user approximately 15 hours of continuous operation.

Circle (91) on Reply Card

CCA transmitter

An FM transmitter that gives broadcast stations significant savings through new design features was announced by **CCA Electronics**. The ST-25 was designed for opera-



tional economy. The use of a single power amplifier tube, which is a high efficiency tetrode, results in substantial savings in both tube replacement costs and power consumption.

Circle (92) on Reply Card

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V-SWITCHER INDUSTRIES Inc.

Circle (66) on Reply Card

Hand-held wireless mics

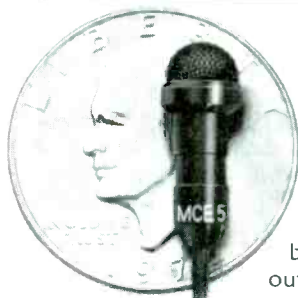
Cetec Vega has announced two hand-held wireless microphones designed for superior sound quality without a mic cable. The model 80 is equipped with an Electro-Voice EV-671 mic capsule, and the model



81 utilizes a Shure SM-58 capsule. Both models use a standard 9V alkaline battery, offering from 7 to 9 hours continuous use, and a range of up to 1000 feet.

Circle (93) on Reply Card

This newsman is wearing two Beyer MCE-5 microphones. Find them; you might win them.



Not too long ago, the man in front of the camera was often hidden behind the microphone.

Now you can hide the microphone.

The new 6.5 gram electret condenser Beyer MCE-5 measures just 7 x 23 mm, yet it's a true broadcast-quality transducer that outperforms many of the giants.

Frequency response is guaranteed 20 - 20,000 HZ ± 3dB and SNR is 62dB. Pickup pattern is omnidirectional, with or without the detachable metal windscreen which reduces wind noise by 20 dB. Impedance of the MCE-5 is 700 ohms and EIA sensitivity is -142dBm with a maximum input of 116dB SPL. A special highly charged back electrode converter gives the MCE-5 a high output of -49dBm, unmatched in a mic of this size.

The MCE-5 can be connected directly to a Beyer pocket-size wireless transmitter, or an optional battery pack for use with 12 or 48 volt phantom power lines. Two special versions of the MCE-5 accept 5.6 volt batteries in their connectors for direct connection to any amplifier or recorder.

Voice quality is excellent, when used indoors or out. And the frequency is contoured to eliminate chest and clothing noises.

The MCE-5's dark matte finish won't reflect even the hottest studio lights, and its tiny size makes it easy to conceal or camouflage, like on the newsman in our photograph.

Ten Microphones Awarded! Take a good look. Study him closely and tell us where you think the mics are. If you're right, your entry will be part of a random drawing and you

may win one of five pairs of MCE-5s. (Each MCE-5 normally sells for \$160.)

Send this entry form (or a photocopy) to "Contest" c/o Burns Audiophonics, at the address below. Enter as often as you wish, but only one coupon per envelope. All entries must be received by June 1, 1980. No purchase is necessary. Contest is not open to employees of Burns Audiophonics, its sales representatives, dealers or distributors.

Winners will be announced in professional broadcast publications, or for a list of winners, send a self-addressed stamped envelope to Burns after June 1, 1980.

I think the Beyer MCE-5 microphones are hidden _____
and _____

Name _____

Title _____

Station _____

Address _____

City _____

State _____ Zip _____

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BE-4

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The most compact lens there is with a complete range of accessories for all applications.

15× Wide Angle 1.7/8.5–125
 with ×2 Range Extender

The widest horizontal angle of view 53° without attachments, focal lengths to 250 mm with ×2 flip-in range extender.

20× Standard 1.4/12–240

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30× Standard 1.4/11–330
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 30× Standard 2.1/20–600
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TV-Lenses for cameras with 1" pick-up tubes

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 20× Standard 2 /17–340
 11× Studio 1.7/14–150.
 15× Wide Angle 1.7/12.5–190
 30× Wide Angle 1.7/12.5–375
 30× Standard 1.7/16–480
 30× Tele/OB 1.7/26–800

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**meetings,
 events,
 & seminars**

May 3—The topic for the 1980 Midwest Acoustics Conference will be "Microphone Techniques for Recording and Broadcasting." The Conference will be held at Hermann Hall, Illinois Institute of Technology, Chicago, IL. For additional information contact Tony Tutins, Knowles Electronics, 3100 North Mannheim Road, Franklin Park, IL 60131 (312) 455-3600.

May—Peirce Phelps has scheduled its 12th Annual Video Forum to take place in Philadelphia May 6-8 and in Washington, DC May 13-15. There is no charge for admission; requests for invitations or additional information may be sent to Teresa Fuller, 2000 Block North 59th Street, Philadelphia, PA, (215) 879-7175.

May—Several meetings are being scheduled by the National Association of Educational Broadcasters. May 5-7, Television lighting workshop, Madison, WI; May 5-7, Television directing workshop, Madison, WI; May 5-7, Electronic field production, Madison, WI; May 21-23, The program decision making process, Toronto, Ontario, Canada; May 21-23, Producing film for TV, Toronto, Ontario, Canada; May 22, Formative evaluation of television projects: Look before you leap, Toronto, Ontario, Canada; May 29-30, Political broadcasting, personal attack and the fairness doctrine, Salt Lake City, UT; May 29-31, Television directing workshop, Salt Lake City, UT; May 29-30, The care and nurturing of on-air promotion, Salt Lake City, UT. For more information contact the NAEB at 1346 Connecticut Ave., NW, Dept. BE, Suite 1101, Washington, DC 20036.

May 6-8—The 66th Audio Engineering Society Convention will be held at the Los Angeles Hilton, Los Angeles, CA. Contact Carolyn Davis, Synergetic Audio Concepts, P.O. Box 427, Dept. BE, Tustin, CA 92680, telephone (714) 838-2288, for further information.

May 18-21—The National Cable Television Association annual convention is being held at the Convention Center in Dallas, TX.

June 3-7—The 29th annual convention of American Women in Radio and Television is being held at the Hilton Palacio del Rio and San Antonio Marriott in San Antonio, TX.

June 11-15—Broadcasters Promotion Association is having their 24th annual seminar at the Queen Elizabeth Hotel in Montreal.

June 18—The first major Danish demonstration of Confravision-Video-Teleconference will be given at the Bella Center in Copenhagen in connection with EuroComm 80 which will be held at the Bella Center from June 17-19.



THE STATION WITH A STUDER HAS A REPUTATION TO MAINTAIN.

Like Chicago's superstation WFMT, whose demand for uncompromised excellence led them to specify Studer decks for all their broadcast and syndication operations. People who know what quality is worth know they can't afford less than a Studer.

Broadcasters will find the Studer B67 of special interest. Portable enough to take on remotes, it's built to the Studer standard for chassis integrity: plugging in a new headblock requires no mechanical realignment. Three-speed operation, with quartz-crystal servo-locked capstan, and continuously adjusted tape tension servo-control reel motors are standard. So is a digital tape timer that reads positive or negative real time at all

speeds and in all operating modes to an accuracy of 0.5%.

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

If your station is good enough to warrant a B67, call us.

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new literature

Videotaped training course

Datatron—The availability of a videotaped training course on the operation and maintenance of its Tempo 76 videotape editing system has been announced. Produced in full color, the course is being offered in ¾-inch format on a series of eight cassettes. The complete set of eight tapes is priced at \$1150; individual course segments are priced at \$350 per tape.

Circle (100) on Reply Card

Solid-state brochure

Cherry Electrical Products—A 14-page brochure contains an introduction to solid-state capacitive keyboards and valuable application data. Specifications, detailed block diagrams and schematic charts give a concise description of these advanced design keyboards.

Circle (101) on Reply Card

Capabilities brochure

Loral—TerraCom, a division of Loral, has introduced its new capabilities brochure. The illustrated, 4-color, 12-page brochure describes the firm's line of tunable microwave and digital multiplexers, production facilities and R&D and quality control programs.

Circle (102) on Reply Card

Guide book

Narda—A detailed 16-page guide book offers technical information, product specifications, applications data and outline drawing for the company's complete line of amplifiers.

Circle (103) on Reply Card

Radio Amateur's Handbook

American Radio Relay League—The newly expanded edition of the Radio Amateur's Handbook for communications professionals and ham radio hobbyists is available. Prices for the soft cover are \$10 in the US, \$11 in Canada and \$12.50 elsewhere. Cloth bound are \$15.75 in the US, and \$18 in Canada and elsewhere.

Circle (104) on Reply Card

Broadcast news doctors

American School of Communications—Surveys conducted by the 1979 graduate broadcast journalism students at the American University indicate that so-called news doctors have become an accepted institution. Copies of the research are available at \$7 to cover printing and postage.

Circle (105) on Reply Card

Emmy Awards directory

Academy of Television Arts & Sciences—The Emmy Awards Directory, which includes all the nominees and winners in both the Primetime national contests and the Los Angeles area contests since 1977, is now available. The directory is complimentary to Academy members upon request, and to all others for \$3.

Circle (106) on Reply Card

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advertisers' index

ADM.....	33, 53
AKG Acoustics.....	47
Ampex.....	17
Ampro/Scully.....	63
Audio Technica, U.S. Inc.....	71
Automated Broadcast Controls.....	60
Beaveronics.....	50
Belar Electronic Labs.....	60
Beston Electronics Inc.....	64
Bosch Fernseh.....	39
Bright Electronics.....	46
Broadcast Electronics.....	1
Burns Audiotronics.....	73
Cetec Broadcast Group.....	9
Cetec Vega.....	IFC
Cinema Products Corp.....	15
Circuit Research.....	43
Commerce Airborne.....	10
Cortland Line Co.....	14
Peter W. Dahl, Inc.....	77
Data Industrial Corp.....	16
Dictaphone Corp.....	68
EMT-Franz GmbH.....	74
ENG Helicopters Satellites, Ltd.....	60
ES Enterprises.....	54
Eddor.....	31
Electro-Voice Inc.....	42
Farinon Video.....	65
John Fluke Mfg. Corp.....	57
Garner Industries.....	10
HM Electronics.....	72
Harris Corp.....	18, 19
Hitachi Denshi America Ltd.....	2, 3, 7
Ikegami Electronics.....	27, 29
Inmark Corp.....	20
James B. Lansing Sound Inc.....	21
Leitch Video Ltd.....	IBC
Liaison.....	69
3M Magnetic Tape Div.....	61
3M Mincom Div.....	25
Matthews Studio Equipment.....	45
Maxell Corp. of Am.....	49
McMartin Industries.....	70
Microtime Inc.....	59
Modular Audio Products.....	62
Mosley Associates.....	66
NEC America.....	13
Opamp.....	77
Otari.....	37
Panasonic.....	51
Polyline Corp.....	77
Potomac Instruments.....	62
Rupert Neve.....	11
Jos. Schneider.....	76
Shure Brothers Inc.....	5
Sigma Systems Engineering.....	64
Sintronic.....	48
Sitlers Supplies Inc.....	77
Sony Corp.....	34, 36, 67
Standard Tape Lab.....	46
Stanton Magnetics Inc.....	36
Studer ReVox America Inc.....	75
Tektronix Inc.....	41
Telex Communications Inc.....	6
UREI.....	58
Ultra Audio Products.....	30
Utah Scientific.....	55
VIF.....	64
VIZ Mfg.....	56
Viscount Industries Ltd.....	72
Ward-Beck Systems Ltd.....	BC
Wilkinson Electronics, Inc.....	12 52

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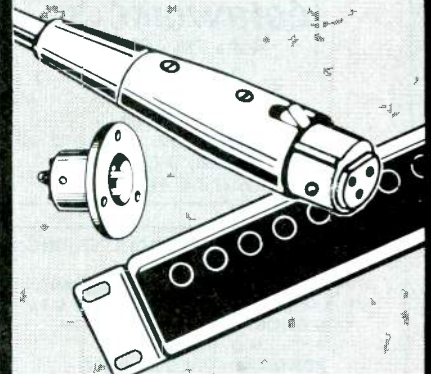
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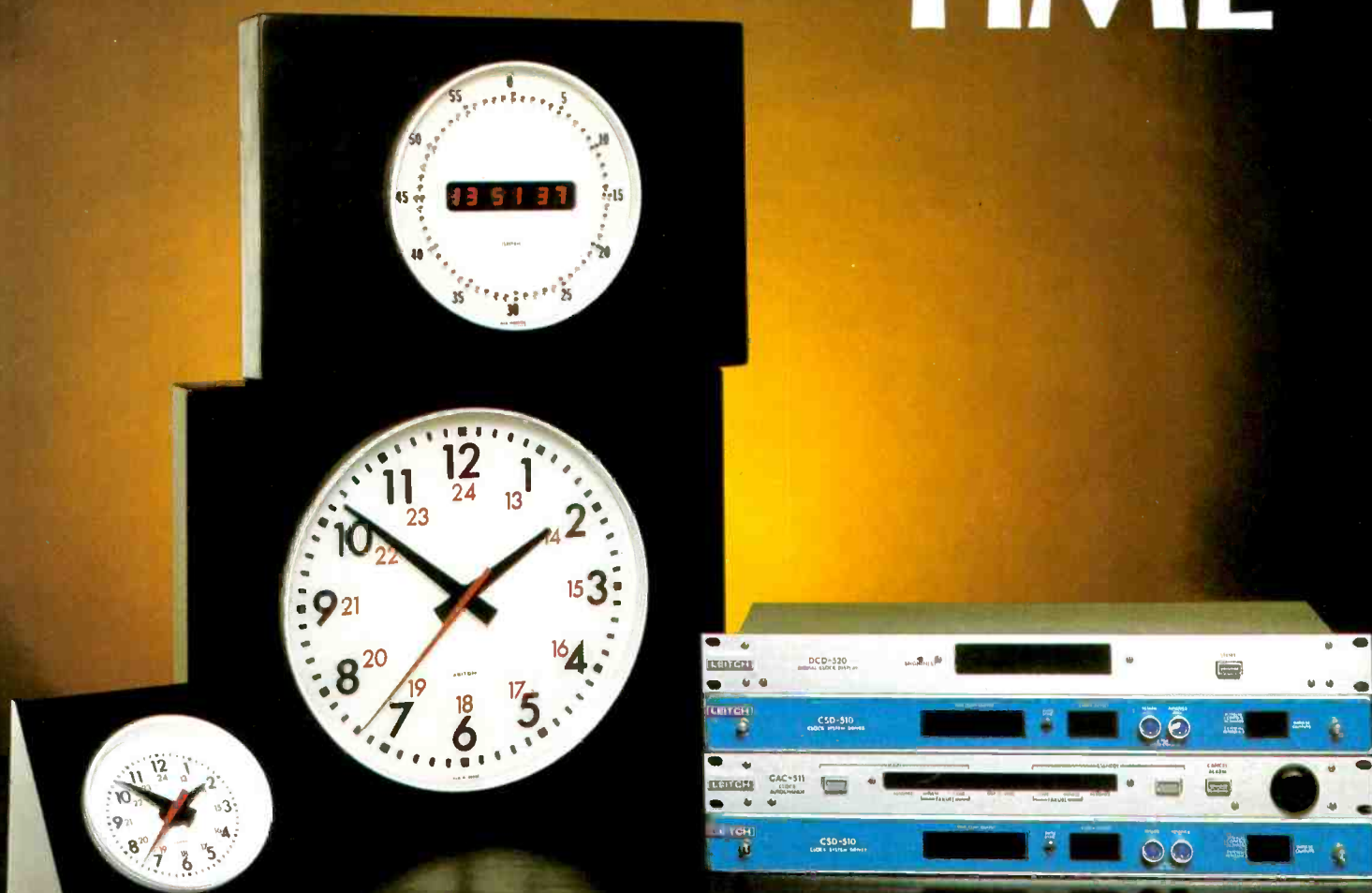
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